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**ELECTIVES FOR MECHANICAL AND AUTOMATION ENGINEERING**

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### VII SEMESTER

#### Elective – II

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<td>Design of Jigs, Fixtures and Press Tools</td>
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### VIII SEMESTER

#### Elective – IV

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#### Elective – V

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<td>Human Rights</td>
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OBJECTIVES:

- To enable learners of Engineering and Technology develop their basic communication skills in English.
- To emphasize specially the development of speaking skills amongst learners of Engineering and Technology.
- To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom.
- To inculcate the habit of reading and writing leading to effective and efficient communication.

UNIT I

9+3
Listening - Introducing learners to GIE - Types of listening - Listening to audio (verbal & sounds); Speaking - Speaking about one’s place, important festivals etc. – Introducing oneself, one’s family / friend; Reading - Skimming a reading passage – Scanning for specific information - Note-making; Writing - Free writing on any given topic (My favourite place / Hobbies / School life, etc.) - Sentence completion - Autobiographical writing (writing about one’s leisure time activities, hometown, etc.); Grammar - Prepositions - Reference words - Wh-questions - Tenses (Simple); Vocabulary - Word formation - Word expansion (root words / etymology); E-materials - Interactive exercises for Grammar & Vocabulary - Reading comprehension exercises - Listening to audio files and answering questions.

UNIT II

9+3
Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking and answering questions - Telephone skills – Telephone etiquette; Reading – Critical reading - Finding key information in a given text - Sifting facts from opinions; Writing - Biographical writing (place, people) - Process descriptions (general/specific) - Definitions - Recommendations – Instructions; Grammar - Use of imperatives – Subject-verb agreement; Vocabulary - Compound words - Word Association (connotation); E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III

9+3
Listening - Listening to specific task - focused audio tracks; Speaking - Role-play – Simulation - Group interaction - Speaking in formal situations (teachers, officials, foreigners); Reading - Reading and interpreting visual material; Writing - Jumbled sentences - Coherence and cohesion in writing - Channel conversion (flowchart into process) - Types of paragraph (cause and effect / compare and contrast / narrative / analytical) - Informal writing (letter/e-mail/blogs) - Paraphrasing; Grammar - Tenses (Past) - Use of sequence words - Adjectives; Vocabulary - Different forms and uses of words, Cause and effect words; E-materials - Interactive exercises for Grammar and Vocabulary - Excerpts from films related to the theme and follow up exercises - Pictures of flow charts and tables for interpretations.

UNIT IV

9+3
Listening - Watching videos / documentaries and responding to questions based on them; Speaking - Responding to questions - Different forms of interviews - Speaking at different types of interviews; Reading - Making inference from the reading passage - Predicting the content of a reading passage; Writing - Interpreting visual materials (line graphs, pie charts etc.) - Essay writing – Different types of essays; Grammar - Adverbs – Tenses – future time reference; Vocabulary - Single word substitutes - Use of abbreviations and acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

UNIT V

9+3
Listening - Listening to different accents, Listening to Speeches/Presentations, Listening to broadcast and telecast from Radio and TV; Speaking - Giving impromptu talks, Making presentations on given topics; Reading - Email communication - Reading the attachment files having a poem/joke/proverb - Sending their responses through email; Writing - Creative writing,
Poster making; Grammar - Direct and indirect speech; Vocabulary - Lexical items (fixed / semi fixed expressions); E-materials - Interactive exercises for Grammar and Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents - Interpreting posters.

**TOTAL (L:45+T:15): 60 PERIODS**

**OUTCOMES:**
Learners should be able to
- Speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies.
- Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
- Read different genres of texts adopting various reading strategies.
- Listen/view and comprehend different spoken discourses/excerpts in different accents

**TEXTBOOKS:**

**REFERENCES:**

**EXTENSIVE Reading (Not for Examination)**

**WEBSITES:**

**TEACHING METHODS:**
- Lectures
- Activities conducted individually, in pairs and in groups like self introduction, peer introduction, group poster making, grammar and vocabulary games, etc.
- Discussions
- Role play activities
- Short presentations
- Listening and viewing activities with follow up activities like discussion, filling up worksheets, writing exercises (using language lab wherever necessary/possible) etc.

**EVALUATION PATTERN:**

Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like
- Project
- Assignment
- Reviews
- Creative writing
• Poster making, etc.

All the four skills are to be tested with equal weightage given to each.

- Speaking assessment: Individual speaking activities, Pair work activities like role play, Interview, Group discussions
- Reading assessment: Reading passages with comprehension questions graded from simple to complex, from direct to inferential
- Writing assessment: Writing paragraphs, essays etc. Writing should include grammar and vocabulary.
- Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content.

End Semester Examination: 80%

MA6151 MATHEMATICS – I

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OBJECTIVES:
- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To make the student knowledgeable in the area of infinite series and their convergence so that he/she will be familiar with limitations of using infinite series approximations for solutions arising in mathematical modeling.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To introduce the concepts of improper integrals, Gamma, Beta and Error functions which are needed in engineering applications.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I MATRICES

UNIT II SEQUENCES AND SERIES

UNIT III APPLICATIONS OF DIFFERENTIAL CALCULUS
Curvature in Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes - Evolute as envelope of normals.

UNIT IV DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES

UNIT V MULTIPLE INTEGRALS

TOTAL (L:45+T:15): 60 PERIODS
OUTCOMES:

- This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.

TEXT BOOKS:


REFERENCES:


PH6151 ENGINEERING PHYSICS – I L T P C

3 0 0 3

OBJECTIVES:

- To enhance the fundamental knowledge in Physics and its applications relevant to various streams of Engineering and Technology.

UNIT I CRYSTAL PHYSICS

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Diamond and graphite structures (qualitative treatment) - Crystal growth techniques –solution, melt (Bridgman and Czochralski) and vapour growth techniques (qualitative)

UNIT II PROPERTIES OF MATTER AND THERMAL PHYSICS

Elasticity- Hooke’s law - Relationship between three modulii of elasticity (qualitative) – stress - strain diagram – Poisson’s ratio –Factors affecting elasticity –Bending moment – Depression of a cantilever –Young’s modulus by uniform bending- I-shaped girders

UNIT III QUANTUM PHYSICS


UNIT IV ACOUSTICS AND ULTRASONICS

Production of ultrasonics by magnetostriction and piezoelectric methods - acoustic grating - Non Destructive Testing – pulse echo system through transmission and reflection modes - A, B and C – scan displays, Medical applications - Sonogram

UNIT V PHOTOINICS AND FIBRE OPTICS 9

OUTCOMES:
- The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.

TEXT BOOKS:
1. Arumugam M. Engineering Physics. Anuradha publishers, 2010

REFERENCES:
1. Searls and Zemansky. University Physics, 2009
5. Rajagopal K. Engineering Physics. PHI, New Delhi, 2011

CY6151 ENGINEERING CHEMISTRY - I L T P C 3 0 0 3

OBJECTIVES:
- To make the students conversant with basics of polymer chemistry.
- To make the student acquire sound knowledge of second law of thermodynamics and second law based derivations of importance in engineering applications in all disciplines.
- To acquaint the student with concepts of important photophysical and photochemical processes and spectroscopy.
- To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I POLYMER CHEMISTRY 9
Introduction: Classification of polymers – Natural and synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerization. Types and mechanism of polymerization: Addition (Free Radical, cationic and anionic); condensation and copolymerization. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Preparation, properties and uses of Nylon 6,6, and Epoxy resin.

UNIT II CHEMICAL THERMODYNAMICS 9
Terminology of thermodynamics - Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions (problems); Criteria of
spontaneity; Gibbs-Helmholtz equation (problems); Clausius-Clapeyron equation; Maxwell relations – Van’t Hoff isotherm and isochore (problems).

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY

UNIT IV PHASE RULE AND ALLOYS

UNIT V NANO CHEMISTRY
Basics - distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Nanoparticles: nano cluster, nano rod, nanotube(CNT) and nanowire. Synthesis: precipitation, thermolysis, hydrothermal, solvothermal, electrode position, chemical vapour deposition, laser ablation; Properties and applications

OUTCOMES:
- The knowledge gained on polymer chemistry, thermodynamics. spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.

TEXT BOOKS:

REFERENCES:

GE6151 COMPUTER PROGRAMMING

OBJECTIVES:
The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
• Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I    INTRODUCTION  8

UNIT II    C PROGRAMMING BASICS  10

UNIT III    ARRAYS AND STRINGS  9

UNIT IV    FUNCTIONS AND POINTERS  9

UNIT V    STRUCTURES AND UNIONS  9
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Preprocessor directives.

OUTCOMES:
At the end of the course, the student should be able to:
• Design C Programs for problems.
• Write and execute C programs for simple applications.

TEXTBOOKS:

REFERENCES:

GE6152    ENGINEERING GRAPHICS  L T P C
2 0 3 4

OBJECTIVES:
• To develop in students, graphic skills for communication of concepts, ideas and design of Engineering products.
• To expose them to existing national standards related to technical drawings.
CONCEPTS AND CONVENTIONS (Not for Examination)
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNIT I PLANE CURVES AND FREE HAND SKETCHING 5+9
Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three Dimensional objects – Layout of views - Free hand sketching of multiple views from pictorial views of objects

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES 5+9
Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT III PROJECTION OF SOLIDS 5+9
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT IV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES 5+9
Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNIT V ISOMETRIC AND PERSPECTIVE PROJECTIONS 6+9
Principles of isometric projection – isometric scale – Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

COMPUTER AIDED DRAFTING (Demonstration Only) 3
Introduction to drafting packages and demonstration of their use.

TOTAL: 75 PERIODS

OUTCOMES:
On Completion of the course the student will be able to
• perform free hand sketching of basic geometrical constructions and multiple views of objects.
• do orthographic projection of lines and plane surfaces.
• draw projections and solids and development of surfaces.
• prepare isometric and perspective sections of simple solids.
• demonstrate computer aided drafting.

TEXT BOOK:
REFERENCES:

Publication of Bureau of Indian Standards:

Special points applicable to University Examinations on Engineering Graphics:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day

GE6161 COMPUTER PRACTICES LABORATORY L T P C

OBJECTIVES:
The student should be made to:
- Be familiar with the use of Office software.
- Be exposed to presentation and visualization tools.
- Be exposed to problem solving techniques and flow charts.
- Be familiar with programming in C.
- Learn to use Arrays, strings, functions, structures and unions.

LIST OF EXPERIMENTS:
1. Search, generate, manipulate data using MS office/ Open Office
2. Presentation and Visualization – graphs, charts, 2D, 3D
3. Problem formulation, Problem Solving and Flowcharts
4. C Programming using Simple statements and expressions
5. Scientific problem solving using decision making and looping.
6. Simple programming for one dimensional and two dimensional arrays.
7. Solving problems using String functions
8. Programs with user defined functions – Includes Parameter Passing
9. Program using Recursive Function and conversion from given program to flow chart.
10. Program using structures and unions.

OUTCOMES:
At the end of the course, the student should be able to:
- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.

TOTAL : 45 PERIODS
• Develop recursive programs.

**LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:**

Standalone desktops with C compiler 30 Nos.

(or)

Server with C compiler supporting 30 terminals or more.

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**GE6162 ENGINEERING PRACTICES LABORATORY**

**OBJECTIVES:**

- To provide exposure to the students with hands-on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.

**GROUP A (CIVIL & MECHANICAL)**

**I CIVIL ENGINEERING PRACTICE**

**Buildings:**

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

**Plumbing Works:**

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

(d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

**Carpentry using Power Tools only:**

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise:

Wood work, joints by sawing, planing and cutting.

**II MECHANICAL ENGINEERING PRACTICE**

**Welding:**

(a) Preparation of arc welding of butt joints, lap joints and tee joints.

(b) Gas welding practice

**Basic Machining:**

(a) Simple Turning and Taper turning

(b) Drilling Practice

**Sheet Metal Work:**

(a) Forming & Bending:

(b) Model making – Trays, funnels, etc.
(c) Different type of joints.

**Machine assembly practice:**
(a) Study of centrifugal pump
(b) Study of air conditioner

**Demonstration on:**
(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

**GROUP B (ELECTRICAL & ELECTRONICS)**

### III ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Stair case wiring
5. Measurement of energy using single phase energy meter.

### IV ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR.
2. Study of logic gates AND, OR, EOR and NOT.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

**TOTAL: 45 PERIODS**

**OUTCOMES:**
- ability to fabricate carpentry components and pipe connections including plumbing works.
- ability to use welding equipments to join the structures.
- ability to fabricate electrical and electronics circuits.

**REFERENCES:**

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**

**CIVIL**

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. 15 Sets.
2. Carpentry vice (fitted to work bench) 15 Nos.
4. Models of industrial trusses, door joints, furniture joints 5 each
5. Power Tools: (a) Rotary Hammer 2 Nos
   (b) Demolition Hammer 2 Nos
(c) Circular Saw 2 Nos
(d) Planer 2 Nos
(e) Hand Drilling Machine 2 Nos
(f) Jigsaw 2 Nos

**MECHANICAL**
1. Arc welding transformer with cables and holders 5 Nos.
2. Welding booth with exhaust facility 5 Nos.
3. Welding accessories like welding shield, chipping hammer, wire brush, etc. 5 Sets.
4. Oxygen and acetylene gas cylinders, blow pipe and other welding outfit 2 Nos.
5. Centre lathe 2 Nos.
6. Hearth furnace, anvil and smithy tools 2 Sets.
7. Moulding table, foundry tools 2 Sets.
8. Power Tool: Angle Grinder 2 Nos
9. Study-purpose items: centrifugal pump, air-conditioner One each.

