## I - VIII SEMESTERS CURRICULA AND SYLLABI

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OBJECTIVES:

• To enable all students of engineering and technology develop their basic communication skills in English.

• To give special emphasis to the development of speaking skills amongst the students of engineering and technology students.

• To ensure that students use the electronic media such as internet and supplement the learning materials used in the classroom.

• To inculcate the habit of reading for pleasure.

UNIT I

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

Listening - Listening and responding to video lectures / talks; Speaking - Describing a simple process (filling a form, etc.) - Asking & 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) - Lab descriptions (general/specific description of laboratory experiments) - Definitions - Recommendations; Grammar - Use of imperatives - Subject-verb agreement; Vocabulary - Compound words - Word Association; E-materials - Interactive exercises for Grammar and Vocabulary - Listening exercises with sample telephone conversations / lectures – Picture-based activities.

UNIT III

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
& effect / compare & 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
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 & acronyms; E-materials - Interactive exercises for Grammar and Vocabulary - Sample interviews - film scenes - dialogue writing.

UNIT V
Listening - Listening to different accents, Listening to Speeches / Presentations, Listening to broadcast & telecast from Radio & 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 & Vocabulary - Sending emails with attachment – Audio / video excerpts of different accents, - Interpreting posters

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

TEXT BOOKS:

REFERENCE BOOKS:

EXTENSIVE READERS

WEBSITE RESOURCES
1. www.uefap.com
2. www.eslcafe.com
3. www.listen-to-english.com
4. www.owl.english.purdue.edu
5. www.chompchomp.com

MA8151 MATHEMATICS – I L T P C
(Common to all branches of B.E. / B.Tech. Programmes) 3 1 0 4

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 9+3

UNIT II  INFINITE SERIES 9+3

UNIT III  FUNCTIONS OF SEVERAL VARIABLES 9+3

UNIT IV  IMPROPER INTEGRALS 9+3

UNIT V  MULTIPLE INTEGRALS 9+3

TOTAL : 60 PERIODS

OUTCOMES:
- This course equips students to have basic knowledge and understanding in one field of materials, integral and differential calculus

TEXT BOOKS:
REFERENCES:

PH 8151 ENGINEERING PHYSICS L T P C
(Common to ALL Branches of B.E./B.Tech. Programmes) 3 0 0 3

OBJECTIVE:
- To introduce the basic physics concepts relevant to different branches of Engineering and Technology.

UNIT I PROPERTIES OF MATTER

UNIT II ACOUSTICS AND ULTRASONICS

UNIT III THERMAL PHYSICS
UNIT IV APPLIED OPTICS


UNIT V SOLID STATE PHYSICS

Nature of bonding - growth of single crystals (qualitative) - crystal systems - crystal planes and directions - expressions for interplanar distance - coordination number and packing factor for simple structures: SC, BCC, FCC and HCP - structure and significance of NaCl, ZnS, diamond and graphite - crystal imperfections: point defects, dislocations and stacking faults - unit cell, Bravais space lattices - miller indices.

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:

REFERENCES:

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 acquaint the students with the basics of nano materials, their properties and applications.
UNIT I  CHEMICAL THERMODYNAMICS 9
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; Criteria of spontaneity; Gibbs-Helmholtz equation; Clausius-Clapeyron equation; Maxwell relations – Van’t Hoff isotherm and isochore. Chemical potential; Gibbs-Duhem equation – variation of chemical potential with temperature and pressure.

UNIT II  POLYMER CHEMISTRY 9
Introduction: Classification of polymers – Natural and Synthetic; Thermoplastic and Thermosetting. Functionality – Degree of polymerisation. Types and mechanism of polymerisation: Addition (Free Radical, cationic, anionic and living); condensation and copolymerisation. Properties of polymers: Tg, Tacticity, Molecular weight – weight average, number average and polydispersity index. Techniques of polymerisation: Bulk, emulsion, solution and suspension.

UNIT III  KINETICS AND CATALYSIS 9

UNIT IV  PHOTOCHEMISTRY AND SPECTROSCOPY 9

UNIT V  NANO CHEMISTRY 9

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

REFERENCE BOOKS

GE 8151 COMPUTING TECHNIQUES 3 0 0 3

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

UNIT II C PROGRAMMING BASICS

UNIT III ARRAYS AND STRINGS
UNIT IV  FUNCTIONS AND POINTERS  

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

GE 8152  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 and 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

Basic Geometrical constructions, Curves used in engineering practices
Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, **Scales:** Construction of Diagonal and Vernier scales.

**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

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 trapezoidal 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

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

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

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 and vanishing point method.

**COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY)**

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 BOOKS

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

PH 8161  PHYSICS LABORATORY  L T P C  0 0 2 1
(Common to all branches of B.E. / B.Tech. Programmes)

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

1. Torsional pendulum  Determination of rigidity modulus of wire and moment of
2. Non-uniform bending inertia of disc  
3. Lee’s disc Determination of Young’s modulus  
4. Potentiometer Determination of thermal conductivity of a bad conductor  
5. Air wedge Determination of thermo e.m.f. of thermocouple  
6. i. Optical fibre Determination of Numerical Aperture and acceptance angle  
   ii. Compact disc Determination of width of the groove using laser  
7. Acoustic grating Determination of velocity of ultrasonic waves in liquids  
8. Post office box Determination of Band gap of a semiconductor  
9. Spectrometer Determination of wavelength using grating  
10. Viscosity of liquids Determination of co-efficient of viscosity of a liquid by Poiseuille’s flow

TOTAL : 30 PERIODS

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.

CY 8161 CHEMISTRY LABORATORY  
(Common to all branches of Engineering and Technology)  
L T P C 0 0 2 1

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.
1. Estimation of HCl using Na₂CO₃ as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler’s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1,10-phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
14. Determination of CMC.
15. Phase change in a solid.

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

TOTAL: 30 PERIODS
REFERENCES:

GE8161 COMPUTER PRACTICES LABORATORY (Common to all branches of B.E. / B.Tech. Programmes) 0 0 3 2

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
9. Program using Recursive Function and conversion from given program to flow chart.
10. Program using structures and unions.

TOTAL: 45 PERIODS

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.
• Develop recursive programs.

GE8162 ENGINEERING PRACTICES LABORATORY (common to all branches of B.E./B.Tech. Programmes) 0 0 3 2

OBJECTIVE
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 & ELECTRICAL)

1. CIVIL ENGINEERING PRACTICE

PLUMBING
- Basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings. Preparation of plumbing line sketches.
- Laying pipe connection to the suction side of a pump – inlet.
- Laying pipe connection to the delivery side of a pump – outlet.
- Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK
- Sawing, planning and making common joints: T-Joint, Mortise and Tennon joint, Dovetail joint.

STUDY
- Study of joints in door panels, wooden furniture
- Study of common industrial trusses using models.

2. ELECTRICAL ENGINEERING PRACTICE

- Basic household wiring using switches, fuse, indicator – lamp etc.,
- Preparation of wiring diagrams
- Stair case light wiring
- Tube – light wiring
- Study of iron-box, fan with regulator, emergency lamp

GROUP – B (MECHANICAL AND ELECTRONICS)

3. MECHANICAL ENGINEERING PRACTICE

WELDING
- Arc welding of butt joints, lap joints, tee joints
- Gas welding Practice.
- Basic Machining
- Simple turning, drilling and tapping operations.
- Machine assembly Practice.
- Study and assembling the following:

...
• Centrifugal pump, mixies and air conditioners.
• Demonstration on
  (a) Smithy operations like the production of hexagonal bolt.
  (b) Foundry operation like mould preparation for grooved pulley.

4. ELECTRONIC ENGINEERING PRACTICE
• Soldering simple electronic circuits and checking continuity.
• Assembling electronic components on a small PCB and testing.
• Study of Telephone, FM radio, low-voltage power supplies.

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.

HS 8251 TECHNICAL ENGLISH II
(For all branches of B.E / B.Tech programmes)

L T P C 3 1 0 4

OBJECTIVES
• To make the students acquire listening and speaking skills meant for both formal and informal contexts.
• To help them develop their reading skills by exposing them to different types of reading strategies.
• To equip them with writing skills needed for academic as well as workplace situations.
• To make them acquire language skills at their own pace by using e-materials and language lab component.

UNIT I
Listening - Listening to informal conversations and participating; Speaking - Opening a conversation (greetings, comments on something, 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 & 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 success, thanking one’s friend / relatives); Grammar - modal verbs, Purpose expressions; Vocabulary - Phrasal verbs and their meanings, Using phrasal verbs in sentences; E-materials - Interactive exercise on Grammar and vocabulary, Extensive reading activity (reading stories / novels from links), 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 the time limit - Skimming; Writing - Minutes of meeting – format and practice in the preparation of minutes - Writing summary after reading the articles from the journals - Format for the 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 & vocabulary - Speed Reading practice exercises; Language Lab - Intonation practice using EFLU materials – Attending a meeting and writing minutes.

UNIT IV

Listening - Listening to a telephone conversation, Viewing a model interview (face-to-face, telephonic and video conferencing) and observing the practices; Speaking - Role play practice in telephone skills - listening and responding, -asking questions, -note taking – passing on messages, Role play and mock interview for grasping the 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 & 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** - 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 - Pictures for discussion; **Language Lab** - Different models of group discussion.

**TOTAL: 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.

**TEXT BOOKS:**

**REFERENCE BOOKS**

**EXTENSIVE READERS**
WEB RESOURCES
1. www.esl-lab.com
2. www.englishgrammar.org
3. www.englishclub.com
4. www.mindtools.com
5. www.esl.about.com

MA 8251 MATHEMATICS II
(Common to all branches of B.E. / B.Tech. Programmes) 3 1 0 4

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 the 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 DIFFERENTIAL EQUATIONS 9+3
Method of variation of parameters – Method of undetermined coefficients – Homogenous equation of Euler’s and Legendre’s type – System of simultaneous linear differential equations with constant coefficients.

UNIT II VECTOR CALCULUS 9+3
Gradient and directional derivative – Divergence and Curl – Irrotational and Solenoidal vector fields – Line integral over a plane curve – Surface integral and volume integral - Green’s, Gauss divergence and Stoke’s theorems – Verification and application in evaluating line, surface and volume integrals.

UNIT III ANALYTIC FUNCTION 9+3
Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions $w = z + c, az, 1/z, z^2$ - Bilinear transformation.

UNIT IV COMPLEX INTEGRATION 9+3
Line integral - Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s and Laurent’s series – Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of
real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V LAPLACE TRANSFORMS


TOTAL : 60 PERIODS

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:

PH 8251 MATERIALS SCIENCE L T P C
(3003) (Common to Manufacturing, Industrial, Mining, Mechanical, Aeronautical, Automobile and Production Engineering)

OBJECTIVE:
- To introduce the essential principles of materials science for mechanical and related engineering applications.
UNIT I  MECHANICAL PROPERTIES


UNIT II  PHASE DIAGRAMS

Solid solutions - Hume Rothery's rules - free energy of solid solution - intermediate phases - The phase rule - single component system - one-component system of iron - binary phase diagrams - isomorphous systems - the tie-line rule - the level rule - application to isomorphous system - eutectic phase diagram - peritectic phase diagram - other invariant reactions - microstructural change during cooling.

UNIT III  FERROUS ALLOYS AND HEAT TREATMENT


UNIT IV  ELECTRONIC MATERIALS

Classification of solids - energy bands - concept of Fermi level - conductor, semiconductor, insulator - Semiconductors: intrinsic, extrinsic - carrier concentration expression (qualitative) - compound semiconductors (qualitative) - dielectric materials - polarization mechanisms - dielectric breakdown - magnetic materials - ferromagnetic materials & hysteresis - ferrites - superconducting materials, properties, types and applications.

UNIT V  NEW MATERIALS AND APPLICATIONS


TOTAL : 45 PERIODS

OUTCOMES:

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

REFERENCE BOOKS:

GE 8251 ENGINEERING MECHANICS  LT P C 3 1 0 4

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

UNIT I  BASICS AND STATICS OF PARTICLES  12

UNIT II  EQUILIBRIUM OF RIGID BODIES  12
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  12
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.

TOTAL: 60 PERIODS

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 BOOK:

REFERENCES:

ME 8251  DESIGN CONCEPTS IN ENGINEERING  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-bench marking.

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 9
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 9
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 9
Material selection for performance characteristics of materials-selection for new design-substitution for existing design-economics of materials-recycling and material selection-types of manufacturing process, process systems- Design for manufacturability (DFM) - Design for assembly (DFA).

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to comprehend the steps in the new product design
- Understanding of customer equipments for new product and making specifications.
- Knowledge in the role of creativity in product design
- Ability to decide materials and processes in product development.

TEXTBOOKS:
31

REFERENCES:

PR8251 CONVENTIONAL MACHINING PROCESSES L T P C 3 0 0 3

OBJECTIVE:
• To impart the knowledge on basic concepts of various machining Processes and Machine tools.
• Classes to be supported by demonstration in the workshop and screening of video film of the various operations of the machines.

UNIT I L A T H E


UNIT II SHAVER, PLANER & SLOTTHER

UNIT III  DRILLING


UNIT IV  MILLING


UNIT V  GRINDING


TOTAL: 45 PERIODS

OUTCOME

• This course will help the students to operate the machines on their own.
• This will help the students to select the right machine to machine the products.

TEXT BOOK:


REFERENCES:

OBJECTIVES

- To impart practical knowledge in modeling.
- To get hands on experience in drafting of automotive / typical industrial components, etc.

LIST OF EXPERIMENTS:

1. Practice on Drafting software using
   Measuring Commands; Basic Draw Commands; Display Commands
   GRID, SNAP CIRCLE, LINE, ARC LIMITS, ZOOM, PAN
2. Practice on using Editing Commands; Creating Layers;
   CHANGE, ERASE, EXTEND, TRIM, GRIPS
   Construction Commands
   ARRAY, COPY, MIRROR, MOVE, OFFSET, FILLET, CHAMFER, OSNAP
3. Placing lettering on a drawing; Crosshatching a drawing
   TEXT, BHATCH
4. 2D drafting of automobile components like engine crank shaft, connecting rod etc.
5. 2D drafting of machine components.
6. 2D drafting of machine shop drawing.
7. 2D drafting of pin joints, cotter joints and bearings.

TOTAL: 45 PERIODS

OUTCOMES:
- ability to use the software packers for drafting

PR 8264

CONVENTIONAL MACHINING PROCESSES LAB

OBJECTIVES:

- To get hands on experience in the conventional machines.
- To prepare the process planning sheets for all the operations and then follow the sequences during the machining processes.

LIST OF EXPERIMENTS:

1. Study of all the conventions machines—identification of parts / Mechanisms and Position of tool and work piece.
2. Facing, plain turning /Step Turning operations in Lathe.
3. Taper Turning/ Threading, Knurling operations in Lathe.
5. Machining to make a cube using shaper.
6. Machining to make a V-Block in shaper.
7. Counter sinking, Counter Boring, Tapping operation in a drilling machine.
8. Surfacing/Pocket Milling in a vertical milling machine.
10. Flat surface grinding and cylindrical grinding operations.
11. Machining an internal spline in a slotting machine. (To prepare the process planning sheets for all the operations and then follow the sequence during the machining process)
12. To machine the given part drawing using Lathe and milling machines.

TOTAL: 45 PERIODS

OUTCOME
• The student can operate the machines without any problem.
• The student can rectify the faults occurred during the machining processes in real life.

MA 8353 NUMERICAL METHODS (Branch specific course) 3 1 0 4

OBJECTIVES:
• To provide the mathematical foundations of numerical techniques for solving linear system, eigenvalue problems, interpolation, numerical differentiation and integration and the errors associated with them;
• To demonstrate the utility of numerical techniques of ordinary and partial differential equations in solving engineering problems where analytical solutions are not readily available.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9+3

UNIT II INTERPOLATION AND APPROXIMATION 9+3
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae – Least square method - Linear curve fitting.
UNIT III  NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

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: 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:
OBJECTIVE:
- To introduce various behavior of structural components under various loading conditions.

UNIT I  INTRODUCTION  8
Definition of stress, strain and their relations – Relations between material constants – Axial loading - Statically determinate and indeterminate problems in tension & compression – Thermal stresses – Impact loading.

UNIT II  STRESSES IN BEAMS  10
Shear force & bending moment diagrams: Bending and shear stress variation in beams of symmetric sections, Beams of uniform strength - beams of two materials.

UNIT III  DEFLECTION OF BEAMS  10

UNIT IV  TORSION – SPRINGS – COLUMNS  10

UNIT V  BIAXIAL STRESSES  7
Stresses in thin-walled pressure vessels – combined loading of circular shaft with bending, torsion and axial loadings – Mohr’s circle and its construction – determination of principal stresses.

TOTAL: 45 PERIODS

OUTCOMES:
- Solve the problems related to the structural components under various loading conditions

TEXT BOOKS:
2. Timoshenko and Young “Strength of Materials” Vol. I & II

REFERENCES:
OBJECTIVE:
• To introduce fundamental concepts in thermodynamics, heat transfer, propulsion and refrigeration and air conditioning.

(Use of standard Steam tables with mollier chart and Refrigerant tables are permitted)

UNIT I BASIC THERMODYNAMICS

UNIT II AIR STANDARD CYCLES AND COMPRESSORS
Otto, Diesel, Dual combustion and Brayton cycles. Air standard efficiency. Mean effective pressure. Compressors, Classifications of compressors, Single stage and multi stage, Effect of intercooler in multi stage compressor, Perfect and imperfect intercooler, work done by the compressor, Reciprocating, Rotary, Axial, Vane compressors.

UNIT III STEAM AND JET PROPULSION
Properties of steam, Dryness fraction, Quality of steam by steam tables and Mollier chart – Rankine cycle, Work done, Steam rate – Steam Nozzles, Types of nozzles, Friction in nozzles - Simple jet propulsion system – Thrust rocket motor – Specific impulse.

UNIT IV REFRIGERATION AND AIR-CONDITIONING
Principles of refrigeration, Vapour compression – Vapour absorption types, comparison - Coefficient of performance (COP), Properties of refrigerants – Basic Principle, Summer, winter and Year round Air conditioning.

UNIT V HEAT AND MASS TRANSFER

TOTAL: 60 PERIODS

OUTCOMES:
• It helps the students to have a clear idea of application of thermodynamics and heat transfer. The student would be able to identify the applications of these techniques in their engineering fields.

TEXT BOOKS:
1. Chattopadhyay. P Engineering Thermodynamics”, oxford University Press, New Delhi,
REFERENCES:
6. Mathur & Sharma Steam Tables, Jain Publishers, New Delhi, 2005

EI8307 ELECTRICAL, ELECTRONICS AND CONTROL SYSTEMS  L T P C  3 0 0 3

OBJECTIVE:
• To study about the electrical components, electronics devices, various types of motors, Control Systems and Measuring Systems.

UNIT I BASIC ELECTRICAL COMPONENTS.
Ohm’s law, Kirchhoff’s laws, Faradaya’s law, Lenz ’s law, Transformers-principle, operation, properties, and characteristics, Motors - D.C, A.C, Servo, and Stepper-principles, operation, properties and characteristics.

UNIT II BASIC ELECTRONIC DEVICES:
R, L, C components - properties and types, Semiconductor devices – Diodes, BJT, FET, UJT, SCR, Displays – operating principles, characteristics, and applications. Rectifier and power supply circuits.

UNIT III ANALOG AND DIGITAL CIRCUITS
UNIT IV BASICS OF CONTROL SYSTEM
Introduction to control systems – open loop and closed loop, Test signals, Block diagram and signal flow graph representation, concept of pole -zero of system, realization of transfer functions. Time and Frequency response of dynamic systems, Stability analysis of control systems.