**ELECTRICAL**
1. Assorted electrical components for house wiring 15 Sets
2. Electrical measuring instruments 10 Sets
3. Study purpose items: Iron box, fan and regulator, emergency lamp 1 each
4. Megger (250V/500V) 1 No.
5. Power Tools: (a) Range Finder 2 Nos (b) Digital Live-wire detector 2Nos

**ELECTRONICS**
1. Soldering guns 10 Nos.
2. Assorted electronic components for making circuits 50 Nos.
3. Small PCBs 10 Nos.
5. Study purpose items: Telephone, FM radio, low-voltage power supply

**GE6163 PHYSICS AND CHEMISTRY LABORATORY – I**

**OBJECTIVES:**
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

**LIST OF EXPERIMENTS**
(Any FIVE Experiments)
1. (a) Determination of Wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of Young’s modulus by Non uniform bending method
6. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge
OUTCOMES:
- The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Diode laser, lycopodium powder, glass plate, optical fiber.
2. Ultrasonic interferometer
3. Spectrometer, mercury lamp, grating
4. Lee’s Disc experimental set up
5. Traveling microscope, meter scale, knife edge, weights
6. Carey foster’s bridge set up
   (vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY - I

OBJECTIVES:
- To make the student to acquire practical skills in the determination of water quality parameters through volumetric and instrumental analysis.
- To acquaint the students with the determination of molecular weight of a polymer by vacometry.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. Determination of DO content of water sample by Winkler’s method.
2. Determination of chloride content of water sample by argentometric method.
3. Determination of strength of given hydrochloric acid using pH meter.
4. Determination of strength of acids in a mixture using conductivity meter.
5. Estimation of iron content of the water sample using spectrophotometer.
   (1,10- phenanthroline / thiocyanate method).
7. Conductometric titration of strong acid vs strong base.

TOTAL: 30 PERIODS

OUTCOMES:
- The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.

REFERENCES:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Iodine flask - 30 Nos
2. pH meter - 5 Nos
3. Conductivity meter - 5 Nos
4. Spectrophotometer - 5 Nos
5. Ostwald Viscometer - 10 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (each 30 Nos.)
OBJECTIVES:
- To make learners acquire listening and speaking skills in both formal and informal contexts.
- To help them develop their reading skills by familiarizing them with different types of reading strategies.
- To equip them with writing skills needed for academic as well as workplace contexts.
- To make them acquire language skills at their own pace by using e-materials and language lab components.

UNIT I
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on topics like weather) - Turn taking - Closing a conversation (excuses, general wish, positive comment, thanks); Reading - Developing analytical skills, Deductive and inductive reasoning - Extensive reading; Writing - Effective use of SMS for sending short notes and messages - Using ‘emoticons’ as symbols in email messages; Grammar - Regular and irregular verbs - Active and passive voice; Vocabulary - Homonyms (e.g. ‘can’) - Homophones (e.g. ‘some’, ‘sum’); E-materials - Interactive exercise on Grammar and vocabulary – blogging; Language Lab - Listening to different types of conversation and answering questions.

UNIT II
Listening - Listening to situation based dialogues; Speaking - Conversation practice in real life situations, asking for directions (using polite expressions), giving directions (using imperative sentences), Purchasing goods from a shop, Discussing various aspects of a film (they have already seen) or a book (they have already read); Reading - Reading a short story or an article from newspaper, Critical reading, Comprehension skills; Writing - Writing a review / summary of a story / article, Personal letter (Inviting your friend to a function, congratulating someone for his / her success, thanking one’s friends / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercises on Grammar and vocabulary, Extensive reading activity (reading stories / novels), Posting reviews in blogs - Language Lab - Dialogues (Fill up exercises), Recording students’ dialogues.

UNIT III
Listening - Listening to the conversation - Understanding the structure of conversations; Speaking - Conversation skills with a sense of stress, intonation, pronunciation and meaning - Seeking information – expressing feelings (affection, anger, regret, etc.); Reading - Speed reading – reading passages with time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading articles from journals - Format for journal articles – elements of technical articles (abstract, introduction, methodology, results, discussion, conclusion, appendices, references) - Writing strategies; Grammar - Conditional clauses - Cause and effect expressions; Vocabulary - Words used as nouns and verbs without any change in the spelling (e.g. ‘rock’, ‘train’, ‘ring’); E-materials - Interactive exercise on Grammar and vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU and RIE materials – Attending a meeting and writing minutes.

UNIT IV
Listening - Listening to a telephone conversation, Viewing model interviews (face-to-face, telephonic and video conferencing); Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping interview skills; Reading - Reading the job advertisements and the profile of the company concerned – scanning; Writing - Applying for a job – cover letter - résumé preparation – vision, mission and goals of the candidate; Grammar - Numerical expressions - Connectives (discourse markers); Vocabulary - Idioms and their meanings – using idioms in sentences; E-materials - Interactive exercises on Grammar and Vocabulary - Different forms of résumés- Filling up a résumé / cover letter; Language Lab - Telephonic interview – recording the responses - e-résumé writing.
UNIT V

Listening - Viewing a model group discussion and reviewing the performance of each participant -
Identifying the characteristics of a good listener;
Speaking - Group discussion skills – initiating the
discussion – exchanging suggestions and proposals – expressing dissent/agreement –
assertiveness in expressing opinions – mind mapping technique;
Reading - Note making skills –
making notes from books, or any form of written materials -
Intensive reading;
Writing – Checklist - Types of reports – Feasibility / Project report – report format – recommendations / suggestions –
interpretation of data (using charts for effective presentation);
Grammar - Use of clauses;
Vocabulary – Collocation;
E-materials - Interactive grammar and vocabulary exercises -
Sample GD - Pictures for discussion, Interactive grammar and vocabulary exercises;
Language Lab -
Different models of group discussion.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
Learners should be able to
• Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue
using appropriate communicative strategies.
• Write effectively and persuasively and produce different types of writing such as narration,
description, exposition and argument as well as creative, critical, analytical and evaluative
writing.
• Read different genres of texts, infer implied meanings and critically analyse and evaluate
them for ideas as well as for method of presentation.
• Listen/view and comprehend different spoken excerpts critically and infer unspoken and
implied meanings.

TEXTBOOKS:
1. Department of English, Anna University. Mindscapes: English for Technologists and
Engineers. Orient Blackswan, Chennai. 2012
2. Dhanavel, S.P. English and Communication Skills for Students of Science and
Engineering. Orient Blackswan, Chennai. 2011

REFERENCES:
New Delhi. 2008
2011
PHI Learning, New Delhi. 2009
5. Smith-Worthington, Darlene & Sue Jefferson. Technical Writing for Success. Cengage,
Mason USA. 2007

EXTENSIVE Reading (Not for Examination)

Websites
2. http://owl.english.purdue.edu

TEACHING METHODS:
• Lectures
• Activities conducted individually, in pairs and in groups like individual writing and
presentations, group discussions, interviews, reporting, etc
• Long presentations using visual aids
• Listening and viewing activities with follow up activities like discussions, filling up
worksheets, writing exercises (using language lab wherever necessary/possible) etc
• Projects like group reports, mock interviews etc using a combination of two or more of the language skills

EVALUATION PATTERN:

Internal assessment: 20%
3 tests of which two are pen and paper tests and the other is a combination of different modes of assessment like
• Project
• Assignment
• Report
• Creative writing, etc.
All the four skills are to be tested with equal weightage given to each.
✓ Speaking assessment: Individual presentations, Group discussions
✓ Reading assessment: Reading passages with comprehension questions graded following Bloom’s taxonomy
✓ Writing assessment: Writing essays, CVs, reports etc. Writing should include grammar and vocabulary.
✓ Listening/Viewing assessment: Lectures, dialogues, film clippings with questions on verbal as well as audio/visual content graded following Bloom’s taxonomy.

End Semester Examination: 80%

MA6251 MATHEMATICS – II

OBJECTIVES:
• To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
• To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines.
• To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.
• To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I VECTOR CALCULUS
Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stokes’ theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT II ORDINARY DIFFERENTIAL EQUATIONS
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III LAPLACE TRANSFORM
UNIT IV  ANALYTIC FUNCTIONS  9+3
Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: \( w = z+k, kz, 1/z, z^2, e^z \) and bilinear transformation.

UNIT V  COMPLEX INTEGRATION  9+3
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula – Taylor’s and Laurent’s series expansions – Singular points – Residues – Cauchy’s residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).

OUTCOMES:
- The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems related to engineering applications by using these techniques.

TEXT BOOKS:

REFERENCES:
UNIT III  MAGNETIC AND SUPERCONDUCTING MATERIALS  9
Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism –
Domain theory – Hysteresis – soft and hard magnetic materials – antiferromagnetic materials –
Ferrites and its applications
Superconductivity: properties – Type I and Type II superconductors – BCS theory of
superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors –
SQUID, cryotron, magnetic levitation.

UNIT IV  DIELECTRIC MATERIALS  9
Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge
polarization – frequency and temperature dependence of polarisation – internal field – Claussius –
Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials
(capacitor and transformer) – ferroelectricity and applications.

UNIT V  ADVANCED ENGINEERING MATERIALS  9
Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA):
Characteristics, properties of NiTi alloy, application, Nanomaterials– Preparation -pulsed laser
deposition – chemical vapour deposition – Applications – NLO materials –Birefringence- optical
Kerr effect – Classification of Biomaterials and its applications

TOTAL: 45 PERIODS

OUTCOMES:
• The students will have the knowledge on physics of materials and that knowledge will be
  used by them in different engineering and technology applications.

TEXT BOOKS:

REFERENCES:

CY6251  ENGINEERING CHEMISTRY - II  L T P C
3 0 0 3

OBJECTIVES:
• To make the students conversant with boiler feed water requirements, related problems
  and water treatment techniques.
• Principles of electrochemical reactions, redox reactions in corrosion of materials and
  methods for corrosion prevention and protection of materials.
• Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills
  and fuel cells.
• Preparation, properties and applications of engineering materials.
• Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.

UNIT I  WATER TECHNOLOGY  9
Introduction to boiler feed water-requirements-formation of deposits in steam boilers and heat
exchangers- disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) prevention
of scale formation -softening of hard water -external treatment zeolite and demineralization
-internal treatment- boiler compounds (phosphate, calgon, carbonate, colloidal) - caustic
embrittlement -boiler corrosion-priming and foaming- desalination of brackish water –reverse
osmosis.
UNIT II  ELECTROCHEMISTRY AND CORROSION


UNIT III  ENERGY SOURCES

Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion- differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator-classification of nuclear reactor- light water reactor- breeder reactor- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- nickel-cadmium battery- lithium battery- fuel cell H₂ -O₂ fuel cell- applications.

UNIT IV  ENGINEERING MATERIALS

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of alumina, magnesite and silicon carbide, Portland cement- manufacture and properties - setting and hardening of cement, special cement- waterproof and white cement- properties and uses. Glass - manufacture, types, properties and uses.

UNIT V  FUELS AND COMBUSTION


TOTAL: 45 PERIODS

OUTCOMES:
- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To explain the basic theorems used in Electrical circuits and the different components and function of electrical machines.
- To explain the fundamentals of semiconductor and applications.
- To explain the principles of digital electronics
- To impart knowledge of communication.

UNIT I ELECTRICAL CIRCUITS & MEASUREMENTS 12
Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II ELECTRICAL MECHANICS 12

UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 12

UNIT IV DIGITAL ELECTRONICS 12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING 12
Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

OUTCOMES:
- ability to identify the electrical components explain the characteristics of electrical machines.
- ability to identify electronics components and use of them to design circuits.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

UNIT I BASIC AND STATICS OF PARTICLES

UNIT II EQUILIBRIUM OF RIGID BODIES
Free body diagram – Types of supports – Action and reaction forces – stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem – Single equivalent force - Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

UNIT III PROPERTIES OF SURFACES AND SOLIDS

UNIT IV DYNAMICS OF PARTICLES

UNIT V FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS
Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction – wedge friction - Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion of simple rigid bodies such as cylinder, disc/wheel and sphere.

OUTCOMES:

- ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration.
- ability to analyse the forces in any structures.
- ability to solve rigid body subjected to dynamic forces.

TEXT BOOKS:

REFERENCES:
GE6261 COMPUTER AIDED DRAFTING AND MODELING LABORATORY

OBJECTIVES:
- To develop skill to use software to create 2D and 3D models.

LIST OF EXERCISES USING SOFTWARE CAPABLE OF DRAFTING AND MODELING
1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

TOTAL: 45 PERIODS

OUTCOMES:
- ability to use the software packers for drafting and modeling
- ability to create 2D and 3D models of Engineering Components

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Description of Equipment</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pentium IV computer or better hardware, with suitable graphics facility</td>
<td>30 No.</td>
</tr>
<tr>
<td>2.</td>
<td>Licensed software for Drafting and Modeling</td>
<td>30 Licenses</td>
</tr>
<tr>
<td>3.</td>
<td>Laser Printer or Plotter to print / plot drawings</td>
<td>2 No.</td>
</tr>
</tbody>
</table>
OBJECTIVES:
- To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. Determination of Young’s modulus by uniform bending method
2. Determination of band gap of a semiconductor
3. Determination of Coefficient of viscosity of a liquid — Poiseuille’s method
4. Determination of Dispersive power of a prism — Spectrometer
5. Determination of thickness of a thin wire — Air wedge method
6. Determination of Rigidity modulus — Torsion pendulum

OUTCOMES:
- The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:
1. Traveling microscope, meter scale, Knife edge, weights
2. Band gap experimental set up
3. Burette, Capillary tube, rubber tube, stop clock, beaker and weighing balance
4. spectrometer, prism, sodium vapour lamp.
5. Air-wedge experimental set up.
6. Torsion pendulum set up.
   (vernier Caliper, Screw gauge, reading lens are required for most of the experiments)

CHEMISTRY LABORATORY - II

OBJECTIVES:
- To make the student acquire practical skills in the wet chemical and instrumental methods for quantitative estimation of hardness, alkalinity, metal ion content, corrosion in metals and cement analysis.