UNIT V MEASURING SYSTEMS
Measurements of Electrical quantities – voltmeter, ammeter, watt- meter, Digital Multi Meters, Cathode Ray Oscilloscopes, -frequency, phase, amplitude measurements. Recorders- tape recorder , X-Y recorders , UV recorders, Printers, Data loggers. Virtual instruments. TOTAL: 60 PERIODS

OUTCOMES:
•  The students will be able to construct analog and digital circuits with electrical and electronics component. They will be familier with the use of electrical and electronic measuring systems

TEXT BOOKS:

REFERENCES:

PR 8301 FOUNDARY AND WELDING TECHNOLOGY L T P C 3 0 0 3
OBJECTIVES:
•  To understand the principle, procedure and applications of Foundry and Welding Processes.
•  Class supported by video film shows on the various processes.
UNIT I  CASTING PROCESS

UNIT II  WELDING PROCESSES

UNIT III  SPECIAL CASTING PROCESSES

UNIT IV  SPECIAL WELDING PROCESSES

UNIT V  TESTING OF CASTINGS & WELDMENTS

TOTAL: 45 PERIODS

OUTCOMES:
- Gives a comprehensive idea about the two different methods of production process.
- Student can select the appropriate process to make a part by the right method.

TEXT BOOK:
REFERENCES:

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.
• To study the theoretical foundations of metallography, X-ray diffraction, electron diffraction, scanning electron microscopy, chemical and thermal analysis.

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS

UNIT II HEAT TREATMENT AND STRENGTHENING

UNIT III FERROUS AND NON FERROUS METALS

UNIT IV MECHANICAL PROPERTIES AND TESTING
UNIT V  CHARACTERISATION OF MATERIALS


TOTAL: 45 PERIODS

OUTCOME
- Students could understand the correlation between the structure and mechanical properties of engineering materials.
- Students could select or suggest a suitable material for any engineering application.
- Students could understand and the need, principle, procedure, applications and limitations of various characterisation techniques.

TEXT BOOKS:

REFERENCES:

EI 8313 ELECTRICAL, ELECTRONICS AND CONTROL LAB  L T P C  0 0 3 2

OBJECTIVE:
- To study and implement various types of motors and electronic measuring devices.

LIST OF EXPERIMENTS
1. Load test on single phase transformer.
2. Load test on D.C Shunt motor.
3. Load test on generator.
4. Load test on three phase Induction motor.
5. Speed control of DC Shunt motor.
11. Testing of logic gates circuits.
12. Measurement of voltage, frequency and phase using C.R.O.
13. Use of Voltmeters and Multimeters.

TOTAL: 45 PERIODS

OUTCOME
- The students will gain practical experience in designing robots in Mechatronics approach

PR 8311 METALLURGY AND MATERIALS TESTING LAB

OBJECTIVE:
- To study the testing methods and quantifying techniques for the mechanical properties of engineering materials.
- To gain practical knowledge in Microstructure analysis of various steels, Cast iron, Non ferrous Materials and Heat Treated steels.

LIST OF EXPERIMENTS
1. Tension test – using mild steel.
2. Torsion test – using mild steel.
5. Compression test for Helical spring.
6. Fatigue test (Rotary type).
7. Creep test.
11. Cooling curve – Pure metal and alloy (Pb-Sn).
12. Heat treatments of Steel-Micro structural study: Annealing/ Normalising / Quench
Hardening/ Tempering.
14. Surface Topography study using AFM/SEM/STM.

OUTCOME
- Students could acquire skill and understand the principle and procedure of performing various tests to find the structure and properties of metallic and non metallic materials.

GE8351 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 environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – 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 (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.
UNIT III  NATURAL RESOURCES
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 over-utilization of surface and ground water, floods, drought, conflicts over 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. 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. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT

UNIT V  HUMAN POPULATION AND THE ENVIRONMENT

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

REFERENCE BOOKS
OBJECTIVE:
To introduce the concepts of fluid statics viscosity and buoyancy. To make the student understand the basic laws namely, mass momentum and energy.

UNIT I BASIC CONCEPTS

UNIT II BASIC EQUATIONS OF FLUID FLOW ANALYSIS

UNIT III INCOMPRESSIBLE INVISCID FLOW
Euler’s equations of motion – Bernoulli’s equations – Applications – Methods of pressure measurement – Flow measurement – Orifice plate – Venturi meter – Irrotational flow – Stream function and velocity potential – Laplace equation – Elementary plane flows

UNIT IV INCOMPRESSIBLE VISCOUS FLOW
Fully developed laminar flow between infinite parallel plates – Laminar and turbulent flow through pipes – Velocity profiles – Energy considerations in pipe flow – Calculation of head loss Pipe flow problems – Hydraulic and energy grade lines – Moody’s diagram

UNIT V FLUID MACHINERY

TOTAL: 45 PERIODS

OUTCOMES:
Students will be able to
• Exhibit the understanding on fluid properties and fluid statics
• Demonstrate the understanding on fluid kinematics and governing equations
• Have the potential to use the governing equations for fluid flow problems and understand the elementary plane flows.
• Ability to analyse laminar and turbulent flow problems.
• Acquire the knowledge on the various types of fluid machines.

TEXT BOOKS:

REFERENCES:

<table>
<thead>
<tr>
<th>PR 8401</th>
<th>METAL CUTTING AND CNC MACHINES</th>
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OBJECTIVES:
- To understand the theory of metal cutting.
- To understand the concepts of gear manufacture.
- To understand CNC machines constructional features, working and programming.

UNIT I  TOOL MATERIAL, TOOL WEAR AND TOOL LIFE


UNIT II  MECHANICS OF METAL CUTTING


UNIT III  GEAR MANUFACTURE

| Different methods of gear manufacture — gear generation – different methods - gear hobbing, gear shaping, gear planning and bevel gear generation. gear broaching – gear finishing methods - shaving – grinding, lapping and gear honing |

UNIT IV  CNC MACHINES

| NC, CNC & DNC – types of CNC – constructional features of CNC machines - feed back devices – preset & qualified tools – Machining center – Turning center – CNC wire cut EDM. |

UNIT V  CNC PROGRAMMING


TOTAL: 45 PERIODS
OUTCOME

- Acquired knowledge will equip the candidate in selection of proper tools of required nomenclature and materials and also the replacement of tools with respect to quality requirement.

TEXT BOOKS:


REFERENCES:

5. Geoffrey Boothroyd, Winston A. Knight , “Fundamental sof Machining and Machine Tools"
OBJECTIVE:
- To understand the principle, procedure and application of Bulk Metal Forming and Sheet Metal Forming.

UNIT I FUNDAMENTALS OF METAL FORMING 9

UNIT II FORGING AND ROLLING 9

UNIT III EXTRUSION AND DRAWING PROCESSES 9

UNIT IV SHEET METAL FORMING PROCESSES 9

UNIT V POWDER FORGING AND RECENT ADVANCES 9
Powdered metals and fabrication procedures, Applications, Preparation of powders, Compacting and sintering, Yield criteria and flow rules, Hot and cold pressing (HIP, CIP) –P/M forming – Electro forming – fine blanking – Hydro forming – Peen forming – Laser Forming – Micro forming – Isothermal forging – high speed forging and extrusion near net shape forming – Ultra fine grained materials by severe plastic deformation, CAD and CAM in forming.

TOTAL: 45 PERIODS

OUTCOMES
- The students can understand load requirements for various bulk metal forming with or without addition of heat. The students can understand tooling and press capacity for making sheet metal components.
TEXTBOOKS:

REFERENCES:

PR 8451 KINEMATICS AND DYNAMICS OF MACHINES L T P C 3 1 0 4
OBJECTIVES:
• To understand the basic concepts of mechanisms and machinery.

UNITI MECHANISMS 14

UNITII FRICTION 12

UNITIII GEARING AND CAMS 12
UNIT IV BALANCING

Static and dynamic balancing – single and several masses in different planes – primary and secondary balancing of reciprocating masses – Balancing of single and multi cylinder engines – Governors and Gyroscopic effects.

UNIT V VIBRATION


TOTAL: 60 PERIODS

OUTCOME

- Students will be able to understand the concepts of mechanisms and machines
- Students can fabricate the mechanisms for their final year project work.

TEXT BOOKS


REFERENCES:


PR 8452 MACHINE COMPONENTS DESIGN

OBJECTIVE:

- To introduce the students the design and theory of common machine elements and to give experience in solving design problems.

UNIT I INTRODUCTION


UNIT II DETACHABLE AND PERMANENT JOINTS

Design of Bolts Under Static Load, Design of Bolt with Tightening/Initial Stress, Design of Bolts
subjected to Fatigue – Keys -Types, Selection of Square and Flat Keys-Design of Riveted Joints and Welded Joints.

UNIT III SHAFTS, COUPLING AND BRAKES 12
Design of Shaft –For Static and Varying Loads, For Strength and Rigidity-Design of Coupling-Types, Flange, Muff and Flexible Rubber Bushed Coupling-Design of Brakes-Block and Band Brakes.

UNIT IV GEAR AND BELT DRIVES 12
Design of Spur, Helical, Bevel and Worm Gear drives-Design of Belt drives-Flat and V Belts.

UNIT V SPRINGS AND BEARINGS 12

TOTAL: 60 PERIODS

OUTCOME
- Students can design any machine components while developing and fabricating the mechanisms considering the load conditions.
- They will be fit to become a design engineer.

TEXTBOOK:

REFERENCES:

PR 8411 METAL CUTTING AND CNC LAB 0032

OBJECTIVE:
- To expose the students to write programming, simulate and machine the various operations in CNC machines by selecting the proper tools.
- To understand the importance of tool life and replacement by measuring wear and cutting force and also to determine the various kinematic forces in terms of measuring external forces.
LIST OF EXPERIMENTS

1. Tool life study on a single point turning tool.
4. Acceptance test on RAM type milling machine as per ISI test chart & Measurement of single point tool angles.
5. Spur Gear milling in gear shaper.
6. Gear hobbing - (i) Spur Gear / Helical Gear.
7. Programming and machining of step turning and taper turning operation in CNC Lathe.
8. Programming and machining of thread cutting and grooving operation in CNC Lathe.
9. Programming and simulation for canned cycle in CNC lathe.
   (i) Stock removing in facing cycle.
   (ii) Stock removing in turning cycle.
   (iii) Grooving cycle.
   (iv) Thread cutting cycle.
11. Programming for mirroring / scaling function / Pocket milling and drilling cycle in a CNC milling.
13. Programming and Simulation in CNC Router.
14. Virtual CNC Programming & Study And Operation Of Machining / Turning Centre.

TOTAL: 45 PERIODS

OUTCOME

• Trained students will be able to understand the working of CNC machines and mechanisms of metal cutting. Acquire knowledge to in proper selection of tools.

OBJECTIVE:

• To familiarize the students with test procedures followed in forming and in foundry and also to practice various types of welding processes.

LIST OF EXPERIMENTS:
METAL FORMING LAB
2. Erichsen cupping Test.
5. Water hammer forming.
6. Determination of Power consumption in sheet rolling process and wire drawing process.
7. Determination of strain rate sensitivity index of given specimen.
8. Superplastic forming studies on Pb-Sn alloys.
10. Forward Extrusion process.
12. Simulation studies on metal forming.

WELDING
1. Oxy-acetylene gas welding of Lap joint, Butt joint and T Joint.
2. Electric arc welding of Lap joint, Butt Joint, and T Joint.
3. Welding of pipes in different positions.
5. Thermit welding of thick material like rod, plates etc.

FOUNDRY
1. Preparation of green moulding sand
   i. testing for Compression, shear, tensile, transverse strengths.
   ii. Hardness in green condition.
2. In dry condition after drying in oven at 150°C for one and half hour.
3. Permeability testing.
4. Determining the clay content.
5. Sieve analysis of dry silica sand.
6. Determining the moisture content.

TOTAL: 45 PERIODS

OUTCOME
- The students can have hands on experience on presses, welding and foundry equipments.
- It is useful for students to fabricate structure using welding machine.
OBJECTIVES:

- To understand the concept of Engineering metrology.
- To learn about metrology instruments and application for various measurements.
- To introduce the concepts of computer applications in metrology.

UNIT I   FUNDAMENTALS OF MEASUREMENT 8

UNIT II   LINEAR AND ANGULAR MEASURING SYSTEMS 10

UNIT III   MEASUREMENT OF SURFACE TEXTURE AND MEASURING MACHINES 9

UNIT IV   METROLOGY OF SCREW THREADS & GEARS 9
Metrology of screw threads & gears Internal and external screw threads – terminology - measurement of various elements of screw threads – thread micrometer – two wire and three wire - methods, gear terminology – measurement of various elements of gears pitch circle method, constant chord method, base tangent method – plug method – Rolling gear tester.

UNIT V   LASER METROLOGY AND COMPUTER AIDED METROLOGY 9

TOTAL: 45 PERIODS

OUTCOME

- Knowledge acquired will equip the students to produce quality parts by implementing the usage of right (appropriate) measuring system.
TEXT BOOKS:

REFERENCES:
2. Galyer G.N. and Shotbolt C.R. “Metrology for Engineers” ELBS 1990

PR 8502 FLUID POWER DRIVES AND CONTROLS

OBJECTIVES:
• To understand the working principle of hydraulic and pneumatic components and its selection.
• To design hydraulic and pneumatic circuits for different applications.

UNIT I INTRODUCTION TO FLUID POWER & HYDRAULICS PRINCIPLE

UNIT II FLUID POWER DRIVES
Fluid Power drives – Pumps – working principle and construction details of Gear, vane and piston pumps, Hydraulic motors, Hydrostatic transmission drives and characteristics, Hydraulic supply components Pneumatic power supply – compressors, air distribution, air motors.

UNIT III FLUID POWER ELEMENTS

UNIT IV HYDRAULIC AND PNEUMATIC CIRCUITS DESIGN
UNIT V  ELECTRO PNEUMATICS AND PLC CIRCUITS

Use of electrical timers, switches, solenoid, relays, proximity sensors etc. electro pneumatic sequencing Ladder diagram – PLC – elements, functions and selection – PLC programming – Ladder and different programming methods - Sequencing circuits.

TOTAL: 45 PERIODS

OUTCOME:
- Gives confidence to design any fluid power circuit.
- Acts as a ball to integrate various activities in a manufacturing activity.

TEXT BOOKS:

REFERENCES:

PR8503 JIGS, FIXTURES AND PRESS TOOLS  
L T P C  
3 0 0 3

OBJECTIVES:
- To introduce the concepts of various types of jigs, fixtures and dies.
- To design jig/fixture/die for a given component.

UNIT I  LOCATION AND CLAMPING DEVICES IN JIGS AND FIXTURES


UNIT II  DESIGN OF ELEMENTS OF JIGS AND FIXTURE

Design concepts of Template Jig, Plate Jig, Sandwich Jig, Vice Jaw Jig, Latch Jig, Turnover jig, Box jig – Fixtures for Milling, Grinding, Turning, Welding, and Assembly – Modular fixtures.

UNIT III  PRESS WORKING OPERATIONS AND FORMING DIES

Blanking, Piercing, lancing, notching, bending design features of dies for drawing, extrusion, wire drawing and forging.
UNIT IV  ELEMENTS OF DIE


UNIT V  DESIGN OF DIES, JIGS AND FIXTURES


TOTAL: 45 PERIODS

OUTCOMES:

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

TEXT BOOKS:


REFERENCES:


PR 8551  QUANTITATIVE TECHNIQUES IN MANAGEMENT

L T P C  3 0 0 3

OBJECTIVE:

- To introduce the various quantitative techniques and optimization techniques and to make the students apply these techniques for modeling and solving many engineering situations in general and manufacturing situations in particular.

UNIT I  LINEAR PROGRAMMING


UNIT II  REPLACEMENT MODELS AND GAME THEORY


UNIT III  QUEUING MODELS AND SIMULATION

Elements of queue – queue discipline – Poisson arrival and exponential service – queue

UNIT IV FORECASTING AND SEQUENCING

UNIT V PROJECT NETWORK ANALYSIS, LINE BALANCING AND DECISION TREE ANALYSIS
Network – CPM/PERT – Project time estimation – critical path – crashing of network; line balancing – applications; Decision tree analysis – applications

OUTCOME
The students will be able to
(i) Formulate the given problem into a suitable model
(ii) Apply the appropriate optimisation technique

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To supplement the principles learnt in kinematics and Dynamics of Machinery.
- To understand how certain measuring devices are used for dynamic Testing.
- To design and modeling using the CAD software.

DYNAMICS

LAB CAD LAB

1. Study of 3D Modelling software.
2. 3D modelling of components using solid modelling software.
3. 3D modelling and Assembly of automobile components, Joints, Bearing, Couplings etc.
4. Creation of simple solid models using CSG and B-Rep Approach
5. Surface modelling types.

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.
4. Cams – Cam profile drawing, Motion curves and study of jump phenomenon.
8. Fatigue testing – Plate, Axial.
OBJECTIVE:
- To study the functional aspects of different pneumatic and hydraulic Components and its use in circuits.
- To train the student in designing different pneumatic and hydraulic circuits for different applications.

LIST OF EXPERIMENTS
1. Study and use of pneumatic and hydraulic elements.
2. Simulation of speed control circuits in a hydraulic trainer.
3. Simulation of hydraulic circuits in a hydraulic trainer.
4. Simulation of single and double acting cylinder circuits using different directional control values.
5. One shot and regenerative pneumatic circuits.
7. Simulation of Electro-pneumatic circuits.
8. Simulation of Logic pneumatic circuits.
9. Simulation of electro pneumatic sequencing circuits.
10. Simulation of PLC based electro pneumatic sequencing circuits.
11. Simulation of pneumatic circuits using PLC.
12. To design and connect the circuits for the given problem (case study).
13. To compare the ladder diagram for electrical and PLC control for the given sequence.
14. Simulation of circuit for the given sequence using software.

TOTAL: 45 PERIODS

OUTCOME
- Will be able to automate stage by stage in present set up.
- Will be able to select the proper component for automation.
OBJECTIVE:

To practice in the various measurement methods.

LIST OF EXPERIMENTS

2. Inspection of Internal and External taper angle.
6. Inspection of screw thread parameters using three wire method.
8. Tool makers microscope- thread parameter measurement.
10. Inspection using vision measuring system.
11. Measurements using CMM.
12. Straightness measurement using Autocollimator.
14. Measurement of dimensions using LASER.

OUTCOME

They will have the knowledge of selecting the proper instruments and measuring techniques for the measurement of various quality parameters of the components.

TOTAL: 45 PERIODS

PR 8652 PRODUCTION OF AUTOMOTIVE COMPONENTS

OBJECTIVES:

• To impart knowledge in various manufacturing methods in developing automotive components.
• To study the principle of automobile engineering.

UNIT I ENGINE

Working principle of two strokes, four stroke and wankel engines – wet and dry liners – Piston and Piston rings – types – classification. Production of – Cylinder block, Cylinder head, liners, oil pan, piston and piston rings and testing.
UNIT II ENGINE PARTS
Working principle of crank shaft – Cam shaft – valve operating mechanisms – carburetors -spark plug Production of – Connecting rod – Crankshaft - push rod and rocker arm – valves – tappets – carburetors and spark plugs

UNIT III FUEL AND TRANSMISSION SYSTEM

UNIT IV CHASSIS AND SUSPENSION SYSTEM

UNIT V RECENT ADVANCES

TOTAL: 45 PERIODS

OUTCOME
- For a given automotive components the students will be able to select the proper sequence of manufacturing process and produce them.

TEXT BOOKS:

REFERENCES:
2. Newton and steels, the motor vehicle, ELBS, 1990
PR 8601  FEA AND SYSTEM SIMULATION  L T P C  3 0 0 3

OBJECTIVES:
• To introduce the concept of FEM and to apply in the field of Manufacturing Engineering.

UNIT I  INTRODUCTION  9

UNIT II  GENERAL PROCEDURE OF FET  9
Discretization of Domain selection of interpolation polynomials-Convergence requirements-Formulation of element characteristics matrices and load vectors – Assembly of element characteristics matrices-Solution of finite element equations-Post processing of results.

UNIT III  FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL AND TWO DIMENSIONAL PROBLEMS  10
One dimensional finite element analysis-Linear bar element-Quadratic bar element-Beam element-Frame elements-One dimensional heat transfer-Two dimensional finite element analysis approximation of geometry and field variables-Three nodded triangular element-Four nodded rectangular element-Six nodded triangular element-Natural coordinates and coordinate transformation – Numerical integration-Incorporation of boundary conditions

UNIT IV  ISO-PARAMETRIC ELEMENTS  9
Iso-parametric elements-Dynamic analysis-Equations of motion using Lagrange’s approach-Consistent and Lumped mass matrices-Formulation of FE equations for vibration problems-Solution of Eigen value problems-Transient vibration analysis-Thermal transients.