LIST OF EXPERIMENTS
(Any FIVE Experiments)
1. Determination of alkalinity in water sample
2. Determination of total, temporary & permanent hardness of water by EDTA method
3. Estimation of copper content of the given solution by EDTA method
4. Estimation of iron content of the given solution using potentiometer
5. Estimation of sodium present in water using flame photometer
6. Corrosion experiment — weight loss method
7. Conductometric precipitation titration using BaCl₂ and Na₂SO₄

TOTAL: 30 PERIODS

OUTCOMES:
- The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

REFERENCES:

   • Laboratory classes on alternate weeks for Physics and Chemistry.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Potentiometer - 5 Nos
2. Flame photo meter - 5 Nos
3. Weighing Balance - 5 Nos
4. Conductivity meter - 5 Nos

Common Apparatus : Pipette, Burette, conical flask, percelain tile, dropper (30 Nos each)

MA6351 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS L T P C

OBJECTIVES:
• To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
• To acquaint the student with Fourier transform techniques used in wide variety of situations.
• To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9+3
Formation of partial differential equations - Singular integrals -- Solutions of standard types of first order partial differential equations - Lagrange's linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

UNIT II FOURIER SERIES 9+3

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3
Classification of PDE – Method of separation of variables - Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two dimensional equation of heat conduction (excluding insulated edges).

UNIT IV FOURIER TRANSFORMS 9+3

UNIT V Z-TRANSFORMS AND DIFFERENCE EQUATIONS 9+3

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.

TEXT BOOKS:

REFERENCES:

ME6301 ENGINEERING THERMODYNAMICS

OBJECTIVES:
- To familiarize the students to understand the fundamentals of thermodynamics and to perform thermal analysis on their behavior and performance.

(Use of Standard and approved Steam Table, Mollier Chart, Compressibility Chart and Psychrometric Chart permitted)

UNIT I BASIC CONCEPTS AND FIRST LAW

UNIT II SECOND LAW AND AVAILABILITY ANALYSIS
UNIT III   PROPERTIES OF PURE SUBSTANCE AND STEAM POWER CYCLE


UNIT IV   IDEAL AND REAL GASES, THERMODYNAMIC RELATIONS


UNIT V   GAS MIXTURES AND PSYCHROMETRY

Mole and Mass fraction, Dalton’s and Amagat’s Law. Properties of gas mixture – Molar mass, gas constant, density, change in internal energy, enthalpy, entropy and Gibbs function. Psychrometric properties, Psychrometric charts. Property calculations of air vapour mixtures by using chart and expressions. Psychrometric process – adiabatic saturation, sensible heating and cooling, humidification, dehumidification, evaporative cooling and adiabatic mixing. Simple Applications

OUTCOMES:
• Upon completion of this course, the students can able to apply the Thermodynamic Principles to Mechanical Engineering Application.
• Apply mathematical fundamentals to study the properties of steam, gas and gas mixtures.

TEXT BOOKS :

REFERENCES :

CE6451   FLUID MECHANICS AND MACHINERY

OBJECTIVES:
• The applications of the conservation laws to flow through pipes and hydraulic machines are studied
• To understand the importance of dimensional analysis.
• To understand the importance of various types of flow in pumps and turbines.
UNIT I  FLUID PROPERTIES AND FLOW CHARACTERISTICS  8
Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, surface tension and capillarity. Flow characteristics – concept of control volume - application of continuity equation, energy equation and momentum equation.

UNIT II  FLOW THROUGH CIRCULAR CONDUITS  8

UNIT III  DIMENSIONAL ANALYSIS  9
Need for dimensional analysis – methods of dimensional analysis – Similitude – types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.

UNIT IV  PUMPS  10
Impact of jets - Euler’s equation - Theory of rotodynamic machines – various efficiencies- velocity components at entry and exit of the rotor- velocity triangles - Centrifugal pumps- working principle - work done by the impeller - performance curves - Reciprocating pump- working principle – Rotary pumps - classification.

UNIT V  TURBINES  10

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can critically analyse the performance of pumps and turbines.

TEXT BOOK:

REFERENCES:

ME6302 MANUFACTURING TECHNOLOGY – I L T P C
3 0 0 3

OBJECTIVES:
- To introduce the concepts of basic manufacturing processes and fabrication techniques, such as metal casting, metal joining, metal forming and manufacture of plastic components.
UNIT I METAL CASTING PROCESSES

Sand Casting: Sand Mould – Type of patterns - Pattern Materials – Pattern allowances – Moulding sand Properties and testing – Cores – Types and applications – Moulding machines – Types and applications; Melting furnaces: Blast and Cupola Furnaces; Principle of special casting processes: Shell - investment – Ceramic mould – Pressure die casting - Centrifugal Casting - CO₂ process – Stir casting; Defects in Sand casting

UNIT II JOINING PROCESSES

Operating principle, basic equipment, merits and applications of: Fusion welding processes: Gas welding - Types – Flame characteristics; Manual metal arc welding – Gas Tungsten arc welding - Gas metal arc welding – Submerged arc welding – Electro slag welding; Operating principle and applications of: Resistance welding - Plasma arc welding – Thermit welding – Electron beam welding – Friction welding and Friction Stir Welding; Brazing and soldering; Weld defects: types, causes and cure.

UNIT III METAL FORMING PROCESSES


UNIT IV SHEET METAL PROCESSES


UNIT V MANUFACTURE OF PLASTIC COMPONENTS


TOTAL: 45 PERIODS

OUTCOMES:

• Upon completion of this course, the students can able to apply the different manufacturing process and use this in industry for component production

TEXT BOOKS:


REFERENCES:

EE6351  ELECTRICAL DRIVES AND CONTROLS  L T P C
3 0 0 3

OBJECTIVES:
• To understand the basic concepts of different types of electrical machines and their performance.
• To study the different methods of starting D.C motors and induction motors.
• To study the conventional and solid-state drives

UNIT I  INTRODUCTION
Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors

UNIT II  DRIVE MOTOR CHARACTERISTICS
Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors.

UNIT III  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.

UNIT IV  CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES
Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers – applications.

UNIT V  CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES
Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

TOTAL: 45 PERIODS

OUTCOMES:
• Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance

TEXT BOOKS:

REFERENCES:

EC6464  ELECTRONICS AND MICROPROCESSORS  L T P C
3 0 0 3

OBJECTIVES:
• To enable the students to understand the fundamental concepts of Semi Conductors, Transistors, Rectifiers, Digital Electronics and 8085 Microprocessors
UNIT I  SEMICONDUCTORS AND RECTIFIERS  9
Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-P type and N type-PN junction-Zenor effect-Zenor diode characteristics-Half wave and full wave rectifiers-Voltage regulation

UNIT II  TRANSISTORS AND AMPLIFIERS  12
Bipolar junction transistor- CB, CE, CC configuration and characteristics-Biasing circuits-Class A, B and C amplifiers-Field effect transistor-Configuration and characteristic of FET amplifier-SCR, Diac, Triac, UJT-Characteristics and simple applications-Switching transistors-Concept of feedback-Negative feedback-Application in temperature and motor speed control.

UNIT III  DIGITAL ELECTRONICS  9
Binary number system-AND, OR, NOT, NAND, NOR circuits-Boolean algebra-Exclusive OR gate-Flip flops-Half and full adders-Registers-Counters-A/D and D/A conversion.

UNIT IV  8085 MICROPROCESSOR  9
Block diagram of microcomputer-Architecture of 8085-Instruction set-Addressing modes-Simple programs using arithmetic and logical operations.

UNIT V  INTERFACING AND APPLICATIONS OF MICROPROCESSOR  6
Basic interfacing concepts-Interfacing of Input and Output devices-Applications of microprocessor-Temperature control, Stepper motor control, traffic light control.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to perform performing on 8085 Microprocessor to control devices
- Ability to use microcontroller and programming

TEXT BOOKS:

REFERENCES:

CE6461  FLUID MECHANICS AND MACHINERY LABORATORY  L T P C
0 0 3 2

OBJECTIVES:
- Upon Completion of this subject, the students can able to have hands on experience in flow measurements using different devices and also perform calculation related to losses in pipes and also perform characteristic study of pumps, turbines etc.,

LIST OF EXPERIMENTS
1. Determination of the Coefficient of discharge of given Orifice meter.
2. Determination of the Coefficient of discharge of given Venturi meter.
3. Calculation of the rate of flow using Rota meter.
4. Determination of friction factor for a given set of pipes.
5. Conducting experiments and drawing the characteristic curves of centrifugal pump/submergible pump.
6. Conducting experiments and drawing the characteristic curves of reciprocating pump.
7. Conducting experiments and drawing the characteristic curves of Gear pump.
8. Conducting experiments and drawing the characteristic curves of Pelton wheel.
9. Conducting experiments and drawing the characteristic curves of Francis turbine.
10. Conducting experiments and drawing the characteristic curves of Kaplan turbine.

OUTCOMES:
- Ability to use the measurement equipments for flow measurement
- Ability to do performance trust on different fluid machinery

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S. No.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Orifice meter setup</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Venturi meter setup</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Rotameter setup</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Pipe Flow analysis setup</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Centrifugal pump/submergible pump setup</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Reciprocating pump setup</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Gear pump setup</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Pelton wheel setup</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Francis turbine setup</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Kaplan turbine setup</td>
<td>1</td>
</tr>
</tbody>
</table>

EE6365 ELECTRICAL ENGINEERING LABORATORY L T P C 0 0 3 2

OBJECTIVES:
- To validate the principles studied in theory by performing experiments in the laboratory

LIST OF EXPERIMENTS
1. Load test on DC Shunt & DC Series motor
2. O.C.C & Load characteristics of DC Shunt and DC Series generator
3. Speed control of DC shunt motor (Armature, Field control)
4. Load test on single phase transformer
5. O.C & S.C Test on a single phase transformer
6. Regulation of an alternator by EMF & MMF methods.
7. V curves and inverted V curves of synchronous Motor
8. Load test on three phase squirrel cage Induction motor
9. Speed control of three phase slip ring Induction Motor
10. Load test on single phase Induction Motor.
11. Study of DC & AC Starters

TOTAL: 45 PERIODS

OUTCOME:
- Ability to perform speed characteristic of different electrical machine

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC Shunt motor</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>DC Series motor</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>DC shunt motor-DC Shunt Generator set</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>DC Shunt motor-DC Series Generator set</td>
<td>1</td>
</tr>
</tbody>
</table>
OBJECTIVES:
• To supplement the theoretical knowledge with practical use of electronic components and programming and control using micro-processors

LIST OF EXPERIMENTS

ELECTRONICS 30
1. VI Characteristics of PN Junction Diode
2. VI Characteristics of Zener Diode
3. Characteristics of CE Transistor
4. Characteristics of JFET
5. Characteristics of Uni Junction Transistor
6. RC or Wein Bridge Oscillator
7. Study of Logic Gates (Basic Gates)
8. Half Adder and Full Adder
9. Shift Registers and Counters
10. Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non – Inverting

MICROPROCESSORS 15
1. Block Transfer
2. 8 bit Addition, Subtraction
3. Multiplication and Division
4. Maximum and Minimum of block of data
5. Sorting
6. Stepper Motor Interfacing

TOTAL : 45 PERIODS

OUTCOMES:
• Ability to perform speed characteristic of different electronics and microprocessor machine

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Voltmeters</td>
<td>5 Nos.</td>
</tr>
<tr>
<td>2</td>
<td>Ammeters</td>
<td>5 Nos.</td>
</tr>
<tr>
<td>3</td>
<td>PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters</td>
<td>1 set.</td>
</tr>
<tr>
<td>4</td>
<td>Digital Logic Trainer Kits</td>
<td>1 No.</td>
</tr>
<tr>
<td>5</td>
<td>Breadboards</td>
<td>1 No.</td>
</tr>
<tr>
<td>6</td>
<td>Microprocessor Kits – 8085</td>
<td>5 Nos.</td>
</tr>
<tr>
<td>7</td>
<td>D/A Converter Interface</td>
<td>1 No.</td>
</tr>
<tr>
<td>8</td>
<td>Stepper Motor Interface</td>
<td>1 No.</td>
</tr>
<tr>
<td>9</td>
<td>CRO</td>
<td>1 No.</td>
</tr>
<tr>
<td>10</td>
<td>Waveform Generator</td>
<td>1 No.</td>
</tr>
<tr>
<td>11</td>
<td>Multimeter</td>
<td>1 No.</td>
</tr>
</tbody>
</table>
OBJECTIVES:
- To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems.

UNIT I  LINEAR MODELS  15

UNIT II  TRANSPORTATION MODELS AND NETWORK MODELS  8

UNIT III  INVENTORY MODELS  6
Inventory models – Economic order quantity models – Quantity discount models – Stochastic inventory models – Multi product models – Inventory control models in practice.

UNIT IV  QUEUEING MODELS  6
Queueing models - Queueing systems and structures – Notation parameter – Single server and multi server models – Poisson input – Exponential service – Constant rate service – Infinite population – Simulation.

UNIT V  DECISION MODELS  10

OUTCOMES:
- Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems

TEXT BOOK:

REFERENCE BOOKS:
UNIT I
Introduction to computer networks, reference models: OSI model, TCP / IP model, Evolution of Internet.