UNIT V  APPLICATION OF FINITE ELEMENT ANALYSIS  8

TOTAL: 45 PERIODS

OUTCOME
• For a given automotive components. The students will be able to select the proper sequence of manufacturing process and produce them.
TEXT BOOKS:

REFERENCES:

PR 8651 QUALITY CONTROL AND RELIABILITY 3 0 0 3

OBJECTIVES:
• To impart the knowledge of the quality control, control charts and application and construction of various quality control charts and the selection.
• To study the significance of design of experiments and its application.
• To train the students in the field of reliability and its estimation.

UNIT I STATISTICAL PROCESS CONTROL 9
Quality control – Definition – Quality Assurance Variation in process – Factors – control charts – variables $X_R$ and $X_\sigma$, - Attributes P, C and U-Chart Establishing and interpreting control charts process capability – Quality rating – Short run SPC.

UNIT II ACCEPTANCE SAMPLING 9
Lot by lot sampling types – probability of acceptance in single, double, multiple sampling plans – OC curves – Producer’s risk and consumer’s risk. AQL, LTPD, AOQL, Concepts Design of single sampling plan – standard sampling plans for AQL and LTPD – Use of standard sampling plans – Sequential sampling plan.
UNIT III  EXPERIMENTAL DESIGN AND TAGUCHI METHOD

UNIT IV  RELIABILITY AND ITS PREDICTION

UNIT V  FAILURE DATA ANALYSIS
Real time distribution, exponential, normal, log normal, gamma and weibull – reliability data requirements – Graphical evaluation.

TOTAL: 45 PERIODS

OUTCOME
• The students will be able to solve engineering problems in 1D, 2D problems by various methods like classical method and nodal approximation method.

TEXT BOOKS:

REFERENCES:

HS8561 EMPLOYABILITYSKILLS
(commons to all branches of Fifth or Sixth Semester B.E / B.Tech programmes)

OBJECTIVES
• To enhance the employability skills of students with a special focus on Presentation skills, Group discussion skills and Interview skills
• To help them improve their soft skills, including report writing, necessary for the workplace situations
1. Making presentations – introducing oneself – introducing a topic – answering questions
2. Creating effective PPTs – presenting the visuals effectively
3. Using appropriate body language in professional contexts – gestures, facial expressions, etc.
4. Preparing job applications - writing covering letter and résumé
5. Applying for jobs online - email etiquette
6. Participating in group discussions – understanding group dynamics - brainstorming the topic
7. Training in soft skills - persuasive skills – People skills - questioning and clarifying skills – mock GD
8. Writing Project proposals – collecting, analyzing and interpreting data / drafting the final report
9. Attending job interviews – answering questions confidently
10. Interview etiquette – dress code – body language – mock interview

TOTAL: 30 PERIODS

OUTCOME
- The students will have enough confidence to present themselves well using proper oral and written communication skills to any interview (or) discussion (or) presentation.

REFERENCE BOOKS

EXTENSIVE READERS

WEB RESOURCES
1. www.humanresources.about.com
2. www.careerride.com
OBJECTIVE:

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

LIST OF EXPERIMENTS

1. One Dimensional FEA Problem.
   a. Truss structure analysis.
   b. Cantilever beam analysis.
   c. Temperature distribution problem.

2. Two Dimensional FEA Problem.
   a. Plane stress analysis.
   b. Axisymmetric analysis.
   c. Vibration Analysis.

3. Three Dimensional FEA Problem.
   a. 3D Shell Analysis.
   b. 3D Contact Analysis.

4. FEA Application in metal forming, Metal cutting, Casting process etc.


6. Simulation of simple mechanism using solid modeling software.


TOTAL: 45 PERIODS

OUTCOME

- Students will be able to solve some engineering problems with the help of FEA simulation problems etc.

PR8612 CREATIVITY AND INNOVATIVE PROJECT

The main objective is to improve the creative and innovative aspects in the design. The project should help a rural cause and should be socially useful. The students may be grouped into small groups and work under a project supervisor. A project report to be submitted by the group, which will be evaluated by a committee constituted by the Head of the Department. Student has to take any 2 topics from the given list.

1. Design of Jigs and Fixtures.
4. Design for Manufacturability.
5. Design for Automation.

TOTAL: 45 PERIODS

OUTCOME
- Helps the student to design a system based on the constraint and difficulties in the present method.

PR 8701 COMPUTER INTEGRATED PRODUCTION SYSTEM L T P C 3 0 0 3

OBJECTIVE:
- To understand the various automated manufacturing activities.
- To study the application of computer Technology in the manufacturing activities.
- To know the smooth transition from conventional manufacturing to automated production and computer integrated manufacturing.

UNIT I INTRODUCTION TO CIM AND AUTOMATED PRODUCTION SYSTEMS 8

UNIT II MATERIAL HANDLING AND STORAGE SYSTEM 10

UNIT III GROUP TECHNOLOGY AND CELLULAR MANUFACTURING 9

UNIT IV  FLEXIBLE MANUFACTURING SYSTEM 9
FMS - Definition and Types – FMS components – Workstations, Material Handling and storage system – FMS Layout type, computer control system, Human resource – Flow chart showing various operations in FMS – Dead lock in FMS – FMS application and benefits – FMS planning and implementation issues.

UNIT V  AUTOMATED ASSEMBLY AND SHOP FLOOR CONTROL 9

OUTCOME
• The students will be in a position to apply computers to the various manufacturing activities in industries.

TEXT BOOK:

REFERENCES:
OBJECTIVE:

• To introduce various concepts of manufacturing management.

UNIT I   PRINCIPLES OF MANAGEMENT AND PERSONNEL MANAGEMENT  7

UNIT II  INVENTORY MANAGEMENT  11
Purpose of inventory – Cost related to inventory – Basic EOQ model – variations in EOQ model – Finite Production, quantity discounts – ABC Analysis – MRP.

UNIT III OPERATIONS MANAGEMENT  10

UNIT IV  FINANCIAL MANAGEMENT  10

UNIT V  MARKETING MANAGEMENT  7

TOTAL: 45 PERIODS

OUTCOMES

• The students after successful completion of the course will be in a position to manage manufacturing and manufacturing related activities in industries and will be coordinate better with other department in industries.

TEXTBOOKS:
REFERENCES:

PR 8703 MECHATRONICS FOR AUTOMATION L T P C
3 0 0 3

OBJECTIVE:
• This syllabus is formed to create knowledge in Mechatronics systems and impart the source of concepts and techniques, which have recently been applied in practical situation. It gives the frame work of knowledge that allows engineers and technicians to develop an interdisciplinary understanding and integrated approach to engineering.

UNIT I MECHATRONICS SYSTEMS AND SENSORS
9
Introduction to Mechatronics Systems, key elements, ways of integration – hardware and software. sensors – Characteristics –static and dynamic, types - linear, rotational, velocity acceleration, force, torque, flow, temperature, proximity, optical, Micro and Nano sensors, selection of sensors

UNIT II ACTUATORS
9
Electrical actuators - switches – mechanical, solid state, solenoids, relays, Motors –Types and characteristics Micro and Nano actuators, Drive circuits for various actuators. Selection of actuators.

UNIT III SYSTEM MODELS AND SIMULATION
9

UNIT IV MICROCONTROLLER AND APPLICATIONS
9
8051 processors – Architecture, Address modes, Instruction sets, simple programming exercises - Memories – different types, 8255 Programmable Peripherals interfacing – Different I/O devices, Stepper motor interface, A/D and D/A interface.
UNIT V  MECHATRONICS SYSTEM DESIGN


TOTAL: 45 PERIODS

OUTCOME
- The students will learn various components of Mechatronics system and will be able to automate the systems in Mechatronics approach.

TEXT BOOKS:

REFERENCES:

INDUSTRIAL TRAINING

OBJECTIVE:
- To provide students, training in live industries so that they can know what is happening in various departments of industries.

1. The students have to undergo practical industrial training for four weeks in recognized industrial establishments during their vacation periods.
2. At the end of the training they have to submit a report with following information:
   a. Profile of the industry
   b. Product range
   c. Organization structure
   d. Plant layout
   e. Processes/Machines/Equipments/Devices
   f. Personnel welfare schemes
   g. Details of the training undergone
   h. Projects undertaken during the training, if any
   i. Learning points
The assessments will be based equally on the report in the prescribed format and viva-voce examination by a committee nominated by the Head of the Department.

TOTAL: 45 PERIODS

OUTCOME
- The student will be very familiar on the very first day or his/her entry industry so that he/she can easily settle well entry industry in industries.

PR 8712 MANAGEMENT AND INDUSTRIAL ENGINEERING LAB

OBJECTIVE:
- To give adequate exposure to applications of software packages in the areas of Applied Statistics, Operations Research and Reliability.

MANAGEMENT LAB:
2. Use of Spreadsheet - Look up tables, Statistics.
3. Use of Reliasoft - Data analysis.
4. Simple OR Programs - Initial Solution of TP, Inventory Price Break Models.
5. Optimization Package (TORA / LINDO)
   - LP Models
   - Transportation
6. Assignment
   - Maximal flow
7. Minimal spanning tree
   - Shortest route
   - Network scheduling

INDUSTRIAL ENGINEERING LAB:
1. Peg Board Experiment.
2. Stopwatch time study.
4. Work sampling and Graphic tools for method study.
5. Effect of speed of walking on treadmill using least rate and energy expenditure.
7. Evaluation of physical fitness using step test.

TOTAL: 45 PERIODS

OUTCOME
• The student will be in a position to make decisions and do statistical analysis decision making and reliability analysis using software packages.

PR 8713 MECHATRONICS AND ROBOTICS LAB L T P C 0 0 3 2

OBJECTIVE:
• To understand the various concepts of sensors and robots.
• To impart practical knowledge in Robotic equipment, Simulation softwares and Microcontroller programming.

LIST OF EXPERIMENTS:
1. Study of characteristics of optical and temperature transducers
2. I/O port programming of an 8051 microcontroller.
3. Applications of ideal operational amplifiers.
5. PC parallel port and microcontroller interfacing of a unipolar stepper motor.
7. Modelling and Simulation of mechanisms using ADAMS.
10. Robot control with stepper motor interfacing.
11. Experimental verification of Frankenstein equation for 1 DOF robot.
12. Experiments on LVDT.
13. AC & DC power control.
14. Distance measurement using Acoustic techniques.

TOTAL: 45 PERIODS

OUTCOME
• Help them to design mechatronic system.
• To appreciate the design of proper robotic type
OBJECTIVE:
• To introduce the advanced OR models and to apply them for Engineering problems.

UNIT I INTRODUCTION 5

UNIT II CLASSIC OPTIMIZATION TECHNIQUES 10

UNIT III NON-LINEAR PROGRAMMING 9
Introduction – Lagrangeon Method – Kuhn-Tucker conditions – Quadratic programming – Separable programming – Stochastic programming

UNIT IV INTEGER PROGRAMMING 11

UNIT V DYNAMIC PROGRAMMING 10
Formulation – Application to capital budgeting, reliability improvement, shortest path, solution of LP using DP.

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:
OBJECTIVE:

- To train the students so that students will be able to design experimental designs and use these concepts for research design.

UNIT I  PROBABILITY THEORY  14
Random variables – probability density and distribution functions-moment generating and characteristic functions – Binomial, Poisson, Normal distributions and their applications.

UNIT II  SAMPLING THEORY  13
Sampling distributions – Standard error – t, F, Chi square distributions – applications.

UNIT III  ESTIMATION THEORY  5
Interval estimation for population mean, standard deviation, difference in means, ratio of standard deviations – point estimation.

UNIT IV  TESTING OF HYPOTHESIS  8
Hypothesis testing – Small samples – Tests concerning proportion, means, Standard deviations – Tests based on chi square

UNIT V  ANOVA  5
One, two factor models – Design of experiments.

TOTAL: 45 PERIODS

OUTCOME

- The student will be in a position to make statistical analysis or experimental results of project work.

TEXT BOOK:

REFERENCES:
OBJECTIVES:
- To introduce the concepts and applications of CAD.
- To introduce the various concepts and techniques used for product design and to develop product design skills.

UNIT I  INTRODUCTION TO COMPUTER AIDED DESIGN  6
Introduction to Engineering Design – Various phases of systematic design – sequential engineering and concurrent engineering – Computer hardware & Peripherals – software packages for design and drafting.

UNIT II  COMPUTER GRAPHICS FUNDAMENTALS  9

UNIT III  GEOMETRIC MODELING  10

UNIT IV  PRODUCT DESIGN CONCEPTS  12

UNIT V  PRODUCT DATA MANAGEMENT  8

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of this course, the students can able to apply geometric modeling principles to design a component and also able to manage the product data and apply product life cycle management to industrial components.

TEXT BOOK:
REFERENCES:

PR8004 DESIGN OF CASTING AND WELDMENTS L T P C
3 0 0 3

OBJECTIVES:
• At the end of this course the student should be able to understand
• Melting procedure of various materials
• Design principles of welding and casting

UNIT I MELTING AND POURING
Principles of melting practice-fluxing- Degasification and inoculation- Types of furnaces
Crucibles, Cupola, Oil fired furnaces – Electric arc and induction furnaces –Melting practice of
cast iron, SG iron, steel, aluminum and copper alloys.

UNIT II CASTING DESIGN
Solidification of pure metals and alloys-shrinkage in cast metals-design of sprue, runner, gate
and risers-problems in design and manufacture of thin and unequal sections - design for
directional solidification, minimum distortion and for overall economy - design problems of
L,T,V,X and Y junctions.

UNIT III WELD DESIGN
Design of welded components-symbolic representation of welds on drawings- residual
stresses in welds-weld distortions-design consideration-strength consideration of welded
joints-analysis of statistically loaded welded joints-welded structures subjected to fatigue loads

UNIT IV PHYSICAL METALLURGY OF WELDING
Welding of ferrous materials: Formation of different micro structural zones in welding of
carbon steels. Welding of C-Mn and low-alloy steels, phase transformations in weld and heat
- affected zones, cold cracking, role of hydrogen and carbon equivalent, formation of acicular
ferrite and effect on weld metal toughness.

UNIT V AUTOMATION
Layout of mechanized foundry – sand reclamation – material handling in foundry pollution
control in foundry — Computer aided design of casting and Automation in welding – robot
welding – safety norms.

TOTAL: 45 PERIODS
OUTCOME

- Students could design runner, rises and gating of casting and could evolve melting procedure for various alloy.
- Student could design the weld joint and evolve suitable welding procedure for various alloys.

TEXT BOOK:

REFERENCES:

PR 8005 LEAN MANUFACTURING L T P C 3 0 0 3

OBJECTIVES:
- To study the various tools for lean manufacturing (LM).
- To apply the above tools to implement LM system in an organization.

UNIT I INTRODUCTION TO LEAN MANUFACTURING 7

UNIT II CELLULAR MANUFACTURING, JIT, TPM 9
Cellular Manufacturing – Types of Layout, Principles of Cell layout, Implementation. JIT – Principles of JIT and Implementation of Kanban. TPM – Pillars of TPM, Principles and implementation of TPM.

UNIT III SET UP TIME REDUCTION, TQM, 5S, VSM 10
Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.
UNIT IV SIX SIGMA
Six Sigma – Definition, statistical considerations, variability reduction, design of experiments – Six Sigma implementation

UNIT V CASE STUDIES
Various case studies of implementation of lean manufacturing at industries.

TOTAL: 45 PERIODS

OUTCOME
• The students will be able to identify waste in any process, reduce the waste using proper kaizens and other methods thereby improving the productivity of the organisation using LM tools.

REFERENCES:

PR8006 MACHINE VISION L T P C

OBJECTIVE:
• To understand the principle, importance and application of machine vision system in Manufacturing and measurement.

UNIT I INTRODUCTION TO MACHINE VISION
Machine Vision use of machine vision – tasks for a vision system – relation to other fields – place of vision in CIM.

UNIT II IMAGE ACQUISITION AND CONVERSION

UNIT III IMAGE PROCESSING DECISION MAKING
Processing of binary images – thresholding, geometrical properties, topological properties – processing of gray scale images statistical operations, spatial operations, segmentation edge detection, morphological operations – image analysis – factors extraction – decision making.
UNIT IV  PATTERN RECOGNITION

UNIT V  MACHINE VISION APPLICATIONS
Applications in user industries automotive, semiconductor, electronic manufacturing, printing industries etc. – generic applications founding manufacturing metrology, inspection assembly verification – application analysis and implementation.

TOTAL: 45 PERIODS

OUTCOMES
- Use of machine vision techniques to pattern recognizing.
- Use of machine vision in manufacturing industries in process implementation, assembly.

TEXT BOOK:

REFERENCES:
1. Milan sonka, Vaclav hlavac, roger boyie, image processing, analysis and machine vision publisher, 1995
2. Richard O.Duda, Peter E. Hurt, Pattern Classification and Scene Analysis Publisher, 1973

OBJECTIVE:
- To introduce the concepts of Maintenance Management and it’s implementation in industries.

UNIT I  MAINTENANCE CONCEPT

UNIT II  MAINTENANCE MODELS
## UNIT III MAINTENANCE LOGISTICS


## UNIT IV REPLACEMENT MODELS

Component replacement decisions – Assumptions –Model for equipment whose operating cost increases with use – Preventive replacement age of item subject to breakdown – Preventive replacement interval/age: minimization of downtime, Capital equipment replacement decisions

## UNIT V ADVANCED MAINTENANCE


**TOTAL: 45 PERIODS**

### OUTCOME
- The student will be in a position to manage maintenance department and can plan well for maintenance schedule.

### TEXT BOOK:


### REFERENCES:


OBJECTIVE:
• To expose the students to the evolution of micro electromechanical systems, to the various fabrication techniques and to make students to be award of micro actuators.

UNIT I MATERIALS FOR MEMS AND MINIATURISATION 6

UNIT II FABRICATION PROCESSES 10

UNIT III MICROSYS TEM – WORKING PRINCIPLE AND PACKAGING 10

UNIT IV MICROSYSTEMS DESIGN 10
UNIT V   NANO TECHNOLOGY

Classification of nano structures – effect of the nanometer length scale effects of nano scale dimensions on various properties – structural, thermal, chemical, mechanical, magnetic, optical and electronic properties – effect of nanoscale dimensions on biological systems. Fabrication methods – Top down processes – bottom up process – nano positioning systems.

TOTAL: 45 PERIODS

OUTCOME

• To understand basics concepts of Nano technology and MEMS. It helps to design micro level sensors, micro-grippers, and its supporting systems.

TEXT BOOKS:


REFERENCES:


PR 8009  MICROMACHINING AND FABRICATION  L T P C
                                                        3 0 0 3

OBJECTIVE:

• To introduce the various types of micromachining processes and their Applications.

UNIT I   INTRODUCTION

Introduction to micromachining process – Classification of micromachining and nanomachining processes – Molecular dynamics, principle of molecular dynamics simulation potential energy function – Boundary condition – MD simulation procedure.
UNIT II MICROFABRICATION METHODS
Methods of microfabrication – Maleno deposition – Electro discharge depositant, Chemical vapour deposition physical vapour deposition – Electro Chemical spark deposition – LIGA.

UNIT III MECHANICAL MICROMACHINING
Ultrasonic machining – Abrasive jet machining – Abrasive water jet machining, water jet machining – Beam energy micromachining – Electron beam machining, electro discharge machining, ion beam machining, focused con beam machining.

UNIT IV MICROMACHINING AND NANO FUNCTIONING WITH ABRASIVE FLOW

UNIT V HYBRID MICRO MACHINING

OUTCOME
- To understand various micromachining techniques and able to suggest suitable micromachining for industrial components

TEXT BOOKS:

REFERENCES:

OBJECTIVE:
- To impart knowledge to the students about various non traditional machining processes and the principles of rapid prototyping.
UNIT I MECHANICAL ENERGY BASED PROCESSES


UNIT II CHEMICAL AND ELECTRO CHEMICAL ENERGY BASED PROCESSES


UNIT III ELECTRICAL ENERGY BASED PROCESSES


UNIT IV THERMAL ENERGY BASED PROCESSES

Laser Beam machining (LBM), Plasma Arc machining (PAM) and Electron Beam Machining (EBM), Principle – Equipment – Types – Applications – Ion Beam Machining (IBM)

UNIT V RAPID PROTOTYPING AND RAPID TOOLING


TOTAL: 45 PERIODS

OUTCOME

- The students will be in a position to select and employ a particular non traditional machining process as well as a rapid prototyping technique based upon the application in industries.