UNIT II
Fundamentals of MAC layer, Data Link layer, Transmission media: Guided and Unguided, Twisted pair cable (STP & UTP), coaxial cable, fiber optic cable, radio waves, infrared, microwaves links.

UNIT III
LAN technologies: Traditional Ethernet (Concept of CSMA / CD), Fast Ethernet, Giga bit Ethernet IEEE 802.4 (Token bus), IEEE 802.5 (Token ring), IEEE 802.11 (Wireless LAN), Working of repeater, hub, bridge and switch.

UNIT IV
Network layer concepts and routing algorithms, IPV6 and IPV4, subnetting and subnet masking, working of routers in LAN. Concept of Virtual LAN

UNIT V
Introduction to encryption and compression of data, network security issues, working of dial up connection, role of internet service provider (ISP) and working of ISDN and broadband internet connection etc, Application layer protocol: DNS, HTTP, FTP, telnet.

TOTAL: 45 PERIODS

OUTCOMES:
- Explain the characteristics and function of the OSI model
- Explain the configuration for TCP/IP configuration
- Explain the fundamentals of networking process
- Explain the data transfer through networks.

TEXT BOOKS:

REFERENCES:

CE6306 STRENGTH OF MATERIALS L T P C
3 1 0 4

OBJECTIVES:
To understand the stresses developed in bars, compounds bars, beams, shafts, cylinders and spheres.

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS
UNIT II TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM


UNIT III TORSION

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts– Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV DEFLECTION OF BEAMS

Double Integration method – Macaulay’s method – Area moment method for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell’s reciprocal theorems.

UNIT V THIN CYLINDERS, SPHERES AND THICK CYLINDERS

Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin and thick cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame’s theorem.

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:

1. Upon completion of this course, the students can able to apply mathematical knowledge to calculate the deformation behavior of simple structures.
2. Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads.

TEXT BOOKS:

REFERENCES:

AN6402 KINEMATICS AND DYNAMICS OF MACHINERY

OBJECTIVES:

1. To understand the basic components and layout of linkages in the assembly of a system/machine.
2. To understand the principles in analyzing the assembly with respect to the displacement, velocity, and acceleration at any point in a link of a mechanism.
3. To understand the motion resulting from a specified set of linkages, design few linkage mechanisms and cam mechanisms for specified output motions.
4. To understand the basic concepts of toothed gearing and kinematics of gear trains and the effects of friction in motion transmission and in machine components.
UNIT I KINEMATIC OF MECHANICS

UNIT II GEARS and GEAR TRAINS

UNIT III FRICTION

UNIT IV FORCE ANALYSIS

UNIT V BALANCING AND VIBRATION

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
• Upon completion of this course, the students can able to apply fundamentals of mechanism for the design of new mechanisms and analyse them for optimum design.

TEXT BOOKS:

REFERENCES:

ME6403 ENGINEERING MATERIALS AND METALLURGY

OBJECTIVES:
• To impart knowledge on the structure, properties, treatment, testing and applications of metals and non-metallic materials so as to identify and select suitable materials for various engineering applications.
UNIT I ALLOYS AND PHASE DIAGRAMS

UNIT II HEAT TREATMENT

UNIT III FERROUS AND NON-FERROUS METALS

UNIT IV NON-METALLIC MATERIALS
Polymers – types of polymer, commodity and engineering polymers – Properties and applications of various thermosetting and thermoplastic polymers (PP, PS, PVC, PMMA, PET,PC, PA, ABS, PI, PAI, PPO, PPS, PEEK, PTFE, Polymers – Urea and Phenol formaldehydes)- Engineering Ceramics – Properties and applications of Al_{2}O_{3}, SiC, Si_{3}N_{4}, PSZ and SIALON –Composites-Classifications- Metal Matrix and FRP - Applications of Composites.

UNIT V MECHANICAL PROPERTIES AND DEFORMATION MECHANISMS
Mechanisms of plastic deformation, slip and twinning – Types of fracture – Testing of materials under tension, compression and shear loads – Hardness tests (Brinell, Vickers and Rockwell), hardness tests, impact test Izod and charpy, fatigue and creep failure mechanisms.

TOTAL : 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to use different materials, their processing, heat treatments in suitable application in mechanical engineering fields.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To understand the concept and basic mechanics of metal cutting, working of standard machine tools such as lathe, shaping and allied machines, milling, drilling and allied machines, grinding and allied machines and broaching. To understand the basic concepts of Computer Numerical Control (CNC) of machine tools and CNC Programming

UNIT I  THEORY OF METAL CUTTING  9
Mechanics of chip formation, single point cutting tool, forces in machining, Types of chip, cutting tools – nomenclature, orthogonal metal cutting, thermal aspects, cutting tool materials, tool wear, tool life, surface finish, cutting fluids and Machinability.

UNIT II  TURNING MACHINES  9
Centre lathe, constructional features, specification, operations – taper turning methods, thread cutting methods, special attachments, machining time and power estimation. Capstan and turret lathes- tool layout – automatic lathes: semi automatic – single spindle : Swiss type, automatic screw type – multi spindle:

UNIT III  SHAPER, MILLING AND GEAR CUTTING MACHINES  9

UNIT IV  ABRASIVE PROCESS AND BROACHING  9
Abrasives: grinding wheel – specifications and selection, types of grinding process– cylindrical grinding, surface grinding, centreless grinding and internal grinding- Typical applications – concepts of surface integrity, broaching machines: broach construction – push, pull, surface and continuous broaching machines

UNIT V  CNC MACHINING  9
Numerical Control (NC) machine tools – CNC types, constructional details, special features, machining centre, part programming fundamentals CNC – manual part programming – micromachining – wafer machining

TOTAL : 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can understand and compare the functions and applications of different metal cutting tools and also demonstrate the programming in CNC machining.

TEXT BOOKS:

REFERENCES:
OBJECTIVES
To supplement the theoretical knowledge gained in Mechanics of Solids with practical testing for determining the strength of materials under externally applied loads. This would enable the student to have a clear understanding of the design for strength and stiffness.

LIST OF EXPERIMENTS
1. Tension test on a mild steel rod
2. Double shear test on Mild steel and Aluminium rods
3. Torsion test on mild steel rod
4. Impact test on metal specimen
5. Hardness test on metals - Brinnell and Rockwell Hardness Number
6. Deflection test on beams
7. Compression test on helical springs
8. Strain Measurement using Rosette strain gauge
10. Tempering- Improvement Mechanical properties Comparison
   (i) Unhardened specimen
   (ii) Quenched Specimen and
   (iii) Quenched and tempered specimen.
11. Microscopic Examination of
   (i) Hardened samples and
   (ii) Hardened and tempered samples.

OUTCOMES:
- Ability to perform different destructive testing
- Ability to characteristic materials

LIST OF EQUIPMENT FOR BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Universal Tensile Testing machine with double 1 shear attachment – 40 Ton Capacity</td>
<td>1</td>
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<tr>
<td>2</td>
<td>Torsion Testing Machine (60 NM Capacity)</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Impact Testing Machine (300 J Capacity)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Brinell Hardness Testing Machine</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Rockwell Hardness Testing Machine</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Spring Testing Machine for tensile and compressive loads (2500 N)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Metallurgical Microscopes</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>Muffle Furnace (800 C)</td>
<td>1</td>
</tr>
</tbody>
</table>

ME6465 MANUFACTURING TECHNOLOGY LABORATORY

OBJECTIVES:
- Demonstration and study of the VARIOUS machines. The Main emphasis will be on a complete understanding of the machine capabilities and processes.
LIST OF EXPERIMENTS

UNIT I       LATHE PRACTICE
a. Plain Turning
b. Taper Turning
c. Thread Cutting
Estimation of machining time for the above turning processes.

UNIT II      DRILLING PRACTICE
a. Drilling
b. Tapping
c. Reaming.

UNIT III     MILLING
a. Surface Milling.
b. Gear Cutting.
c. Contour Milling.

UNIT IV      PLANNING AND SHAPING
a. Cutting Key Ways.
b. Dove tail machining.

OUTCOMES:
• Ability to use different machine tools to manufacturing gears.
• Ability to use different machine tools for finishing operations
• Ability to manufacture tools using cutter grinder
• Develop CNC part programming

TOTAL: 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lathe -</td>
<td>15 Nos.</td>
</tr>
<tr>
<td>2</td>
<td>Drilling Machine -</td>
<td>1 No.</td>
</tr>
<tr>
<td>3</td>
<td>Milling Machine -</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>4</td>
<td>Planning Machine -</td>
<td>1 No.</td>
</tr>
<tr>
<td>5</td>
<td>Shaping Machine -</td>
<td>2 Nos.</td>
</tr>
</tbody>
</table>

AN6411      LAN AND NETWORKING LABORATORY

OBJECTIVES:
• To familiarize the students to write program for LAN and networks

LIST OF EXPERIMENTS:
1. Looking up Internet Addresses.
2. Testing the characteristics of an IP address.
3. Write a program to trace the port of a particular host.
4. Write a program to implement the daytime protocol.
5. Write a program to implement the echo client.
6. Write a program to implement the finger client.
7. Write a program to implement the whois client.
8. Demonstration of TCP/IP protocol.
10. Implement a chat server using TCP/IP protocol.
11. Transfer of files from PC to PC using Windows / Unix socket processing

OUTCOMES:
- Ability to demonstrate LAN and Networking

TOTAL : 45 PERIODS

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>SOFTWARE</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td> C / C++ / Java / Equivalent Compiler</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td> Network simulator like NS2/Glomosim/OPNET/ Equivalent</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2.</td>
<td>HARDWARE</td>
<td>30 Nos</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Standalone desktops</td>
<td></td>
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</tbody>
</table>

GE6351 ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES:
To the study of nature and the facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION
Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere - formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO2, NOx, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their
environmental significance: Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes. (c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes – Biogas – production and uses, anaerobic digestion; case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins – Biochemical degradation of pollutants, Bioconversion of pollutants.
Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7
Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

TOTAL : 45 PERIODS

OUTCOMES:
Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
• Public awareness of environmental is at infant stage.
• Ignorance and incomplete knowledge has lead to misconceptions
• Development and improvement in std. of living has lead to serious environmental disasters

TEXT BOOKS:
REFERENCES:

CS6302 DATABASE MANAGEMENT SYSTEMS L T P C 3 0 0 3

OBJECTIVES:
• To expose the students to the fundamentals of Database Management Systems.
• To make the students understand the relational model.
• To familiarize the students with ER diagrams.
• To expose the students to SQL.
• To make the students to understand the fundamentals of Transaction Processing and Query Processing.
• To familiarize the students with the different types of databases.
• To make the students understand the Security Issues in Databases.

UNIT I INTRODUCTION TO DBMS 10
File Systems Organization - Sequential, Pointer, Indexed, Direct - Purpose of Database System - Database System Terminologies - Database characteristics - Data models – Types of data models – Components of DBMS - Relational Algebra. LOGICAL DATABASE DESIGN: Relational DBMS - Codd’s Rule - Entity-Relationship model - Extended ER Normalization – Functional Dependencies, Anomaly- 1NF to 5NF - Domain Key Normal Form – Denormalization

UNIT II SQL & QUERY OPTIMIZATION 8

UNIT III TRANSACTION PROCESSING AND CONCURRENCY CONTROL 8

UNIT IV TRENDS IN DATABASE TECHNOLOGY 10

UNIT V ADVANCED TOPICS 9
DATABASE SECURITY: Data Classification-Threats and risks – Database access Control – Types of Privileges –Cryptography- Statistical Databases.- Distributed Databases-Architecture-Transaction Processing-Data Warehousing and Mining-Classification-Association rules-Clustering-Information Retrieval- Relevance ranking-Crawling and Indexing the Web- Object Oriented Databases-XML Databases.

TOTAL: 45 PERIODS
OUTCOMES:
At the end of the course, the student should be able to:
• Design Databases for applications.
• Use the Relational model, ER diagrams.
• Apply concurrency control and recovery mechanisms for practical problems.
• Design the Query Processor and Transaction Processor.
• Apply security concepts to databases.

TEXT BOOK:

REFERENCES:

ME6503 DESIGN OF MACHINE ELEMENTS L T P C 3 0 0 3

OBJECTIVES:
• To familiarize the various steps involved in the Design Process
• To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
• To learn to use standard practices and standard data
• To learn to use catalogues and standard machine components
  (Use of P S G Design Data Book is permitted)

UNIT I STEADY STRESSES AND VARIABLE STRESSES IN MACHINE MEMBERS 10

UNIT II SHAFTS AND COUPLINGS 8
Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, keyways and splines – crankshafts - Rigid and flexible couplings.

UNIT III TEMPORARY AND PERMANENT JOINTS 9
Threaded fastners - Bolted joints including eccentric loading, Knuckle joints, Cotter joints – Welded joints, riveted joints for structures - theory of bonded joints.
UNIT IV ENERGY STORING ELEMENTS AND ENGINE COMPONENTS
Various types of springs, optimization of helical springs - rubber springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

UNIT V BEARINGS
Sliding contact and rolling contact bearings - Hydrodynamic journal bearings, Sommerfeld Number, Raimondi and Boyd graphs, -- Selection of Rolling Contact bearings.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to successfully design engine components

TEXT BOOKS:

REFERENCES:

AN6501 MANUFACTURING SYSTEM MANAGEMENT

OBJECTIVES:
- Ability to design, develop and implement are integrated system involving man, machine, materials and energy

UNIT I INTRODUCTION
Production functions

Plant Organization: Organization principles of organization, Organization structure-line and staff organization.

Plant Location, Layout: Process layout product layout and combination – methods of layout, economics of layout; group technology.

UNIT II PRODUCTION PLANNING & CONTROL
Types of products, demand, demand forecasting, marketing strategies, scheduling and control of scheduling production control.