TEXT BOOKS:


REFERENCES:


PR 8012 NON DESTRUCTIVE TESTING METHODS L T P C 3 0 0 3

OBJECTIVES:
• To understand principle behind various NDT techniques.
• To study about NDT equipments and accessories.
• To learn working procedures of various NDT techniques.

UNIT I  NON-DESTRUCTIVE TESTING: AN INTRODUCTION  6
Introduction to various non-destructive methods – Comparison of Destructive and Non destructive Tests, Visual Inspection, Optical aids used for visual inspection, Applications.

UNIT II  LIQUID PENETRANT TESTING AND MAGNETIC PARTICLE TESTING  10
Physical principles, procedure for penetrant testing, Pentrant testing materials, Penetrant testing methods – Applications Principle of MPT, Magnetising technical and procedure used for testing a component, Equipment used for MPT, Applications.

UNIT III  EDDY CURRENT TESTING AND ACOUSTIC EMISSION TESTING  10

UNIT IV  ULTRASONIC TESTING  10
PRINCIPLE, Ultrasonic transducers, Inspection Methods – Normal incident pulse-echo Inspection, through – transmission testing, angle Beam Pulse-echo testing, Techniques A-Scan, B-Scan, C-Scan – Applications.

UNIT V  RADIOGRAPHY, COMPARISON AND SELECTION OF NDT METHODS  9
Basic principle, Effect of radiation of Film, Radiographic Imaging – Inspection Techniques – Single wall single image, Double wall Penetration & Multiwall Penetration technique – Comparison and selection of various NDT techniques.

TOTAL: 45 PERIODS

OUTCOMES
• Ability to defect the flow and other defects using non destructive testing procedure for industrial component.

TEXT BOOKS:
REFERENCES:
3. www.ndt.net

PR 8013 OPERATIONS PLANNING AND COST ESTIMATION  L T P C
3 0 0 3

OBJECTIVES:
• To develop good process planning capabilities.
• To impart the knowledge on cost estimation of a given product.

UNIT I PROCESS PLANNING

UNIT II ESTIMATION, COSTING AND ELEMENTS OF COST

UNIT III ANALYSIS OF OVERHEAD EXPENSES & METHODS OF DEPRECIATION

UNIT IV ESTIMATION OF COSTS FOR FORGING, CASTING AND WELDING

UNIT V ESTIMATION OF MACHINING TIME
Estimation in Machine-shop – Introduction – Machining times and allowances – General term

TOTAL: 45 PERIODS

OUTCOME

- The student will be in a position to develop process planning sheets for manufacturing various components and decide a selection of machines, equipment etc.

TEXT BOOKS:


REFERENCES:

1. G.B.S. Narang and V.Kumar, “Production and costing”, Khanna publishers, 2000

PR8014 PLANT LAYOUT AND MATERIAL HANDLING SYSTEMS L T P C 3 0 0 3

OBJECTIVE:

- To introduce the concepts of Plant Layout and Materials Handling Systems and their Applications in industry.

UNIT I INTRODUCTION


UNIT II PLANT LAYOUT

Layout for mass production – types of facilities and layouts used for different levels of production quantity and product variety – Single model and mixed model production lines – Flow line production layouts Set up time – Change over times – Manufacturing Support Systems – Automation migration strategy composite part concept – machine cell design – Arranging machines in a G.T. Cell.
UNIT III MATERIAL HANDLING

UNIT IV ANALYSIS OF MATERIAL TRANSPORT SYSTEMS
Charting techniques in material handling – Analysis of vehicle based systems – Conveyor analysis – Single direction conveyor – Recirculating conveyor analysis.

UNIT V STORAGE SYSTEMS
Storage system performance – Comparison of storage strategies – storage location strategies conventional and automated storage systems. Automated storage and retrieval systems – Engineering Analysis of storage systems.

OUTCOME
1. The student will be in a position to develop good plant layouts and material handling system.

TEXT BOOKS:

REFERENCES:

OBJECTIVE:
1. To impart knowledge in the increasing quality concepts of parts, accuracy requirement of machine tools and also to introduce latest topics in manufacturing like micro machining and smart materials so as to equip them to produce precision parts and to join core electronic manufacturing industries.
UNIT I CONCEPT OF ACCURACY AND OF MACHINE TOOLS 8

UNIT II STIFFNESS, THERMAL EFFECTS AND FINISH MACHINING 10

UNIT III DIMENSIONING, CLAMPING AND SETTING ERRORS AND ERRORS DUE TO LOCATION 11

UNIT IV MICRO-MACHINING AND MICRO FABRICATION 8

UNIT V SMART STRUCTURES, MATERIALS AND MICRO ACTUATORS 8

TOTAL: 45 PERIODS

OUTCOMES
- Upon completion of this course the student can able to use of quality concepts parts, accuracy requirements of machine tools and use of latest machining process such as micro machining and micro fabrication.

TEXTBOOKS:
REFERENCES:

PR 8016 PROCESSING OF POLYMERS AND COMPOSITES
L T P C
3 0 0 3

OBJECTIVES:
• To study matrix material, particulates and fibres of polymer matrix composites, MMC and ceramic matrix composites.
• To develop knowledge on processing, interfacial properties and application of computers.

UNIT I INTRODUCTION TO POLYMERs

UNIT II PROCESSING OF POLYMERS
UNIT III  INTRODUCTION TO FIBRES AND COMPOSITE MATERIALS


UNIT IV  PROCESSING OF POLYMER MATRIX COMPOSITES


UNIT V  PROCESSING OF – METAL MATRIX COMPOSITES AND CERAMIC MATRIX COMPOSITES


TOTAL: 45 PERIODS

OUTCOMES

• Ability to select suitable matrix, reinforce materials for polymer matrix composites, metal matrix composites and ceramics matrix composites

TEXT BOOK:


REFERENCES:

OBJECTIVE:

- To introduce the various aspects of Purchasing And Materials Management.

**UNIT I  FUNCTIONS OF MATERIALS MANAGEMENT**

Introduction to materials management – objectives – organization – Functions – operating cycle – value analysis – make or buy decisions.

**UNIT II  PURCHASING MANAGEMENT**


**UNIT III  STORES MANAGEMENT**


**UNIT IV  INVENTORY MANAGEMENT**


**UNIT V  QUANTITATIVE TECHNIQUES IN MATERIAL MANAGEMENT**


**TOTAL: 45 PERIODS**

**OUTCOMES**

- To explain the functions and structure of materials, purchase and store management
- To perform analysis on materials planning
- To perform calculation using different inventory models.

**TEXT BOOKS:**


**REFERENCES:**

OBJECTIVE:
• By considering various constraints like material chart, process attributes, Material cost, recyclability, materials are selected for the engineering components.

UNIT I MATERIALS AND PROPERTIES

UNIT II FACTORS IN SELECTION PROCESS
Design process - types of design, design requirements, function, Material attributes. Shape and Manufacturing processes - Materials processing and design processes and their influence on design, Process attributes, Systematic process selection, Process selection diagrams, Process cost, Energy consumption for production, Material costs, availability and recyclability, Environmental consideration.

UNIT III MATERIALS SELECTION PROCESS
Materials selection methods: Screening, Ranking - weighted ranking, Performance indices - Materials selection charts, Deriving property limits and material indices, Structural indices. Shape factors, Efficiency of standard sections, Material limits for shape factors, Material indices which include shape-microscopic or micro structural shape factor, Co-selecting material and shape.

UNIT IV CASE STUDIES ON APPLICATIONS
Automobile materials (Body and Crank shaft), Marine structural materials (Hull and Propeller), Aircraft structural materials (Wings and landing gears), Materials for space (Gas turbines and Nose), Materials for power generation machinery (Boilers and Pressure vessels), Materials for medical applications (Surgical knives and Bone replacements), Chemical and petrochemical industries (Acid storage tanks and Fuel carrying pipes).

UNIT V SUBSTITUTION OF MATERIALS & MINI PROJECT WORK
Environmental design, Economics and environmental impact of materials, Hybrid materials: composites, sandwich structure, lattices and segmented structure, case studies on hybrid materials, polymer foams, Natural Biomaterials and Implantable Biomaterials. Students will carry out a materials selection exercise for a hypothetical design project, identifying selection parameters and potential materials.

TOTAL: 45 PERIODS
OUTCOME

- It gives in sight of various metallurgical properties of materials and to suggest suitable material for real time application with considering design constraints.

TEXT BOOK:


REFERENCES:


PR8071 ELECTRONIC MATERIALS AND PROCESSING L T P C
3 0 0 3

OBJECTIVE:

- To introduce the technology behind electronic materials and processing and their applications.

UNIT I INTRODUCTION

Overview of semiconductors and other basic materials - Plastics, Elastomers, and Composites -tables with material properties, terms and definitions, trade names, and material structure correlation, MEMS.

UNIT II ORGANIC MATERIALS AND PROCESSES

Types and properties of organic materials, manufacturing technique –Vacuum Metallization, Vapour phase deposition, Thermal Imaging, Digital Lithography, Application areas.

UNIT III MEMS MATERIALS AND PROCESS

MEMS design process- Methods, Selection of materials for process, Optimization techniques in design, Over view of additive process for –Semiconductors , Dielectric materials, Metals, and Polymer Materials, Piezo electric materials, Shape memory alloys , Micromachining techniques, packaging methods.
UNIT IV MATERIALS SYSTEMS

UNIT V THERMAL MANAGEMENT OF MATERIALS AND SYSTEMS
Temperature effects on circuit operation and physical construction. Laws of heat transfer mechanism and their considerations in the manufacturing process. Thermal management in packaging of electronic materials

OUTCOME
- The students will be able to identify and select electronics materials in designing MEMS under different techniques by taking care of temperature effects.

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:

PR 8072 ENERGY MANAGEMENT

AIM:
To instruct the importance of energy conservation in both thermal and electrical energy and its management for the better utilization of resources.

OBJECTIVE:
At the end of the course, the student expected to
- Understand and analyze the plant energy data
- Energy audit and suggest methodologies for energy savings
- Energy accounting and balance and
- Able to utilize the available resources in optimal way

UNIT I IMPORTANCE OF ENERGY CONSERVATION AND MANAGEMENT
UNIT II  ELECTRICAL SYSTEMS
AC / DC current systems, Demand control, power factor correction, load management, Motor drives : motor efficiency testing, energy efficient motors, motor speed control – Lighting : lighting levels, efficient options, day lighting, timers, Energy efficient windows – electrical distribution systems – Transformers – Power quality – harmonic distortion.

UNIT III  THERMAL SYSTEMS

UNIT IV  ENERGY CONSERVATION
Energy conservation in Pumps, Fans (flow control) and blowers, Compressed Air Systems, Refrigeration and air conditioning systems – Waste heat recovery recuperators, heat sheets, heat pipes, heat pumps.

UNIT V  ENERGY MANAGEMENT, ECONOMICS

OUTCOME
- The student will be in a position to plan for energy saving machinery, energy economy equipment

TEXT BOOK:

REFERENCES:
OBJECTIVE:

• To introduce the concepts of economics as applied to Engineering and Management of Finance in business.

UNIT I FINANCIAL ACCOUNTING 12

UNIT II PROFIT VOLUME ANALYSIS 10

UNIT III WORKING CAPITAL MANAGEMENT 8

UNIT IV CAPITAL BUDGETING 7
Significance of capital budgeting – payback period – present value method – Accounting rate of return method.

UNIT V ENGINEERING ECONOMICS 8

TOTAL: 45 PERIODS

OUTCOME

• The student will be in a position to plan for finance and budget and will be able to manage finance.

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
- This course aims to provide students with knowledge on the theories, eco-design concepts, methods, and relevant hands-on experience for designing a range of sustainable green electronic products. It is expected that students will develop their ability to address relevant issues on environmental impact; product design, operating life, and the 3R concept (reduce, reuse, and recycle).

UNIT I INTRODUCTION TO GREEN ELECTRONICS
Environmental concerns of the modern society- Overview of electronics industry and their relevant regulations in China, European Union and other key countries- global and regional strategy and policy on green electronics industry. Restriction of Hazardous substances (RoHS) - Waste Electrical and electronic equipment (WEEE - Energy using Product (EuP) and Registration - Evaluation, Authorization and Restriction of Chemical substances (REACH).

UNIT II GREEN ELECTRONICS MATERIALS &PRODUCTS
Introduction to green electronic materials and products - Lead (Pb) -free solder pastes, conductive adhesives, halogen-free substrates and components. Substitution of non-recyclable thermosetting polymer based composites with recyclable materials X-Ray Fluorescence (XRF) for identifying hazardous substances in electronic products.

UNIT III GREEN ELECTRONICS ASSEMBLY AND RECYCLING
Various processes in assembling electronics components - the life-cycle environmental impacts of the materials used in the processes - substrate interconnects . Components and process equipments used. Technology and management on e-waste recycle system construction, global collaboration, and product disassembles technology.

UNIT IV PRODUCT DESIGN AND SUSTAINABLE ECO-DESIGN
Stages of product development process in green design: Materials- Manufacturing - Packaging and use - End of Life and disposal - Design for recycling - Life Cycle Assessment (LCA), and Eco-design tools - Environmental management systems, and International standards - Eco-design in electronics industry.

UNIT V CASE STUDIES

TOTAL: 45 PERIODS
OUTCOME
• The students will be able to design reliable range of sustainable green electronic products
  Without wastages By taking into account various environmental conditions

TEXT BOOKS:

REFERENCES:
2. Green Communications and Networks, by Yuhang yang and Maode Ma, Springer Publication, 2005

PR 8075 ROBOTIC ENGINEERING L T P C
3 0 0 3

OBJECTIVE:
• To study the kinematics, drive systems and programming of robots.

UNIT I  FUNDAMENTALS OF ROBOT 7

UNIT II  ROBOT DRIVE SYSTEMS AND END EFFECTORS 10

UNIT III  SENSORS IN ROBOTICS 8
Force sensing, touch and tactile sensors, proximity sensors, non contact sensors, safety considerations in robotic cell, proximity sensors, fail safe hazard sensor systems, and compliance RCC. Machine vision system - camera, frame grabber, sensing and digitizing image data – signal conversion, image storage, lighting techniques, image processing and analysis – data reduction, segmentation, feature extraction, object recognition, other algorithms, applications – Inspection, identification.
UNIT IV  ROBOT KINEMATICS AND PROGRAMMING  12
Forward kinematics, inverse kinematics and the difference: forward kinematics and Reverse
Kinematics of Manipulators with two, three degrees of freedom (in 2 dimensional), four degrees
of freedom (in 3 dimensional) – derivations and problems. Homogeneous transformation
matrices, translation and rotation matrices D-H transformation - Teach pendant programming,
lead through programming, robot programming languages – VAL programming – Motion
Commands, Sensors commands, End-Effector Commands, and simple programs.

UNIT V  APPLICATIONS OF ROBOT  8
Role of robots in inspection, assembly, material handling, underwater, space and medical
fields, Humanoid robots.

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

TEXT BOOKS:
1. Groover M.P., Industrial Robotics – Technology, Programming and applications,

REFERENCES:
1. Fu K.S. GonzalchR.C. and ice C.S.G.Robotics Control, Sensing, Vision and Intelligence,

PR8076  SENSORS AND CONTROL SYSTEMS IN MANUFACTURING  L T P C
                    3 0 0 3

OBJECTIVE:
• To introduce concepts of sensors and control systems and their applications in Manufacturing.

UNIT I  INTRODUCTION  9
Sensor Fundamental, Classification and Types of Sensors, Desirable Sensor Attributes,
Sensor Performance and Power dissipation -a trade off, Self Checking and Self Compensating
Sensors- Sensor for Work Pieces and Product Monitoring.

UNIT II  SENSOR IN PRECISION MANUFACTURING  9
Identification of Manufactured Components, Digital Encoders, Opto Electronic Color Sensors-
Principles, Properties, Features and Control Applications in Robotics.
UNIT III  SENSORS AND CONTROL IN CIM AND FMS


UNIT V  RECENT TRENDS IN SENSOR AND CONTROL SYSTEM

Fiber Optics in Sensor and Control System.- Fibre Optics Parameters, Configurations, Photo Electric Sensor for Long Distance, Sensor Alignment Techniques, Sensors for Biomedical Technology.

TOTAL: 45 PERIODS

OUTCOME

• The students will be able to design and control various manufacturing process using suitable sensors and control techniques.

TEXT BOOK:


REFERENCE:


PR8077 SURFACE ENGINEERING  L T P C 3 0 0 3

OBJECTIVE:

• To study the surface preparation techniques
• To import knowledge on thermal spraying process and electrodeposited coating
• To study the process of Hot dip and diffusion coating
• To induce the testing procedure for surface coating

UNIT I  METAL CLEANING AND PREVIEW ON SURFACE ENGINEERING

processes.

UNIT II THERMAL SPRAYING PROCESSES AND ELECTRODEPOSITED COATINGS


UNIT III HOT DIP COATING AND DIFFUSION COATINGS


UNIT IV NON-METALLIC COATING OXIDE AND COVERSION COATINGS


UNIT V QUALITY ASSURANCE, TESTING AND SELECTION OF COATINGS


TOTAL: 45 PERIODS

OUTCOMES:
- Explain the important of surface engineering to industries
- Use of thermal spray for coating
- Explain the process and mechanism of different diffusion coating process
- Explain the methods of non metallic coating
- Explain the testing procedure for quality assurance.

REFERENCES:
OBJECTIVES:
- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I  HUMAN VALUES

UNIT II  ENGINEERING ETHICS

UNIT III  ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law – The Challenger Case Study

UNIT IV  SAFETY, RESPONSIBILITIES AND RIGHTS

UNIT V  GLOBAL ISSUES

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society

TEXTBOOK
REFERENCES:

WEB SOURCES:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

MG8654 TOTAL QUALITY MANAGEMENT

AIM
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES
- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Quality statements - Customer focus –Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Continuous process improvement – PDCA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.
UNIT III  TQM TOOLS & TECHNIQUES I

UNIT IV  TQM TOOLS & TECHNIQUES II

UNIT V  QUALITY SYSTEMS

TOTAL : 45 PERIODS

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

TEXT BOOK:

REFERENCE BOOKS:

ME8081  RELIABILITY CONCEPTS IN ENGINEERING

L T P C
3 0 0 3

OBJECTIVE:
• To impart knowledge in reliability concepts, reliability estimation methods and reliability improvement methods

UNIT I  RELIABILITY CONCEPT
Reliability definition –Reliability parameters- f(t), F(t) and R(t) functions- Measures of central tendency – Bath tub curve – A priori and posteriori probabilities of failure – Component mortality - Useful life.
UNIT II LIFE DATA ANALYSIS


UNIT III RELIABILITY ESTIMATION

Series parallel configurations – Parallel redundancy – m/n system – Complex systems: RBD approach – Baye’s method – Minimal path and cut sets - Fault Tree analysis – Standby system.

UNIT IV RELIABILITY MANAGEMENT


UNIT V RELIABILITY IMPROVEMENT


TOTAL: 45 PERIODS

OUTCOME

• The students will be able to do reliability estimation failure analysis, reliability improvement.

REFERENCES:


GE8072 DISASTER MANAGEMENT

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

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, Scenarios in the Indian context, Disaster damage assessment and management.

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

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:
1. The students in batches (not exceeding three in a batch) have to take up a project in the area of Production engineering.

2. Each batch is guided by a faculty member. The students have to select a suitable problem/design, prepare the drawings, produce the components, assemble and commission the project/develop a software with analysis.

3. The students have to prepare and present a detailed project report at the end of the VIII Semester

4. The evaluation will be made for the continuous internal assessment for the Project by a committee nominated by the Head of the Department.