Method Study: Definition and concepts, method study procedures, symbols, advantages, Flow process charts, Motion study, micro motion, SIMO charts, Systems Concepts, Classification analysis techniques.
UNIT III WORK MEASUREMENT 9
Definition, objectives & techniques, Time study equipment, performance rating, allowances, standard time, work sampling, PMTS.

UNIT IV INDUSTRIAL MAINTENANCE 9
Types, organization for maintenance department, Breakdown and preventive maintenance.

**Inventory control and replacement analysis**: Introduction replacement policy and method adopted, EOQ.

UNIT V MANAGEMENT CONCEPTS 9
Development of management principles, scientific management, human relation aspects.

**Production Cost Concepts**: Introduction, cost of production, cost center and unit, classification and analysis of cost, break Even Analysis.

**TOTAL : 45 PERIODS**

**OUTCOMES:**
- Knowledge gained in replacement policies of man power and equipments.
- Knowledge in product cost and costing analysis.

**TEXT BOOKS:**

**REFERENCE:**

---

**AN6502 MEASUREMENTS AND CONTROLS**

**OBJECTIVES:**
- To understand the principle and use of sensors for measurement of different parameters.
- To understand the concept of feedback control systems and their applications.

**UNIT I MEASUREMENTS** 9

**UNIT II INSTRUMENTS** 9
Transducer, Modifying (intermediate) and Terminal stages - Mechanical and electrical transducers - preamplifiers - charge amplifiers - filters - attenuaters - D’ Arsonval CRO - Oscillographs - records - micro processor based data logging, processing and output.

**UNIT III PARAMETERS FOR MEASUREMENT** 9
UNIT IV  AUTOMATIC CONTROL SYSTEMS  9
Basic elements - feedback principle implication of measurements - Error detectors final actuating
elements - Two position, multi position, floating, pro-portional controls relays – seNO amplifiers -
seNO motors - mechanical, Electrical, magnetic, electronic, hydraulic, pneumatic systems.

UNIT V  APPLICATION OF CONTROL SYSTEMS  9
Governing of speed kinetic and process control- pressure, temperature, fluid level, flow thrust and
flight control - photo electric controls.

OUTCOMES:
• Understanding terminologies of Mechanical Measurements.
• Gaining knowledge of parameters of Mechanical Measurements.
• Usage of Automobile control of mechanisms in measurements of mechanical parameters.

TEXT BOOKS:
   Sons, Ch.1-4, 1982.

REFERENCES:
   1969.

MT6602  APPLIED HYDRAULICS AND PNEUMATICS  L T P C
3 0 0 3

OBJECTIVES:
• This course will give an appreciation of the fundamental principles, design and operation of
  hydraulic and pneumatic components and systems and their application in manufacturing
  and mechanical systems.

UNIT I  FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS  9
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 – Friction loss- Work,
Power and Torque. Problems Sources of Hydraulic power: Pumping Theory – Pump Classification-
Construction, Working, Design. Advantages, Disadvantages, Performance, Selection criterion of
Linear, Rotary- Fixed and Variable displacement pumps-Problems

UNIT II  HYDRAULIC ACTUATORS AND VALVES  9
Hydraulic Actuators: Cylinders– Types and construction, Application, Hydraulic cushioning -
Hydraulic motors Control Components: Direction control, Flow control and Pressure control valves-
Types, Construction and Operation- Servo and Proportional valves - Applications – Types of
actuation. Accessories: Reservoirs, Pressure Switches- Applications- Fluid Power ANSI Symbols -
Problems

UNIT III  HYDRAULIC SYSTEMS  9
Accumulators, Intensiﬁers, Industrial hydraulic circuits- Regenerative, Pump Unloading, Double-
pump, Pressure Intensiﬁer, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-safe,
Speed control, Hydrostatic transmission, Electro hydraulic circuits, Mechanical Hydraulic servo systems.

UNIT IV  PNEUMATIC SYSTEMS
Properties of air- Perfect Gas Laws- Compressors- Filter, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust valves, Pneumatic actuators, Design of pneumatic circuit cascade method- Electro pneumatic circuits, Introduction to Fluidics, Pneumatic logic circuits.

UNIT V  TROUBLE SHOOTING AND APPLICATIONS

TOTAL: 45 PERIODS

OUTCOMES:
- Understanding operating principles and constructional features of hydraulic and pneumatic systems.
- Knowledge with selection of hydraulic / pneumatic components
- Understanding of designing and layout of Hydraulic Power package and trouble shooting.

TEXT BOOK:

REFERENCES:

AN6511  DYNAMICS AND METROLOGY LABORATORY   L T P C
DYNAMICS LABORATORY
OBJECTIVES:
- To supplement the principles learnt in kinematics and Dynamics of Machinery.
- To understand how certain measuring devices are used for dynamic testing.

LIST OF EXPERIMENTS:
1. a) Study of gear parameters.
   b) Experimental study of velocity ratios of simple, compound, Epicyclic and differential gear trains.
2. a) Kinematics of Four Bar, Slider Crank, Crank Rocker, Double crank, Double rocker, Oscillating cylinder Mechanisms.
   b) Kinematics of single and double universal joints.
3. a) Determination of Mass moment of inertia of Fly wheel and Axle system.
   b) Determination of Mass Moment of Inertia of axisymmetric bodies using Turn Table apparatus.
c) Determination of Mass Moment of Inertia using bifilar suspension and compound pendulum.

4. Motorized gyroscope – Study of gyroscopic effect and couple.

5. Governor - Determination of range sensitivity, effort etc., for Watts, Porter, Proell, and Hartnell Governors.

6. Cams – Cam profile drawing, Motion curves and study of jump phenomenon


   b) Multi degree freedom suspension system – Determination of influence coefficient.

8. a) Determination of torsional natural frequency of single and Double Rotor systems.- Undamped and Damped Natural frequencies.

   b) Vibration Absorber – Tuned vibration absorber.

9. Vibration of Equivalent Spring mass system – undamped and damped vibration.


11. a) Balancing of rotating masses.

   b) Balancing of reciprocating masses.

12. a) Transverse vibration of Free-Free beam – with and without concentrated masses.

   b) Forced Vibration of Cantilever beam – Mode shapes and natural frequencies.

   c) Determination of transmissibility ratio using vibrating table.

Students should be familiar with the use of the following device/equipments depending upon availability.

1. Tachometers – Contact and non contact
2. Dial gauge
3. Stroboscope
4. Accelerometers – Vibration pickups
5. Displacement meters.
6. Oscilloscope
7. Vibration Shaker
8. F.F.T. Analyzer, and

METROLOGY LABORATORY

LIST OF EXPERIMENTS:

Contact methods:
1. Linear and Angular measurement using Autocollimator.
3. Calibration of optical comparator and measurement of dimension
4. Determining the accuracy of electrical and optical comparator.

Non-contact measurement techniques:
3. Experiments in CMM.

OUTCOMES:
• To make the students understand the fundamental principles of measuring techniques by practicing exercises on various measuring instruments.
• To make the students understand the fundamental principles of measuring techniques by practicing exercises on various measuring instruments.
LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Micrometer</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Vernier Caliper</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Vernier Height Gauge</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Vernier Depth Gauge</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Slip Gauge Set</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Gear Tooth Vernier</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Sine Bar</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Bevel Protractor</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Floating Carriage Micrometer</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Profile Projector</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Mechanical / Electrical / Pneumatic Comparator</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Temperature Measuring Setup</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Displacement Measuring Setup</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Force Measuring Setup</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Torque Measuring Setup</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Vibration / Shock Measuring Setup</td>
<td>1</td>
</tr>
</tbody>
</table>

Optional Equipments

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Autocollimator</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Coordinate Measuring Machine</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Tool Makers Microscope</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Dial Gauge Calibration</td>
<td>1</td>
</tr>
</tbody>
</table>

ME6611 CAD / CAM LABORATORY

OBJECTIVES:
- To gain practical experience in handling 2D drafting and 3D modelling software systems.
- To study the features of CNC Machine Tool.
- To expose students to modern control systems (Fanuc, Siemens etc.,)
- To know the application of various CNC machines like CNC lathe, CNC Vertical Machining centre, CNC EDM and CNC wire-cut and studying of Rapid prototyping.

LIST OF EXPERIMENTS

1. 3D GEOMETRIC MODELLING

List of Experiments

1. Introduction of 3D Modelling software

Creation of 3D assembly model of following machine elements using 3D Modelling software

2. Flange Coupling
3. Plummer Block
4. Screw Jack
5. Lathe Tailstock
6. Universal Joint
7. Machine Vice
8. Stuffing box
9. Crosshead
10. Safety Valves
11. Non-return valves
12. Connecting rod
13. Piston
14. Crankshaft
* Students may also be trained in manual drawing of some of the above components

21 PERIODS
(i) Part Programming - CNC Machining Centre
   a) Linear Cutting.
   b) Circular cutting.
   c) Cutter Radius Compensation.
   d) Canned Cycle Operations.
(ii) Part Programming - CNC Turning Centre
   a) Straight, Taper and Radius Turning.
   b) Thread Cutting.
   c) Rough and Finish Turning Cycle.
   d) Drilling and Tapping Cycle.

3. Computer Aided Part Programming
   e) CL Data and Post process generation using CAM packages.
   f) Application of CAPP in Machining and Turning Centre.

TOTAL: 45 PERIODS

OUTCOMES
- Ability to develop 2D and 3D models using modeling softwares.
- Ability to understand the CNC control in modern manufacturing system.
- Ability to prepare CNC part programming and perform manufacturing.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description of Equipment</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>HARDWARE</td>
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<td></td>
</tr>
<tr>
<td>1.</td>
<td>Computer Server</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Computer nodes or systems (High end CPU with atleast 1 GB main memory) networked to the server</td>
<td>30</td>
</tr>
<tr>
<td>3.</td>
<td>A3 size plotter</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Laser Printer</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>CNC Lathe</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>CNC milling machine</td>
<td>1</td>
</tr>
<tr>
<td>SOFTWARE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Any High end integrated modeling and manufacturing CAD / CAM software</td>
<td>15 licenses</td>
</tr>
<tr>
<td>8.</td>
<td>CAM Software for machining centre and turning centre (CNC Programming and tool path simulation for FANUC / Sinumeric and Heidenhain controller)</td>
<td>15 licenses</td>
</tr>
<tr>
<td>9.</td>
<td>Licensed operating system</td>
<td>Adequate</td>
</tr>
<tr>
<td>10.</td>
<td>Support for CAPP</td>
<td>Adequate</td>
</tr>
</tbody>
</table>

CS6312 DATABASE MANAGEMENT SYSTEMS LABORATORY  
L T P C  
0 0 3 2

OBJECTIVES: 
The student should be made to:
- Learn to create and use a database
- Be familiarized with a query language
- Have hands on experience on DDL Commands
• Have a good understanding of DML Commands and DCL commands
• Familiarize advanced SQL queries.
• Be Exposed to different applications

LIST OF EXPERIMENTS:
1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views, Synonyms, Sequence, Indexes, Save point.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
7. Write a PL/SQL block to satisfy some conditions by accepting input from the user.
8. Write a PL/SQL block that handles all types of exceptions.
10. Creation of database triggers and functions
11. Mini project (Application Development using Oracle/ Mysql )
    a) Inventory Control System.
    b) Material Requirement Processing.
    c) Hospital Management System.
    d) Railway Reservation System.
    e) Personal Information System.
    f) Web Based User Identification System.
    g) Timetable Management System.
    h) Hotel Management System

REFERENCE:
spoken-tutorial.org

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
• Design and implement a database schema for a given problem-domain
• Populate and query a database
• Create and maintain tables using PL/SQL.
• Prepare reports.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS

HARDWARE:
Standalone desktops 30 Nos.
(or)
Server supporting 30 terminals or more.

SOFTWARE:
Front end: VB/VC ++/JAVA or Equivalent
Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent

MG6851 PRINCIPLES OF MANAGEMENT L T P C 3 0 0 3

OBJECTIVES:
• To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization.
UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

UNIT II PLANNING

UNIT III ORGANISING

UNIT IV DIRECTING

UNIT V CONTROLLING
System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
- To understand the mechanisms of heat transfer under steady and transient conditions.
- To understand the concepts of heat transfer through extended surfaces.
- To learn the thermal analysis and sizing of heat exchangers and to understand the basic concepts of mass transfer.
(Use of standard HMT data book permitted)

UNIT I CONDUCTION

UNIT II CONVECTION

UNIT III PHASE CHANGE HEAT TRANSFER AND HEAT EXCHANGERS

UNIT IV RADIATION

UNIT V MASS TRANSFER

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to understand and apply different heat and mass transfer principles of different applications.

TEXT BOOK:

REFERENCE BOOKS:
OBJECTIVES:
- To gain knowledge on the principles and procedure for the design of Mechanical power Transmission components.
- To understand the standard procedure available for Design of Transmission of Mechanical elements
- To learn to use standard data and catalogues (Use of P S G Design Data Book permitted)

UNIT I  DESIGN OF FLEXIBLE ELEMENTS  9
Design of Flat belts and pulleys - Selection of V belts and pulleys – Selection of hoisting wire ropes and pulleys – Design of Transmission chains and Sprockets.

UNIT II  SPUR GEARS AND PARALLEL AXIS HELICAL GEARS  9
Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects – Fatigue strength - Factor of safety - Gear materials – Design of straight tooth spur & helical gears based on strength and wear considerations – Pressure angle in the normal and transverse plane- Equivalent number of teeth-forces for helical gears.

UNIT III  BEVEL, WORM AND CROSS HELICAL GEARS  9

UNIT IV  GEAR BOXES  9
Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box - Design of multi speed gear box for machine tool applications - Constant mesh gear box - Speed reducer unit. – Variable speed gear box, Fluid Couplings, Torque Converters for automotive applications.

UNIT V  CAMS, CLUTCHES AND BRAKES  9
Cam Design: Types-pressure angle and under cutting base circle determination-forces and surface stresses. Design of plate clutches –axial clutches-cone clutches-internal expanding rim clutches- Electromagnetic clutches. Band and Block brakes - external shoe brakes – Internal expanding shoe brake.

OUTCOMES:
- Upon completion of this course, the students can able to successfully design transmission components used in Engine and machines

TEXT BOOKS:

REFERENCES:
ME6603  FINITE ELEMENT ANALYSIS  

OBJECTIVES:
- To introduce the concepts of Mathematical Modeling of Engineering Problems.
- To appreciate the use of FEM to a range of Engineering Problems.

UNIT I  INTRODUCTION  

UNIT II  ONE-DIMENSIONAL PROBLEMS  

UNIT III  TWO DIMENSIONAL SCALAR VARIABLE PROBLEMS  

UNIT IV  TWO DIMENSIONAL VECTOR VARIABLE PROBLEMS  
Equations of elasticity – Plane stress, plane strain and axisymmetric problems – Body forces and temperature effects – Stress calculations - Plate and shell elements.

UNIT V  ISOPARAMETRIC FORMULATION  

TOTAL : 45 PERIODS

OUTCOMES:
- Upon completion of this course, the Students can able to understand different mathematical Techniques used in FEM analysis and use of them in Structural and thermal problem
TEXT BOOKS:

REFERENCES:

IE6504 MANUFACTURING AUTOMATION L T P C
3 0 0 3

OBJECTIVES:
- To give a brief exposure to automation principles and applications to production systems covering few types of automation.

UNIT I MANUFACTURING OPERATIONS 9
Automation in production systems, principles and strategies, Product/production relationships, Production concepts and mathematical models, Costs of manufacturing operations.

UNIT II CONTROL TECHNOLOGIES 9
Automated systems – elements, functions, levels, Continuous Vs discrete control, Computer process control, Sensors, Actuators, ADC, DAC, Programmable logic controllers – ladder logic diagrams.

UNIT III NUMERICAL CONTROL AND ROBOTICS 9

UNIT IV AUTOMATED HANDLING AND STORAGE 9

UNIT V COMPUTER-AIDED DESIGN 9
Fundamentals of CAD – design process, manufacturing database – Computer graphics – functions, constructing the geometry, transformation, wire frame Vs solid modelling.

TOTAL : 45 PERIODS

OUTCOMES:
- Ability to understand the requirements of automation in manufacturing systems.
- Knowledge in the techniques of machinery automation, shop floor automation.
- Selection of material handling systems for automated industries.
- Gaining basic knowledge in CAD systems.
REFERENCES:

AN 6611 AUTOMATION LABORATORY

OBJECTIVES:
- To train the students to write part programming using G-codes and M-codes for machining operations
- To train the students to write programming for robot control and PLC

LIST OF EXPERIMENTS
1. Part programming for CNC lathe
2. Simulation and machining practice in CNC lathe
3. Part programming for CNC Milling machine
4. Practice in CNC milling machine
5. Programming exercise for robot
6. Programming of PLC using ladder logic diagram
7. Experiments using PLC.

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to write CNC programming using G-code and M-code
- Ability to write programming for robot control
- Ability to use PLC for actuation

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS
1. CNC Lathe
2. CNC Milling Machine
3. Pick and Place Robot
4. PLC Trainer

AN 6612 DESIGN AND FABRICATION PROJECT

OBJECTIVES:
- The main objective is to give an opportunity to the student to get hands on training in the fabrication of one or more components of a complete working model, which is designed by them.

GUIDELINE FOR REVIEW AND EVALUATION
The students may be grouped into 2 to 4 and work under a project supervisor. The device/system/component(s) to be fabricated may be decided in consultation with the supervisor and if possible with an industry. A project report to be submitted by the group and the fabricated model, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 60 PERIODS
OUTCOMES:
- Use of design principles and develop conceptual and engineering design of any components.
- Ability to fabricate any components using different manufacturing tools.

GE6674 COMMUNICATION AND SOFT SKILLS - LABORATORY BASED

OBJECTIVES:
To enable learners to,
- Develop their communicative competence in English with specific reference to speaking and listening.
- Enhance their ability to communicate effectively in interviews.
- Strengthen their prospects of success in competitive examinations.

UNIT I LISTENING AND SPEAKING SKILLS
Conversational skills (formal and informal)- group discussion- making effective presentations using computers, listening/watching interviews conversations, documentaries. Listening to lectures, discussions from TV/ Radio/ Podcast.

UNIT II READING AND WRITING SKILLS
Reading different genres of tests ranging from newspapers to creative writing. Writing job applications- cover letter- resume- emails- letters- memos- reports. Writing abstracts- summaries- interpreting visual texts.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS
International English Language Testing System (IELTS) - Test of English as a Foreign Language (TOEFL) - Civil Service(Language related)- Verbal Ability.

UNIT IV INTERVIEW SKILLS
Different types of Interview format- answering questions- offering information- mock interviews- body language( paralinguistic features)- articulation of sounds- intonation.

UNIT V SOFT SKILLS
Motivation- emotional intelligence-Multiple intelligences- emotional intelligence- managing changes-time management-stress management-leadership straits-team work- career planning - intercultural communication- creative and critical thinking

TOTAL: 60 PERIODS

Teaching Methods:
1. To be totally learner-centric with minimum teacher intervention as the course revolves around practice.
2. Suitable audio/video samples from Podcast/YouTube to be used for illustrative purposes.
3. Portfolio approach for writing to be followed. Learners are to be encouraged to blog, tweet, text and email employing appropriate language.
4. GD/Interview/Role Play/Debate could be conducted off the laboratory (in a regular classroom) but learners are to be exposed to telephonic interview and video conferencing.
5. Learners are to be assigned to read/write/listen/view materials outside the classroom as well for graining proficiency and better participation in the class.
Lab Infrastructure:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment (minimum configuration)</th>
<th>Qty Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Server</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>• PIV System</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 1 GB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• OS: Win 2000 server</td>
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</tr>
<tr>
<td></td>
<td>• Audio card with headphones</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• JRE 1.3</td>
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<tr>
<td>2</td>
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<tr>
<td></td>
<td>• PIII or above</td>
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<tr>
<td></td>
<td>• 256 or 512 MB RAM / 40 GB HDD</td>
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</tr>
<tr>
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<td>• OS: Win 2000</td>
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<td></td>
<td>• Audio card with headphones</td>
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<td>• JRE 1.3</td>
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<td>Television 46&quot;</td>
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<tr>
<td>5</td>
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<tr>
<td>6</td>
<td>Cordless mike</td>
<td>1 No.</td>
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<tr>
<td>7</td>
<td>Audio Mixer</td>
<td>1 No.</td>
</tr>
<tr>
<td>8</td>
<td>DVD recorder/player</td>
<td>1 No.</td>
</tr>
<tr>
<td>9</td>
<td>LCD Projector with MP3/CD/DVD provision for Audio/video facility</td>
<td>1 No.</td>
</tr>
</tbody>
</table>

Evaluation:

Internal: 20 marks
Record maintenance: Students should write a report on a regular basis on the activities conducted, focusing on the details such as the description of the activity, ideas emerged, learning outcomes and so on. At the end of the semester records can be evaluated out of 20 marks.

External: 80 marks
- Online Test - 35 marks
- Interview - 15 marks
- Presentation - 15 marks
- Group Discussion - 15 marks

Note on Internal and External Evaluation:
1. Interview – mock interview can be conducted on one-on-one basis.
2. Speaking – example for role play:
   a. Marketing engineer convincing a customer to buy his product.
   b. Telephonic conversation- fixing an official appointment / placing an order / enquiring and so on.
3. Presentation – should be extempore on simple topics.
4. Discussion – topics of different kinds; general topics, and case studies.

OUTCOMES:
At the end of the course, learners should be able to
- Take international examination such as IELTS and TOEFL
- Make presentations and Participate in Group Discussions.
- Successfully answer questions in interviews.

REFERENCES:
2. Graded Examinations in Spoken English and Spoken English for Work downloadable materials from Trinity College, London.
GE6757          TOTAL QUALITY MANAGEMENT          L  T  P  C 
                      3  0  0  3

OBJECTIVES:  
  • To facilitate the understanding of Quality Management principles and process.

UNIT I   INTRODUCTION  9

UNIT II  TQM PRINCIPLES  9
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.

UNIT III  TQM TOOLS AND TECHNIQUES I  9
The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to benchmark, Bench marking process - FMEA - Stages, Types.

UNIT IV  TQM TOOLS AND TECHNIQUES II  9

UNIT V  QUALITY SYSTEMS  9

TOTAL: 45 PERIODS

OUTCOMES:  
  • The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

TEXTBOOK:  

Web Sources:  
http://www.slideshare.net/rohitjsh/presentation-on-group-discussion  
http://www.washington.edu/doit/TeamN/present_tips.html  
http://www.oxforddictionaries.com/words/writing-job-applications  
http://www.kent.ac.uk/careers/cv/coveringletters.htm  
http://www.mindtools.com/pages/article/newCDV_34.htm

4. Interactive Multimedia Programs on Managing Time and Stress.  
REFERENCES:

AN6701 METAL CUTTING AND TOOL DEISGN

OBJECTIVES:
• To use mechanics of various cutting processes and selection of cutting parameters.

UNIT I INTRODUCTION 9
Definition of feed, depth of cut and cutting speed. Concept of specific cutting energy in metal cutting and Numerical based on calculation of machining time on lathe, drilling machine, shaper, milling machine and grinding machines considering specific cutting energy of materials.

Theory of Metal Cutting: Orthogonal and oblique cutting, types of chips, Factors affecting the chip formation, Cutting forces in orthogonal cutting and their measurement, Merchant circle and derivation of relationships between the cutting forces, chip thickness ratio, shear angle, stress and strain in the chip, work done and power required in metal cutting, plowing forces and the 'size-effect', apparent mean shear strength of work material.

UNIT II ERNST MERCHANT THEORY 9


UNIT III MACHINABILITY 9
Machinability and its criteria, forms of tool-wear in metal cutting, tool-life and its criteria, effect of different cutting parameters on tool-life. Economics of machining and numericals. Cutting fluids, their physical action and applications.

Grinding: Specifications of grinding wheel, Mechanics of grinding, effect of grinding conditions and type of grinding on wheel behaviour, equivalent diameter of grinding wheel.

UNIT IV CUTTING TOOL DESIGN: 9
General considerations, single point tool geometry. Principles of different cutting tool materials and their important characteristics. Geometry of a drill. Basic principles of design of a single point and multiple point tools i.e broaches and twist drill.

UNIT V JIGS AND FIXTURES 9

TOTAL (L:45+T:15): 60 PERIODS

OUTCOMES:
• Knowledge in the mechanics of various cutting processes and selection of cutting parameters.
• Ability to design single / multipoint cutting tools.
• Confidence in designing and recommending jigs and fixtures

TEXT BOOKS:
ME6702 MECHATRONICS L T P C 3 0 0 3

OBJECTIVES:
• To impart knowledge about the elements and techniques involved in Mechatronics systems which are very much essential to understand the emerging field of automation.

UNIT I INTRODUCTION 12

UNIT II 8085 MICROPROCESSOR AND 8051 MICROCONTROLLER 10

UNIT III PROGRAMMABLE PERIPHERAL INTERFACE 8

UNIT IV PROGRAMMABLE LOGIC CONTROLLER 7
Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC.

UNIT V ACTUATORS AND MECHATRONIC SYSTEM DESIGN 8

TOTAL : 45 PERIODS

OUTCOMES:
• Upon completion of this course, the Students can able to design mechatronics system with the help of Microprocessor, PLC and other electrical and Electronics Circuits.

TEXT BOOKS:

REFERENCES:

ME6703 COMPUTER INTEGRATED MANUFACTURING SYSTEMS

OBJECTIVES:
- To understand the application of computers in various aspects of Manufacturing viz,, Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

UNIT I INTRODUCTION

UNIT II PRODUCTION PLANNING AND CONTROL AND COMPUTERISED PROCESS PLANNING

UNIT III CELLULAR MANUFACTURING

UNIT IV FLEXIBLE MANUFACTURING SYSTEM (FMS) AND AUTOMATED GUIDED VEHICLE SYSTEM (AGVS)

UNIT V INDUSTRIAL ROBOTICS

OUTCOME:
- Upon completion of this course, the Student can able to understand the use of computers in process planning and use of FMS and Robotics in CIM

TEXT BOOKS:

REFERENCES:

MF6711 COMPUTER AIDED SIMULATION AND ANALYSIS LABORATORY L T P C 0 0 3 2

OBJECTIVES:
- To give exposure to software tools needed to analyze engineering problems.
- 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 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.
5. Thermal stress and heat transfer analysis of plates.
7. Vibration analysis of spring-mass systems.
8. Model analysis of Beams.
9. Harmonic, transient and spectrum analysis of simple systems.

TOTAL: 45 PERIODS

OUTCOMES:
- To train the students to make use of software for simulation and analysis for various applications in the field of manufacturing engineering.

TEXT BOOKS:

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS
1. Finite Element Analysis Software
2. MATLAB Software
3. Computers with necessary accessories.

ME6712 MECHATRONICS LABORATORY L T P C 0 0 3 2

OBJECTIVES:
• To know the method of programming the microprocessor and also the design, modeling & analysis of basic electrical, hydraulic & pneumatic Systems which enable the students to understand the concept of mechatronics.

LIST OF EXPERIMENTS:
2. Stepper motor interface.
4. Speed control of DC motor.
5. Study of various types of transducers.
7. Modelling and analysis of basic hydraulic, pneumatic and electrical circuits using Software.
8. Study of PLC and its applications.
9. Study of image processing technique.

TOTAL : 45 PERIODS

OUTCOMES:
• Upon completion of this course, the Students can able to design mechatronics system with the help of Microprocessor, PLC and other electrical and Electronics Circuits.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>NAME OF THE EQUIPMENT</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Basic Pneumatic Trainer Kit with manual and electrical controls/ PLC Control each</td>
<td>1 No.</td>
</tr>
<tr>
<td>2</td>
<td>Basic Hydraulic Trainer Kit</td>
<td>1 No.</td>
</tr>
<tr>
<td>3</td>
<td>Hydraulics and Pneumatics Systems Simulation Software</td>
<td>10 No.</td>
</tr>
<tr>
<td>4</td>
<td>8051 - Microcontroller kit with stepper motor and drive circuit sets</td>
<td>2 No.</td>
</tr>
<tr>
<td>5</td>
<td>Image processing system with hardware &amp; software</td>
<td>1 No.</td>
</tr>
</tbody>
</table>

AN6711

COMPREHENSION

OBJECTIVES:
• To encourage the students to comprehend the knowledge acquired from the first Semester to Sixth Semester of B.E Degree Course through periodic exercise.

METHOD OF EVALUATION:
The students will be assessed 100% internally through weekly test with objective type questions on all the subject related topics

TOTAL : 30 PERIODS

OUTCOMES:
• ability to understand and comprehend any given problem related to mechanical engineering field.

ME6010

ROBOTICS

OBJECTIVES:
To understand the functions of the basic components of a Robot.
To study the use of various types of End of Effectors and Sensors
To impart knowledge in Robot Kinematics and Programming
To learn Robot safety issues and economics.

UNIT I  FUNDAMENTALS OF ROBOT  6
Robot - Definition - Robot Anatomy - Co ordinate Systems, Work Envelope Types and Classification-Specifications-Pitch, Yaw, Roll, Joint Notations, Speed of Motion, Pay Load- Robot Parts and their Functions-Need for Robots-Different Applications.

UNIT II  ROBOT DRIVE SYSTEMS AND END EFFECTORS  9
Pneumatic Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives-D.C. Servo Motors, Stepper Motors, A.C. Servo Motors-Salient Features, Applications and Comparison of all these Drives, End Effectors-Grippers-Mechanical Grippers, Pneumatic and Hydraulic- Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations.

UNIT III  SENSORS AND MACHINE VISION  12

UNIT IV  ROBOT KINEMATICS AND ROBOT PROGRAMMING  13
Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT V  IMPLEMENTATION AND ROBOT ECONOMICS  5
RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics

TEXT BOOKS:

REFERENCES:
AN6811  

PROJECT WORK  

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 180 PERIODS

OUTCOMES:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

ME6004  

UNCONVENTIONAL MACHINING PROCESSES

OBJECTIVES:

- To learn about various unconventional machining processes, the various process parameters and their influence on performance and their applications

UNIT I  

INTRODUCTION  6


UNIT II  

MECHANICAL ENERGY BASED PROCESSES  9


UNIT III  

ELECTRICAL ENERGY BASED PROCESSES  9


UNIT IV  

CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES  11


UNIT V  

THERMAL ENERGY BASED PROCESSES  10
Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment –Types - Beam control techniques – Applications.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to demonstrate different unconventional machining processes and know the influence of difference process parameters on the performance and their applications.

TEXT BOOK:

REFERENCES:

MG6072 MARKETING MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:
- To enable students to deal with newer concepts of marketing concepts like strategic marketing segmentation, pricing, advertisement and strategic formulation. The course will enable a student to take up marketing as a professional career.

UNIT I MARKETING PROCESS 9
Definition, Marketing process, dynamics, needs, wants and demands, marketing concepts, environment, mix, types. Philosophies, selling versus marketing, organizations, industrial versus consumer marketing, consumer goods, industrial goods, product hierarchy.

UNIT II BUYING BEHAVIOUR AND MARKET SEGMENTATION 9
Cultural, demographic factors, motives, types, buying decisions, segmentation factors - demographic - Psycho graphic and geographic segmentation, process, patterns.

UNIT III PRODUCT PRICING AND MARKETING RESEARCH 9
Objectives, pricing, decisions and pricing methods, pricing management. Introduction, uses, process of marketing research.

UNIT IV MARKETING PLANNING AND STRATEGY FORMULATION 9
Components of marketing plan-strategy formulations and the marketing process, implementations, portfolio analysis, BCG, GEC grids.

UNIT V ADVERTISING, SALES PROMOTION AND DISTRIBUTION 9

TOTAL: 45 PERIODS

OUTCOMES:
- The learning skills of Marketing will enhance the knowledge about Marketer’s Practices and create insights on Advertising, Branding, Retailing and Marketing Research.
TEXTBOOKS:

REFERENCES:

ME6002 REFRIGERATION AND AIR CONDITIONING L T P C
3 0 0 3

OBJECTIVES:
• To understand the underlying principles of operations in different Refrigeration & Air conditioning systems and components.
• To provide knowledge on design aspects of Refrigeration & Air conditioning systems

UNIT I INTRODUCTION 5
Introduction to Refrigeration - Unit of Refrigeration and C.O.P.– Ideal cycles- Refrigerants Desirable properties – Classification - Nomenclature - ODP & GWP.

UNIT II VAPOUR COMPRESSION REFRIGERATION SYSTEM 10

UNIT III OTHER REFRIGERATION SYSTEMS 8
Working principles of Vapour absorption systems and adsorption cooling systems – Steam jet refrigeration- Ejector refrigeration systems- Thermoelectric refrigeration- Air refrigeration - Magnetic - Vortex and Pulse tube refrigeration systems.

UNIT IV PSYCHROMETRIC PROPERTIES AND PROCESSES 10
Properties of moist Air-Gibbs Dalton law, Specific humidity, Dew point temperature, Degree of saturation, Relative humidity, Enthalpy, Humid specific heat, Wet bulb temperature Thermodynamic wet bulb temperature, Psychrometric chart; Psychrometric of air-conditioning processes, mixing of air streams.

UNIT V AIR CONDITIONING SYSTEMS AND LOAD ESTIMATION 12
Air conditioning loads: Outside and inside design conditions; Heat transfer through structure, Solar radiation, Electrical appliances, Infiltration and ventilation, internal heat load; Apparatus selection; fresh air load, human comfort & IAQ principles, effective temperature & chart, calculation of summer & winter air conditioning load; Classifications, Layout of plants; Air distribution system; Filters; Air Conditioning Systems with Controls: Temperature, Pressure and Humidity sensors, Actuators & Safety controls.

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of this course, the students can able to demonstrate the operations in different Refrigeration & Air conditioning systems and also able to design Refrigeration & Air conditioning systems.

TEXT BOOK:

REFERENCES:

ME6020 VIBRATION AND NOISE CONTROL

OBJECTIVES:
• The student will be able to understand the sources of vibration and noise in automobiles and make design modifications to reduce the vibration and noise and improve the life of the components

UNIT I BASICS OF VIBRATION
Introduction, classification of vibration: free and forced vibration, undamped and damped vibration, linear and non linear vibration, response of damped and undamped systems under harmonic force, analysis of single degree and two degree of freedom systems, torsional vibration, determination of natural frequencies.

UNIT II BASICS OF NOISE
Introduction, amplitude, frequency, wavelength and sound pressure level, addition, subtraction and averaging decibel levels, noise dose level, legislation, measurement and analysis of noise, measurement environment, equipment, frequency analysis, tracking analysis, sound quality analysis.

UNIT III AUTOMOTIVE NOISE SOURCES

UNIT IV CONTROL TECHNIQUES
Vibration isolation, tuned absorbers, un-tuned viscous dampers, damping treatments, application dynamic forces generated by IC engines, engine isolation, crank shaft damping, modal analysis of the mass elastic model shock absorbers.

UNIT V SOURCE OF NOISE AND CONTROL
Methods for control of engine noise, combustion noise, mechanical noise, predictive analysis, palliative treatments and enclosures, automotive noise control principles, sound in enclosures, sound energy absorption, sound transmission through barriers

TOTAL: 45 PERIODS

OUTCOMES:
• Understanding course, source and types of vibrations in machineries
• Gaining knowledge in sources and measurement standard of noise
• Ability to design and develop vibrations and noise systems.
TEXT BOOK:

REFERENCES:

ME6003 RENEWABLE SOURCES OF ENERGY L T P C
3 0 0 3

OBJECTIVES:
• The students are expected to identify the new methodologies / technologies for effective utilization of renewable energy sources.

UNIT I INTRODUCTION

UNIT II SOLAR ENERGY

UNIT III WIND ENERGY

UNIT IV BIO - ENERGY

UNIT V OTHER RENEWABLE ENERGY SOURCES

TOTAL : 45 PERIODS
OUTCOMES:

- Upon completion of this course, the students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.

TEXT BOOKS:


REFERENCES:


MA6459 NUMERICAL METHODS  

OBJECTIVES:

- This course aims at providing the necessary basic concepts of a few numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  10+3


UNIT II INTERPOLATION AND APPROXIMATION  8+3

Interpolation with unequal intervals - Lagrange’s interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION  9+3

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson’s 1/3 rule – Romberg’s method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson’s 1/3 rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS  9+3


UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS  9+3

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular
domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

**TOTAL (L:45+T:15): 60 PERIODS**

**OUTCOMES:**
- The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.

**TEXT BOOKS:**

**REFERENCES:**

**ME6001 QUALITY CONTROL AND RELIABILITY ENGINEERING**

**OBJECTIVES:**
- To introduce the concept of SQC
- To understand process control and acceptance sampling procedure and their application.
- To learn the concept of reliability.

**UNIT I**
**INTRODUCTION AND PROCESS CONTROL FOR VARIABLES**
Introduction, definition of quality, basic concept of quality, definition of SQC, benefits and limitation of SQC, Quality assurance, Quality control: Quality cost-Variation in process causes of variation – Theory of control chart- uses of control chart – Control chart for variables – X chart, R chart and σ chart -process capability – process capability studies and simple problems. Six sigma concepts

**UNIT II**
**PROCESS CONTROL FOR ATTRIBUTES**
Control chart for attributes –control chart for non conformings– p chart and np chart – control chart for nonconformities– C and U charts, State of control and process out of control identification in charts, pattern study.

**UNIT III**
**ACCEPTANCE SAMPLING**

**UNIT IV**
**LIFE TESTING - RELIABILITY**

**UNIT V**
**QUALITY AND RELIABILITY**

79
Note: Use of approved statistical table permitted in the examination.

OUTCOMES:

- Upon successful completion of this course, the students can able to apply the concept of SQC in process control for reliable component production

TEXT BOOKS:


REFERENCES:


ME6005 PROCESS PLANNING AND COST ESTIMATION

OBJECTIVE:

- To introduce the process planning concepts to make cost estimation for various products after process planning

UNIT I   INTRODUCTION TO PROCESS PLANNING

Introduction- methods of process planning-Drawing interpretation-Material evaluation – steps in process selection-.Production equipment and tooling selection

UNIT II   PROCESS PLANNING ACTIVITIES

Process parameters calculation for various production processes-Selection jigs and fixtures selection of quality assurance methods - Set of documents for process planning-Economics of process planning- case studies

UNIT III   INTRODUCTION TO COST ESTIMATION

Importance of costing and estimation –methods of costing-elements of cost estimation –Types of estimates – Estimating procedure- Estimation labor cost, material cost- allocation of over head charges- Calculation of depreciation cost

UNIT IV   PRODUCTION COST ESTIMATION

Estimation of Different Types of Jobs - Estimation of Forging Shop , Estimation of Welding Shop, Estimation of Foundry Shop

UNIT V   MACHINING TIME CALCULATION

Estimation of Machining Time - Importance of Machine Time Calculation- Calculation of Machining Time for Different Lathe Operations ,Drilling and Boring - Machining Time Calculation for Milling , Shaping and Planning -Machining Time Calculation for Grinding
OUTCOMES:
- Upon completion of this course, the students can able to use the concepts of process planning and cost estimation for various products.

TEXT BOOK:

REFERENCES:

ME6006 DESIGN OF JIGS, FIXTURES AND PRESS TOOLS L T P C 3 0 0 3

OBJECTIVES:
- To understand the functions and design principles of Jigs, fixtures and press tools
- To gain proficiency in the development of required views of the final design.

UNIT I LOCATING AND CLAMPING PRINCIPLES: 8

UNIT II JIGS AND FIXTURES 10
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.

UNIT III PRESS WORKING TERMINOLOGIES AND ELEMENTS OF CUTTING DIES 10

UNIT IV BENDING AND DRAWING DIES 10

UNIT V OTHER FORMING TECHNIQUES 7
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.

TOTAL: 45 PERIODS

Note: (Use of P S G Design Data Book is permitted in the University examination)

OUTCOMES:
- Upon completion of this course, the students can able to design jigs, fixtures and press tools.

TEXT BOOKS:

REFERENCES:
5. ASTME Fundamentals of Tool Design Prentice Hall of India.

ME6014  COMPUTATIONAL FLUID DYNAMICS  L  T  P  C
3 0 0 3

OBJECTIVES:
- To introduce Governing Equations of viscous fluid flows
- To introduce numerical modeling and its role in the field of fluid flow and heat transfer
- To enable the students to understand the various discretization methods, solution procedures and turbulence modeling.
- To create confidence to solve complex problems in the field of fluid flow and heat transfer by using high speed computers.

UNIT I  GOVERNING EQUATIONS AND BOUNDARY CONDITIONS  8

UNIT II  FINITE DIFFERENCE AND FINITE VOLUME METHODS FOR DIFFUSION  9

UNIT III  FINITE VOLUME METHOD FOR CONVECTION DIFFUSION  10
Steady one-dimensional convection and diffusion – Central, upwind differencing schemes properties of discretization schemes – Conservativeness, Boundedness, Transportiveness, Hybrid, Power-law, QUICK Schemes.

UNIT IV  FLOW FIELD ANALYSIS  9

UNIT V TURBULENCE MODELS AND MESH GENERATION 9

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the students can able
• To create numerical modeling and its role in the field of fluid flow and heat transfer
• To use the various discretization methods, solution procedures and turbulence modeling to solve flow and heat transfer problems.

TEXT BOOKS:

REFERENCES:

AN6001 MORDERN CONCEPTS OF ENGINEERING DESIGN L T P C 3 0 0 3

OBJECTIVES:
• To impart the importance of design in today’s context of global competition, environmental awareness and customer oriented market.
• To impart the basic concepts and various aspects of design using simple examples and case studies.

UNIT I DESIGN TERMINOLOGY 9
Definition- various methods and forms of design-importance of product design-static and dynamic products- various design projects- morphology of design- requirements of a good design-concurrent engineering-computer aided engineering-codes and standards-product and process cycles-benchmarking.

UNIT II DESIGN PROCESS 9
Basic module in design process-scientific method and design method-Need identification, importance of definition of problem-structured problem, real life problem- gathering information- customer requirements- Quality Function Deployment (QFD)- product design specifications- generation of alternative solutions- Analysis and selection- Detail design and drawings- Prototype, modeling, simulation, testing and evaluation (Basics only)
UNIT III CREATIVITY IN DESIGN
Creativity and problem solving-vertical and lateral thinking-invention-psychological view, mental blocks-Creativity methods-brainstorming, synectics, force fitting methods, mind map, concept map-
Theory of innovative problem solving (TRIZ) - conceptual decomposition creating design concepts.

UNIT IV HUMAN AND SOCIETAL ASPECTS
Human factors in design, ergonomics, user friendly design-Aesthetics and visual aspects
environmental aspects-marketing aspects-team aspects-legal aspects-presentation aspects.

UNIT V MATERIAL AND PROCESSES IN DESIGN
Material selection for performance characteristics of materials-selection for new design substitution
for existing design-economics of materials-selection methods-recycling and material selection-
types of manufacturing process, process systems- Design for manufacturability (DFM) - Design for
assembly (DFA).

TOTAL: 45 PERIODS

OUTCOMES:
• Understanding the Sequential steps of modern design process.
• Knowing the importance of creative thinking design.
• Knowledge in Human Factor, Environmental factors in Mechanical Design.

TEXT BOOK:

REFERENCES:
   Press, 1997
   Press,1996

ME6011 THERMAL TURBO MACHINES L T P C
3 0 0 3

OBJECTIVES:
• To understand the various systems, principles, operations and applications of different
  types of turbo machinery components.

UNIT I PRINCIPLES
Energy transfer between fluid and rotor-classification of fluid machinery,-dimensionless
parameters-specific speed-applications-stage velocity triangles-work and efficiency.

UNIT II CENTRIFUGAL FANS AND BLOWERS
Types-stage and design parameters-flow analysis in impeller blades-volute and diffusers, losses,
characteristic curves and selection, fan drives and fan noise.

UNIT III CENTRIFUGAL COMPRESSOR
Construction details, impeller flow losses, slip factor, diffuser analysis, losses and performance
curves.

UNIT IV AXIAL FLOW COMPRESSOR
Stage velocity diagrams, enthalpy-entropy diagrams, stage losses and efficiency, work done simple stage design problems and performance characteristics.

**UNIT V AXIAL AND RADIAL FLOW TURBINES**

Stage velocity diagrams, reaction stages, losses and coefficients, blade design principles, testing and performance characteristics.

**OUTCOMES:**
- Upon completion of this course, the students can able to explain the various systems, principles and applications and different types of turbo machinery components.

**TEXT BOOK:**

**REFERENCES:**

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**AN6002 NUCLEAR ENGINEERING**

**OBJECTIVES:**
- To gain some fundamental knowledge about nuclear physics, nuclear reactor, nuclear fuels, reactors and safe disposal of nuclear wastes.
- Knowledge about nuclear physics, nuclear reactor, nuclear fuels, reactors and safe disposal of nuclear wastes.

**UNIT I NUCLEAR PHYSICS**
Nuclear model of an atom-Equivalence of mass and energy-binding- radio activity-half life-neutron interactions-cross sections.

**UNIT II NUCLEAR REACTIONS AND REACTION MATERIALS**
Mechanism of nuclear fission and fusion- radio activity- chain reactions-critical mass and composition-nuclear fuel cycles and its characteristics-uranium production and purification-Zirconium, thorium, beryllium.

**UNIT III REPROCESSING**
Reprocessing: nuclear fuel cycles-spent fuel characteristics-role of solvent extraction in reprocessing-solvent extraction equipment.

**UNIT IV NUCLEAR REACTOR**
Nuclear reactors: types of fast breeding reactors-design and construction of fast breeding reactors-heat transfer techniques in nuclear reactors- reactor shielding. Fusion reactors.

**UNIT V SAFETY AND DISPOSAL**

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to understand nuclear reaction process and knowledge in nuclear fuels.
- Gaining knowledge in nuclear fuel reprocessing technology
- Understanding of nuclear power plants
- Acquiring knowledge in safety and disposal of nuclear fuels.

TEXT BOOK:

REFERENCES:

ME6007 COMPOSITE MATERIALS AND MECHANICS

OBJECTIVES:
- To understand the fundamentals of composite material strength and its mechanical behavior
- Understanding the analysis of fiber reinforced Laminate design for different combinations of plies with different orientations of the fiber.
- Thermo-mechanical behavior and study of residual stresses in Laminates during processing. Implementation of Classical Laminate Theory (CLT) to study and analysis for residual stresses in an isotropic layered structure such as electronic chips.

UNIT I INTRODUCTION, LAMINA CONSTITUTIVE EQUATIONS & MANUFACTURING

UNIT II FLAT PLATE LAMINATE CONSTITUTE EQUATIONS

UNIT III LAMINA STRENGTH ANALYSIS

UNIT IV THERMAL ANALYSIS

UNIT V ANALYSIS OF LAMINATED FLAT PLATES
10

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of this course, the students can able to analyse the fiber reinforced Laminate for optimum design
• Apply classical laminate theory to study and analyse the residual stresses in Laminate.

TEXT BOOKS:

REFERENCES:

ME6012 MAINTENANCE ENGINEERING

OBJECTIVES:
• To enable the student to understand the principles, functions and practices adapted in industry for the successful management of maintenance activities.
• To explain the different maintenance categories like Preventive maintenance, condition monitoring and repair of machine elements.
• To illustrate some of the simple instruments used for condition monitoring in industry.

UNIT I PRINCIPLES AND PRACTICES OF MAINTENANCE PLANNING
9

UNIT II MAINTENANCE POLICIES – PREVENTIVE MAINTENANCE
9
Maintenance categories – Comparative merits of each category – Preventive maintenance, maintenance schedules, repair cycle - Principles and methods of lubrication – TPM.

UNIT III CONDITION MONITORING
9
Condition Monitoring – Cost comparison with and without CM – On-load testing and offload testing – Methods and instruments for CM – Temperature sensitive tapes – Pistol thermometers – wear-debris analysis

UNIT IV REPAIR METHODS FOR BASIC MACHINE ELEMENTS 10
Repair methods for beds, slide ways, spindles, gears, lead screws and bearings – Failure analysis – Failures and their development – Logical fault location methods – Sequential fault location.

UNIT V REPAIR METHODS FOR MATERIAL HANDLING EQUIPMENT 8
Repair methods for Material handling equipment - Equipment records – Job order systems - Use of computers in maintenance.

TOTAL: 45 PERIODS

OUTCOMES:
• Upon completion of the programme, the students can able to implement the maintenance function and different practices in industries for the successful management of maintenance activities
• To identify the different maintenance categories like Preventive maintenance, condition monitoring and repair of machine elements.

TEXT BOOKS:

REFERENCES:

GE6083 DISASTER MANAGEMENT L T P C 3 0 0 3

OBJECTIVES:
• To provide students an exposure to disasters, their significance and types.
• To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
• To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
• To enhance awareness of institutional processes in the country and
• To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I INTRODUCTION TO DISASTERS 9
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOK:

REFERENCES
1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005

IE6605 PRODUCTION PLANNING AND CONTROL L T P C 3 0 0 3
OBJECTIVES:
- To understand the various components and functions of production planning and control such as work study, product planning, process planning, production scheduling, Inventory Control.
To know the recent trends like manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

UNIT I INTRODUCTION
Objectives and benefits of planning and control-Functions of production control-Types of production-job- batch and continuous-Product development and design-Marketing aspect - Functional aspects-Operational aspect-Durability and dependability aspect aesthetic aspect. Profit consideration-Standardization, Simplification & specialization- Break even analysis-Economics of a new design.

UNIT II WORK STUDY
Method study, basic procedure-Selection-Recording of process - Critical analysis, Development - Implementation - Micro motion and memo motion study – work measurement - Techniques of work measurement - Time study - Production study - Work sampling - Synthesis from standard data - Predetermined motion time standards.

UNIT III PRODUCT PLANNING AND PROCESS PLANNING
Product planning-Extending the original product information-Value analysis-Problems in lack of product planning-Process planning and routing-Pre requisite information needed for process planning-Steps in process planning-Quantity determination in batch production-Machine capacity, balancing-Analysis of process capabilities in a multi product system.

UNIT IV PRODUCTION SCHEDULING

UNIT V INVENTORY CONTROL AND RECENT TRENDS IN PPC
Inventory control-Purpose of holding stock-Effect of demand on inventories-Ordering procedures. Two bin system -Ordering cycle system-Determination of Economic order quantity and economic lot size-ABC analysis-Recorder procedure-Introduction to computer integrated production planning systems-elements of JUST IN TIME SYSTEMS-Fundamentals of MRP II and ERP.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to prepare production planning and control activities such as work study, product planning, production scheduling, Inventory Control
- They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

TEXT BOOKS:

REFERENCES:

CE6071 ADVANCED STRENGTH OF MATERIALS

OBJECTIVES:
- To analyse the stresses and deformations through advanced mathematical models.
- To estimate the design strength of various industrial equipments.

UNIT I ANALYSIS OF PLATES

UNIT II THICK CYLINDERS AND SPHERES
Equilibrium and compatibility conditions - Lame’s Theorem – Boundary conditions – distribution of radial and tangential stresses – compound cylinders – Interference fits - Stresses due to temperature distributions.

UNIT III ROTATING DISCS
Lame-Clayperon Theorem – radial and tangential stresses in discs due to centrifugal effects – boundary conditions – solid and hollow discs – Interference fit on shafts – Strengthening of the hub – residual stresses – Autofrettege – Discs of variable thickness – Disc profile for uniform strength.

UNIT IV BEAMS ON ELASTIC FOUNDATION
Infinite beam subjected to concentrated load – Boundary Conditions – Infinite beam subjected to a distributed load segment – Triangular load – Semi infinite beam subjected to loads at the ends and concentrated load near the ends – Short beams.

UNIT V CURVED BEAMS AND CONTACT STRESSES
Analysis of stresses in beams with large curvature – Stress distribution in curved beams – Stresses in crane hooks and C clamps – Contact Stresses – Hertz equation for contact stresses – applications to rolling contact elements.

OUTCOMES:
- Apply mathematical knowledge to calculate the deformation behavior of simple structures.
- Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behavior for different types of loads.

TEXT BOOKS:

REFERENCES
AN6003 PRODUCT DESIGN AND COSTING

OBJECTIVES:
- To enable the student to understand the several aspects of the design process and to apply them in practice. Also to train the student in the concept of product costing and other manufacturing economics in optimization of product design.

UNIT I PRODUCT DESIGN AND DEVELOPMENT

UNIT II ECONOMICS OF DESIGN
Breaks even point - Selection of optimal materials and processes – Material layout planning – Value analysis – Re-engineering and its impact on product development.

UNIT III PRODUCT MODELING

UNIT IV PRODUCT COSTING
Bill of materials – Outline Process charts – Concepts of operational standard time - Work measurement by analytical estimation and synthesis of time – Budgets times – Labor cost and material cost at every stage of manufacture – W.I.P. costing

UNIT V RECENT ADVANCES AND CONCEPTS IN PRODUCT DESIGN
Fundamentals of FEM and its significance to product design – Product life cycle management – Intelligent information system – Concept of Knowledge based product and process design.

TOTAL: 45 PERIODS

OUTCOMES:
- Knowledge gained in steps involved in new product development.
- Exposure to economical design of products.
- Gaining knowledge in product models.
- Understanding of product costing techniques.

TEXT BOOKS

REFERENCES:
OBJECTIVES:

- To develop and strengthen entrepreneurial quality and motivation in students and to impart basic entrepreneurial skills and understanding to run a business efficiently and effectively.

UNIT I ENTREPRENEURSHIP

UNIT II MOTIVATION
Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

UNIT III BUSINESS

UNIT IV FINANCING AND ACCOUNTING

UNIT V SUPPORT TO ENTREPRENEURS

OUTCOMES:

- Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:
• To sensitize the Engineering students to various aspects of Human Rights.

UNIT I

UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL : 45 PERIODS

OUTCOME:
• Engineering students will acquire the basic knowledge of human rights.

REFERENCES: