### B.E. INDUSTRIAL ENGINEERING

1 – VIII SEMESTERS CURRICULA AND SYLLABI

#### SEMESTER I

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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.

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

TOTAL: 60 PERIODS

OUTCOMES:
Learners should be able to

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

TEXT BOOKS:
REFERENCES:

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
(Common to all branches of B.E. / B.Tech. Programmes in I Semester) 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

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties of
eigenvalues and eigenvectors – Cayley-Hamilton Theorem – Diagonalization of matrices –
Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of
quadratic forms.

UNIT II  INFINITE SERIES

Sequences – Convergence of series – General properties – Series of positive terms – Tests
of convergence (Comparison test, Integral test, Comparison of ratios and D’Alembert’s ratio
test) – Alternating series – Series of positive and negative terms – Absolute and conditional
convergence – Power Series – Convergence of exponential, logarithmic and Binomial Series.

UNIT III  FUNCTIONS OF SEVERAL VARIABLES

Limits and Continuity – Partial derivatives – Homogeneous functions and Euler’s theorem
– Total derivative – Differentiation of implicit functions – Change of variables – Jacobians –
Partial differentiation of implicit functions – Taylor’s series for functions of two variables –
Errors and approximations – Maxima and minima of functions of two variables – Lagrange’s
method of undetermined multipliers.

UNIT IV  IMPROPER INTEGRALS

Improper integrals of the first and second kind and their convergence – Evaluation of integrals
involving a parameter by Leibnitz rule – Beta and Gamma functions – Properties – Evaluation
of integrals using Beta and Gamma functions – Error functions.

UNIT V  MULTIPLE INTEGRALS

Double integrals – Change of order of integration – Double integrals in polar coordinates –
Area enclosed by plane curves – Triple integrals – Volume of Solids – Change of variables in
double and triple integrals – Area of a curved surface.

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:

PH8151 ENGINEERING PHYSICS
(Common to ALL Branches of B.E./B.Tech. Programmes)

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
Interference – Michelson interferometer: construction, working, determination of wave length and thickness – anti-reflection coating – air wedge and its application – Lasers – Einstein’s coefficients – CO₂, Nd:YAG and semiconductor lasers - homo junction and hetro junction -

UNIT V SOLID STATE PHYSICS


TOTAL : 45 PERIODS

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 develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
- To acquaint the students with the basics of nano materials, their properties and applications.

UNIT I CHEMICAL THERMODYNAMICS

Second law: Entropy - entropy change for an ideal gas, reversible and irreversible processes; entropy of phase transitions; Clausius inequality. Free energy and work function: Helmholtz and Gibbs free energy functions; 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

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


UNIT IV PHOTOCHEMISTRY AND SPECTROSCOPY


UNIT V NANOCHEMISTRY


OUTCOMES:

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

TEXT BOOKS:

REFERENCES:
2. K. K. Rohatgi-Mukherjee, “Fundamental of Photochemistry” New Age International (P)
   Ltd., New Delhi, 1986.
4. V.R.Gowariker, N.V.Viswanathan and Jayadev Sreedhar, “Polymer Science”, New Age

GE8151 COMPUTING TECHNIQUES

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
Generation and Classification of Computers- Basic Organization of a Computer – Number
System – Binary – Decimal – Conversion – Problems. Need for logical analysis and thinking
– Algorithm – Pseudo code – Flow Chart.

UNIT II C PROGRAMMING BASICS
Problem formulation – Problem Solving - Introduction to ‘C’ programming – fundamentals
– structure of a ‘C’ program – compilation and linking processes – Constants, Variables –
Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations –
Decision Making and Branching – Looping statements – solving simple scientific and statistical
problems.

UNIT III ARRAYS AND STRINGS
Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String-

UNIT IV FUNCTIONS AND POINTERS
Function – Definition of function – Declaration of function – Pass by value – Pass by reference
– Recursion – Pointers - Definition – Initialization – Pointers arithmetic – Pointers and arrays-
Example Problems.
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.

TOTAL : 45 PERIODS

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:

GE8152 ENGINEERING GRAPHICS

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

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 14
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 14
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 14
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 15
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) 3
Introduction to drafting packages and demonstration of their use.

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.

TOTAL: 75 PERIODS
TEXT BOOK:

REFERENCES:

PUBLICATION OF BUREAU OF INDIAN STANDARDS:

SPECIAL POINTS APPLICABLE TO UNIVERSITY EXAMINATIONS ON ENGINEERING GRAPHICS:
1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
4. The examination will be conducted in appropriate sessions on the same day
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 inertia of disc
2. Non-uniform bending  Determination of young’s modulus
3. Lee’s disc  Determination of thermal conductivity of a bad conductor
4. Potentiometer  Determination of thermo e.m.f. of thermocouple
5. Air wedge  Determination of thickness of a thin sheet of paper
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.
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.

TOTAL: 30 PERIODS

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

REFERENCES:
• 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)

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 AND 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 Tenon 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.
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

HS8251 TECHNICAL ENGLISH II L T P C (FOR ALL BRANCHES OF B.E / B.TECH PROGRAMMES) 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:

REFERENCES:

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
OBJECTIVES:

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

UNIT I  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

UNIT IV  COMPLEX INTEGRATION 9+3

UNIT V  LAPLACE TRANSFORMS 9+3
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:

PH8251 MATERIALS SCIENCE L T P C
(Common to Manufacturing, Industrial, Mining, Mechanical, Aeronautical, Automobile and Production Engineering) 3 0 0 3

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 BOOKS :

REFERENCES :
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

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICITION AND ELEMENTS OF RIGID BODY DYNAMICS  12
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 BOOKS:


REFERENCES:


EE8202  FUNDAMENTALS OF ELECTRICAL ENGINEERING  L T P C
                                                   3 0 0 3

AIM:
To provide knowledge in the basic concepts of circuits, electrical machines and measurement techniques.

OBJECTIVE:
To impart knowledge on
- Electric circuit laws
- Principle of Electrical Machines
- Various measuring instruments
UNIT I  ELECTRIC CIRCUITS

UNIT II  DC MACHINES

UNIT III  TRANSFORMER AND THREE-PHASE CIRCUITS

UNIT IV  AC MACHINES

UNIT V  MEASUREMENTS
Classification of instruments – moving coil and moving iron ammeter and Voltmeter – Multimeters – dynamometer type Wattmeter– energy meter – megger – Instrument transformer (CT & PT)

TOTAL : 45 PERIODS

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

TEXT BOOKS:

REFERENCES
OBJECTIVE:
To introduce the students on the concepts of basic manufacturing processes and fabrication techniques, such as metal casting, metal joining, metal forming and manufacture of plastic components.

UNIT I  METAL CASTING PROCESSES  9

UNIT II  JOINING PROCESSES  9

UNIT III  BULK DEFORMATION PROCESSES  9

UNIT IV  SHEET METAL PROCESSES  9

UNIT V  MANUFACTURE OF PLASTIC COMPONENTS  9
Types and characteristics of plastics – Moulding of thermoplastics – working principles and typical applications – injection moulding – Plunger and screw machines – Compression moulding, Transfer Moulding – Typical industrial applications – introduction to blow moulding – Rotational moulding – Film blowing – Extrusion – Thermoforming – Bonding of
Thermoplastics.

TOTAL : 45 PERIODS

OUTCOMES:

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

TEXT BOOKS :


REFERENCES:


EE8262 ELECTRICAL ENGINEERING LABORATORY L T P C

0 0 3 2

AIM :

To provide the practical knowledge and control methods of electrical machines

OBJECTIVE:

To impart practical knowledge on
I. Characteristics of different machines
II. Method of speed control of machines
III. Measurement of various electrical parameters.
1. Study of Starters
2. Power Measurements in Three-Phase Circuits
3. Speed Control of DC Motor
4. Load Test on DC Shunt Motor
5. OCC & Load Test on DC Shunt Generator
7. OC and SC Test on Single-Phase Transformer
8. Load Test on Single-Phase Transformer
9. Load Test on Single-Phase Induction Motor
10. Load Test on Three-Phase Induction Motor
11. Load Characteristics of Alternator.

TOTAL : 45 PERIODS

OUTCOMES
Ability to perform speed characteristic of different electrical machine

ME8262 MANUFACTURING TECHNOLOGY LAB – I L T P C

0 0 3 2

OBJECTIVE:
To Study and practice the various operations that can be performed in lathe, shaping, drilling, milling etc. and to equip with the practical knowledge required in the core industries.

LIST OF EXPERIMENTS:
Machining, Measurement and Machining time estimations of: Taper Turning
External Thread cutting Internal Thread Cutting
Eccentric Turning Knurling
Square Head Shaping
Hexagonal Head Shaping

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the students can able to demonstrate and fabricate different types of components using the machine tools

MA8356 PROBABILITY AND STATISTICS L T P C

3 1 0 4

OBJECTIVES:
To make the students acquire a sound knowledge in statistical techniques that model engineering problems. The Students will have a fundamental knowledge of the concepts of probability.
UNIT I  RANDOM VARIABLES  9+3
Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions – Functions of a random variable

UNIT II  TWO-DIMENSIONAL RANDOM VARIABLES  9+3
Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III  TESTS OF SIGNIFICANCE  9+3

UNIT IV  DESIGN OF EXPERIMENTS  9+3
Completely randomized design – Randomized block design – Latin square design - 2- factorial design - Taguchi’s robust parameter design.

UNIT V  STATISTICAL QUALITY CONTROL  9+3
Control charts for measurements ( X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

TOTAL: 60 PERIODS

OUTCOMES:
After successfully completing the course, students should be able to do the following:
- Use statistical methodology and tools in the engineering problem-solving process.
- Compute and interpret descriptive statistics using numerical and graphical techniques.
- Understand the basic concepts of probability, random variables, probability distribution, and joint probability distribution.
- Compute point estimation of parameters, explain sampling distributions, and understand the central limit theorem.

TEXT BOOKS:
CE8353  STRENGTH OF MATERIALS  L T P C  3 0 0 3

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

UNIT I  STRESS, STRAIN AND DEFORMATION OF SOLIDS  9

UNIT II  TRANSVERSE LOADING ON BEAMS AND STRESSES IN BEAM  9

UNIT III  TORSION  9
Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts – Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT IV  DEFLECTION OF BEAMS  9
Double Integration method – Macaulay’s method – Area moment Theorems for computation of slopes and deflections in beams - Conjugate beam and strain energy – Maxwell’s reciprocal theorems.

UNIT V  THIN CYLINDERS, SPHERES AND THICK CYLINDERS  9
Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure – Deformation in spherical shells – Lame’s theory – Application of theories of failure.

TOTAL: 45 PERIODS

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

TEXT BOOKS:
EC8352  ELECTRONICS ENGINEERING  
L T P C  3 0 0 3

OBJECTIVES:
- To introduce important analog electronic devices and their characteristics
- To introduce concepts analog amplifiers and oscillators in discrete and IC form
- To teach digital logic, related digital circuits and analog to digital and digital to analog conversions

UNIT I  SEMICONDUCTORS AND RECTIFIERS  9
Classification of solids based on energy band theory, Intrinsic semiconductors, Extrinsic semiconductors – P-type and N-type, P-N junction, VI Characteristics of PN junction diode, Half and Full wave rectifiers, Zener effect, Zener diode, Zener diode Characteristics, Zener diode as a regulator.

UNIT II  TRANSISTOR AND AMPLIFIERS  9
Bipolar junction transistors – CB, CE, CC configurations and characteristics, Biasing circuits – Fixed bias, Voltage divider bias, CE amplifier, Concept of feedback, Negative feedback, voltage series feedback amplifier, Current series feedback amplifier.

UNIT III  FET AND POWER ELECTRONIC DEVICES  9
FET – Configuration and characteristics, FET amplifier, Characteristics and simple applications of SCR, Diac, Triac and UJT.

UNIT IV  SIGNAL GENERATORS AND LINEAR ICs  9
UNIT V  DIGITAL ELECTRONICS

Boolean algebra, Logic Gates, Half and Full adders, Decoder, Encoder, Multiplexer, Demultiplexer, Flip flops, Digital to Analog converters - R-2R and weighted resistor types, Analog to Digital converters - Successive approximation and Flash types.

TOTAL: 45 PERIODS

OUTCOMES:

- ability to identify electronics components and use of them to design circuits.

TEXT BOOK:


REFERENCES:


IE8301  ENGINEERING ECONOMY AND COST ESTIMATION  L T P C  3 0 0 3

OBJECTIVES:

- To study and understand the concept of Engineering Economics and apply in the real word.
- To gain knowledge in the field of cost estimation to enable the students to estimate the cost of various manufacturing processes.

UNIT I  INTRODUCTION TO MANAGERIAL ECONOMICS AND DEMAND ANALYSIS  9


UNIT II  PRODUCTION AND COST ANALYSIS  9

UNIT III  PRICING  9  

UNIT IV  ESTIMATION OF MATERIAL AND LABOUR COSTS  9  

UNIT V  ESTIMATION OF OPERATIONAL COST  9  

OUTCOMES:  
Students will become familiar with principles of micro economics and cost estimation. They will be able to apply these principles to appreciate the functioning of product and input market as well as the economy.

TEXT BOOKS:  

REFERENCES:  

IE8302  FACILITY LAYOUT AND MATERIALS HANDLING  L T P C  3 0 0 3

OBJECTIVE:  
To explain the basic principles in facilities planning, location, layout designs and material handling systems.

UNIT I  PLANT LOCATION  9  
UNIT II  FACILITY LAYOUT DESIGN  9
Need for Layout study, Factors influencing plant layout, Objectives of a good facility layout, Classification of layout, Layout procedure – Nadler’s ideal system approach, Immer’s basic steps, Apple’s layout procedure, Reed’s layout procedure – Layout planning – Systematic Layout Planning – Information gathering, flow analysis and activity analysis, relationship diagram, space requirements and availability, designing the layout. Utilities planning.

UNIT III  COMPUTERISED LAYOUT PLANNING  9

UNIT IV  DESIGNING PRODUCT LAYOUT  9
Line balancing - Objectives, Line balancing techniques – Largest Candidate rule- Kilbridge and Wester method- RPW method- COMSOAL.

UNIT V  MATERIAL HANDLING AND PACKAGING  9
Objectives and benefits of Material handling, Relationship between layout and Material handling, Principles of material handling, Unit load concept, Classification of material handling equipments, Equipment selection, Packaging.

TOTAL: 45 PERIODS

OUTCOMES:
• Students must analyse, design and apply layout principles for layout product, material handling and packaging.

TEXT BOOK:

REFERENCES:
OBJECTIVE:
To impart knowledge in the area of Method study and Time study so that students can implement these principles and techniques to improve productivity in manufacturing and Service sectors.

UNIT I  PRODUCTIVITY
Total time for a job or operation, total work content and ineffective time, – Production and Productivity - Productivity and standard of living, Factors affecting Productivity, Introduction to Productivity measurement Models.

UNIT II  METHODS ENGINEERING
Methods Engineering-Steps -Tools and techniques, Motion study.

UNIT III  WORK MEASUREMENT

UNIT IV  APPLIED WORK MEASUREMENT
Work sampling, Group Timing Technique (GTT), predetermined time systems, types, Methods Time Measurement (MTM), Introduction to MOST standard, Wage incentive plans.

UNIT V  WORK DESIGN FOR OFFICE WORK
Organization and methods (O & M), Work measurement of office work, Work Analysis techniques applied to support staff, Form design and control.

TOTAL: 45 PERIODS

OUTCOMES:
• The Students should be able to measure productivity of a work system through work system design and apply various above mentioned techniques.

TEXT BOOK:

REFERENCES:
OBJECTIVES:
To study the properties of materials when subjected to different types of loading.

LIST OF EXPERIMENTS
1. Tension test on mild steel rod
2. Double shear test on metal
3. Torsion test on mild steel rod
4. Impact test on metal specimen (Izod and Charpy)
5. Hardness test on metals (Rockwell and Brinell Hardness Tests)
6. Deflection test on metal beam
7. Compression test on helical spring
8. Deflection test on carriage spring

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

REFERENCE:
1. Relevant Indian Standards

EC8361 ELECTRONICS ENGINEERING LABORATORY

1. VI Characteristics of PN Junction and Zener Diodes.
2. Characteristics of CE configuration of Transistor.
4. Characteristics of FET.
5. Operational Amplifier Applications – Adder, Multiplier.
6. RC Oscillator
7. LC Oscillators
8. IC 555 Astable and Monostable multivibrators
9. Half and Full adders
10. RS, T and D FFs
11. BCD counter using IC 7490

**Equipment required**

1. Dual Regulated power supplies (0-30V) : 10 Nos
2. Function Generators (3 MHz) : 10 Nos
3. CRO (30MHz) : 10 Nos
4. Diodes (1N4007) : 25
5. Zener diodes : 25
6. Transistors (BC107, BC148) : 25
7. UJT (2N2636) : 25
8. FET (BFW10) : 25
9. Inductances and capacitances
10. OR, NOR and AND gate ICs : 25
    IC 7483,7486,7490 : 25
IE8311 WORK SYSTEM DESIGN LABORATORY

OBJECTIVE:
To understand the theory better and apply in practice, practical training is given in the following areas:

1. Graphic tools for method study
2. Peg board experiment
3. Stop watch time study
4. Performance rating exercise a. Walking rating
   b. Card dealing
5. Work sampling
6. MTM practice
7. Video Based Time Study

TOTAL: 45 PERIODS

OUTCOMES:
- Students should be able to design, analyse and apply the above mentioned techniques to measure productivity.

GE8351 ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES
To the study of nature and the facts about environment.
- To find 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

CE8352 FLUID MECHANICS AND MACHINERY L T P C 3 0 0 3

OBJECTIVES:
• The applications of the conservation laws to flow through pipes and hydraulic machines are studied
• To understand the importance of dimensional analysis.
• To understand the importance of various types of flow in pumps and turbines.

UNIT I FLUID PROPERTIES AND FLOW CHARACTERISTICS 8
Units and dimensions- Properties of fluids- mass density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapor pressure, capillarity and surface tension. Flow characteristics – concept of control volume - application of control volume to continuity equation, energy equation and momentum equation.

UNIT II FLOW THROUGH CIRCULAR CONDUITS 7

UNIT III DIMENSIONAL ANALYSIS 8
Need for dimensional analysis – methods of dimensional analysis – Similitude –types of similitude - Dimensionless parameters- application of dimensionless parameters – Model analysis.
UNIT IV  PUMPS

UNIT V  TURBINES

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

TEXT BOOKS:

REFERENCES:

IE8401  OPERATIONS RESEARCH-I  L T P C  3 0 0 3

OBJECTIVE :
To learn the basics of deterministic optimization tools.

UNIT I  LINEAR PROGRAMMING  9

UNIT II  ADVANCES IN LPP – I  9
Duality theory - Dual simplex method - Sensitivity analysis – Transportation problems – Assignment problems - Traveling sales man problem
UNIT III  ADVANCES IN LPP – II  9
Integer programming – Multi objective optimization: Goal programming–Introduction to Data Envelopment Analysis

UNIT IV  NETWORK MODELS  9

UNIT V  DYNAMIC PROGRAMMING  9
Elements of dynamic programming – state –stage-recursive equations – computational procedure – applications

TOTAL : 45 PERIODS

OUTCOME:
The students can solve optimization problems of deterministic nature

TEXT BOOKS:

REFERENCES:

ME8451 MANUFACTURING TECHNOLOGY – II  L T P C  3 0 0 3

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

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

UNIT III  RECIPROCATING, MILLING AND GEAR CUTTING MACHINES  9

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

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

TOTAL: 45 PERIODS

OUTCOMES:
• The students can understand and compare the functions and applications of different metal cutting tools and also demonstrate the programming in CNC machining.

TEXT BOOKS:

REFERENCES
OBJECTIVES:

- To understand the principles in the formation of mechanisms and their kinematics.
- To understand the effect of friction in different machine elements.
- To analyze the forces and torques acting on simple mechanical systems.
- To understand the importance of balancing and vibration.

UNIT I  KINEMATIC OF MECHANICS  9

UNIT II  GEARS AND GEAR TRAINS  9

UNIT III  FRICTION IN MACHINE ELEMENTS  9
Surface contacts – Sliding and Rolling friction – Friction drives – Friction in screw threads – Bearings and lubrication – Friction clutches – Belt and rope drives – Friction aspects in brakes – Friction in vehicle propulsion and braking.

UNIT IV  FORCE ANALYSIS  9

UNIT V  BALANCING AND VIBRATION  9

TOTAL: 45 PERIODS

OUTCOME

- The students can apply mathematical knowledge to predict the properties and characteristics of a fluid.
- Can critically analyse the performance of pumps and turbines.
TEXT BOOK:

REFERENCES:

STANDARDS:

ME8453 THERMODYNAMICS L T P C
3 1 0 4

OBJECTIVES:
• To understand the basic laws of Thermodynamics and Heat transfer.
• To understand the principle of operation of thermal equipments like IC engine, boilers, turbine and refrigerator etc.
UNIT I  BASIC CONCEPTS OF THERMODYNAMICS

UNIT II  FIRST AND SECOND LAW OF THERMODYNAMIC

UNIT III  HEAT ENGINES

UNIT IV  GASES AND VAPOUR MIXTURES

UNIT V  HEAT TRANSFER

TOTAL : 60 PERIODS

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

TEXT BOOKS:
REFERENCE BOOKS:

CE8413 FLUID MECHANICS AND MACHINERY LABORATORY L T P C
0 0 3 2

OBJECTIVE:
Students should able to verify the principles studied in theory by performing the experiments in lab.

A. Flow Measurement
1. Calibration of Rotometer
2. Flow through Venturimeter
3. Flow through a circular Orifice
4. Determination of mean velocity by Pitot tube
5. Verification of Bernoulli’s Theorem

B. Losses in Pipes
6. Determination of friction coefficient in pipes
7. Determination of losses due to bends, fittings and elbows

C. Pumps
8. Characteristics of Centrifugal pumps
9. Characteristics of Gear pump
10. Characteristics of Submersible pump
11. Characteristics of Reciprocating pump

D. Turbines
12. Characteristics of Pelton wheel turbine
13. Characteristics of Francis turbine

E. Determination of Metacentric height
14. Determination of Metacentric height

TOTAL: 45 PERIODS
OUTCOMES:

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

REFERENCE BOOKS:


ME8461 MANUFACTURING TECHNOLOGY LAB – II L T P C 0 0 3 2

OBJECTIVES:
To Study and acquire knowledge on various basic machining operations in special purpose machines and its applications in real life manufacture of components in the industry

LIST OF EXPERIMENTS:

1. Contour milling using vertical milling machine
2. Spur gear cutting in milling machine
3. Helical Gear Cutting in milling machine
4. Gear generation in hobbing
5. Gear generation in shaping
6. Spline Broaching
7. Plain Surface grinding
8. Cylindrical grinding
9. Tool angle grinding with tool and Cutter Grinder
10. Measurement of cutting forces in Milling /Turning Process
11. CNC Part Programming.

OUTCOMES:

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

OTAL : 45 PERIODS
OBJECTIVE:
To give a brief exposure to automation principles and applications to production systems covering few types of automation.

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

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

UNIT III TRANSFER LINES 9
Automated production lines – applications, Analysis – with and without buffers, automated assembly systems, line unbalancing concept.

UNIT IV NUMERICAL CONTROL AND ROBOTICS 9

UNIT V AUTOMATED HANDLING AND STORAGE 9
Automated guided vehicle systems, AS/RS, Carousel storage, Automatic data capture - Bar code technology.

TOTAL: 45 PERIODS

OUTCOMES:
- To provide employability in the industries using various automated equipments such as transfer lines, CNC machines, industrial robots, automated inspection, material handling, storage and data collection systems.

REFERENCES:
IE8502 OPERATIONS RESEARCH - II L T P C 3 0 0 3

OBJECTIVE:
To impart knowledge on some probabilistic optimization techniques.

UNIT I DETERMINISTIC INVENTORY MODELS
Purchase model with no shortages – Manufacturing model with no shortages – purchase model with shortages – Manufacturing model with shortages – Model with price breaks.

UNIT II PROBABILISTIC INVENTORY MODELS
Probabilistic inventory model – Reorder point model – Multiproduct-selective inventory control

UNIT III QUEUING THEORY
Queuing theory terminology – Single server, multi server, limited queue capacity, limited population capacity – Applications – Markov chains.

UNIT IV DECISION THEORY
Decision making under certainty – Decision making under risk – Decision making under uncertainty – Decision tree analysis – Introduction to MCDM; AHP. Game Theory – Two person zero sum games, pure and mixed strategies – Theory of dominance - Graphical Solution – Solving by LP.

UNIT V NON-LINEAR PROGRAMMING
Introduction to non-linear programming – Unconstrained extreme points – Constrained problems with equality constraints: Lagrangean method - Constrained problems with inequalities: Kuhn tucker conditions – Quadratic programming.

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be able to handle optimization problems of probabilistic nature. They can also apply scientific method for decision making.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To impart knowledge to enable the students to design and implement Statistical Process Control in any industry.
- To design and implement acceptance sampling inspection methods in industry.

UNIT I  QUALITY FUNDAMENTALS
Importance of quality- evolution of quality- definitions of quality- dimensions of quality- quality control- quality assurance- areas of quality- quality planning- quality objectives and policies- quality costs- economics of quality- quality loss function- quality Vs productivity- Quality Vs reliability.

UNIT II  CONTROL CHARTS FOR VARIABLES
Process variation- preliminary decisions- control limits and their computation- construction and application of X bar, R and S charts- warning and modified control limits- process adjustment for trend,- Comparison of process variation with specification limits- O.C. curve for X bar chart.

UNIT III  STATISTICAL PROCESS CONTROL
Process stability- process capability study using control charts- capability evaluation- Cp, Cpk and Cpm – capability analysis using histogram and normal probability plot- machine capability study- gauge capability study- setting statistical tolerances for components and assemblies- individual measurement charts- X-chart, moving average and moving range chart, multi-vari chart.

UNIT IV  CONTROL CHARTS FOR ATTRIBUTES
Limitations of variable control charts- Control charts for fraction non-conforming- p and np charts, variable sample size, operating characteristic function, run length- Control chart for nonconformities (defects)- c, u, ku charts, demerits control chart- applications.

UNIT V  ACCEPTANCE SAMPLING
Need- economics of sampling- sampling procedure- single and double sampling- O.C. curves- Average outgoing quality- Average sample number- Average total inspection- Multiple and sequential sampling- Standard sampling plans- Military, Dodge-Roming, IS 2500.

OUTCOMES:
- Control the quality of processes using control charts for variables in manufacturing industries.
- Control the occurrence of defective product and the defects in manufacturing companies.
- Control the occurrence of defects in services.
• Achieve savings in rupees to the companies through quality control and improvement programmes.

TEXT BOOK:

REFERENCES:

ME8553 MACHINE DESIGN L T P C 3 1 0 4

OBJECTIVES:
• To familiarize the various steps involved in the Design Process
• To understand the principles involved in evaluating the shape and dimensions of a component to satisfy functional and strength requirements.
• To learn to use standard practices and standard data
• To learn to use catalogues and standard machine components

UNIT I STEADY STRESSES IN MACHINE MEMBERS 10
Introduction to the design process - factor influencing machine design, selection of materials based on mechanical properties - Preferred numbers, fits and tolerances – Direct, Bending and torsional stress equations – Impact and shock loading – calculation of principle stresses for various load combinations, eccentric loading -Factor of safety - theories of failure – Design based on strength and stiffness.

UNIT II SHAFTS, COUPLINGS, JOINTS AND BEARINGS 8
Design of solid and hollow shafts based on strength, rigidity and critical speed – Keys, key ways and splines – Rigid and flexible couplings.
Threaded fasteners, Welded joints and riveted joints for structures, Sliding contact and rolling contact bearings (Simple problems)
UNIT III ENERGY STORING ELEMENTS AND ENGINE COMPONENTS
Various types of springs, optimization of helical springs - Flywheels considering stresses in rims and arms for engines and punching machines- Connecting Rods and crank shafts.

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

UNIT V SPUR GEARS, HELICAL GEARS AND GEAR BOXES
Speed ratios and number of teeth-Force analysis -Tooth stresses - Dynamic effects - Fatigue strength - Factor of safety - Gear materials – Design of straight tooth spur & helical gears based on strength and wear considerations.
Geometric progression - Standard step ratio - Ray diagram, kinematics layout -Design of sliding mesh gear box -Constant mesh gear box. – Design of multi speed gear box for machine tool applications – Variable speed gear box

TOTAL: 60 PERIODS
Note: (Use of P S G Design Data Book is permitted in the University examination)

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

TEXT BOOK:

REFERENCES:
STANDARDS:

IE8511 AUTOMATION LAB

OBJECTIVE:
To give hands on experience on CNC programming on lathe and milling as well as PLC controller

1. Part programming for CNC Lathe- Starturn
2. Simulation and Machining Process in CNC Lathe – Starturn
3. Part programming for CNC Lathe- XLturn
4. Simulation and Machining Process in CNC Lathe – XLturn
5. Part programming for CNC Milling- StarMill PC
6. Simulation and Machining Process in CNC Milling- StarMill PC
7. Part programming for CNC Milling- XLMill
8. Simulation and Machining Process in CNC Milling -XLMill
9. Programming Exercise for Robots
10. Programming of PLC using Ladder Logic Diagram

TOTAL: 45 PERIODS

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

IE8512 OPTIMIZATION LAB

OBJECTIVES:
To give adequate exposure to applications of software packages in the area of Operations Research.

Problem Formulation, Solving Using C ,C++,Excel and Optimisation Package (TORA/Lindo/Lingo)
LP Models
Transportation Problem
Assignment Problems
Maximal Flow
Minimal Spanning Tree
Shortest route
Project Management - PERT and CPM
Goal Programming
AHP and DEA

TOTAL : 45 PERIODS

OUTCOMES:
- Due to the practical exposure, to the theoretical knowledge gained earlier, the students are capable of selecting to right tool to solve optimization problems.

MF8561 CAD LAB L T P C
0032

AIM:
To understand and handle design problems in a systematic manner. To gain practical experience in handling 2D drafting and 3D modeling software systems and to apply CAD in real life applications.

COMPUTER AIDED DESIGN (CAD)
- 2D drawing Using AUTOCAD
- 3D Part modeling – protrusion, cut, sweep, draft, loft, blend, rib
- Editing – Move, Pattern, Mirror, Round, Chamfer
- Assembly – creating assembly from parts – assembly constraints
- Conversion of 3D solid model to 2D drawing - different views, sections, isometric view and dimensioning
- Introduction to Surface Modeling
- 3D modeling of machine elements like Flanged coupling, screw jack etc. (PRO-E)

TOTAL: 45 PERIODS

OUTCOMES:
- Able to draw 2D and 3D models.
- Able to assemble various 3D models to form product model.
- Able to obtain 2D drawing from 3D models.
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

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

TEXT BOOK:

REFERENCE BOOKS:

IE8601 APPLIED ERGONOMICS L T P C
3 0 0 3

OBJECTIVE:
To explain the general principles that govern the interaction of humans and their working environment for improving worker performance and safety.

UNIT I INTRODUCTION
9

UNIT II HUMAN PERFORMANCE
9

UNIT III PHYSIOLOGICAL ASPECTS OF HUMAN AT WORK
9

UNIT IV WORK PLACE DESIGN
9
Problems of body size, Anthropometry measures, Work posture – Work space layout and work station design – Design of displays, controls and VDT work stations – Hand tool design, illumination.

UNIT V OCCUPATIONAL HEALTH AND SAFETY
9
Industrial accidents, Personnel Protective devices, Safety Management practices – Effect of Environment – heat, cold & noise – NIOSH regulations and Factories Act

TOTAL: 45 PERIODS

OUTCOMES:
• The Student should apply ergonomic principles to design workplaces for the improvement of human performance and implement latest occupational health and safety to the work place.

TEXT BOOKS:
REFERENCES:

IE8602 PRODUCTION AND OPERATIONS MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:
To impart knowledge in the areas of production planning and control applicable to various types of manufacturing systems.

UNIT I INTRODUCTION

UNIT II FORECASTING
Need, Determinants of Demand, Demand Patterns, Measures of forecast error, Qualitative Forecasting Methods-Delphi techniques. Market Research, Nominal Group Technique Quantitative Forecasting methods – Moving Average Methods, Exponential Smoothing Methods, Regression methods, Monitoring and Control of Forecasts, Requirements and Selection of Good forecasting methods.

UNIT III AGGREGATE PLANNING
Role of aggregate Product planning, Managerial inputs to Aggregate planning, Pure and Mixed strategies, Mathematical Models for Aggregate planning – Transportation Method, Linear programming Formulation, Linear Decision Rues, Master Production Schedule(MPS), Procedure for developing MPS, MRP, Lot sizing methods of MRP, MRP Implementation issues, MRP – II.

UNIT IV CAPACITY MANAGEMENT
Measures of capacity, Factors affecting capacity, Capacity planning, Systematic approach to capacity planning, Long-term and short-term capacity decisions, Tools for capacity planning, Capacity Requirement planning- Business process outsourcing
UNIT V PRODUCTION ACTIVITY CONTROL

Objectives and Activities of Production Activity Control, Flow-shop, Intermittent flow shop, Job shop, Shop floor control – High volume Production Activity Control, Job-shop Production Activity Control.

TOTAL: 45 PERIODS

OUTCOMES

- Upon completion of this course, the students will be able to demonstrate the knowledge in fundamental concepts and issues of operations management in creating and enhancing a firm’s competitive advantages

REFERENCES:


IE8603 RELIABILITY 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

OUTCOMES

• Students will be able to conduct reliability assessment and failure analysis on any complex systems.

REFERENCES:


HS8561  EMPLOYABILITY SKILLS  L T P C
(COMMON TO ALL BRANCHES OF FIFTH OR SIXTH SEMESTER  0 0 2 1
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

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.

REFERENCES:

EXTENSIVE READERS

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

IE8611 ERGONOMICS LAB

OBJECTIVE:
To test the principles of human factors engineering in a laboratory
1. Effect of speed of walking on tread mill using heart rate and energy expenditure
2. Effect of workload on heart rate using Ergo cycle.
3. Evaluation of physical fitness using step test
4. Effect of work-rest schedule on physical performance (Ergo cycle / tread mill)
5. Development of anthropometric data for male and female.
6. Application of anthropometric data for the design of desk for students
7. Evaluation of physical facilities (chairs, tables etc.) Through comfort rating.
8. Evaluation of cognitive performance of individuals
9. Analysis of noise level in different environment
10. Study of illumination of work places.

TOTAL: 45 PERIODS

OUTCOMES:

- Ability to design the industry with ergonomics consideration

IE8612 INDUSTRIAL TRAINING / MINI PROJECT

The student has the option of undergoing either industrial training or can carry out a mini project.

INDUSTRIAL TRAINING:

The objective is to give an exposure to the industrial environment and learn how they function. A minimum of 4 weeks of industrial training is required. He/she can undergo training either at a stretch or in two spells of a minimum of two weeks each. The training should have been completed in the immediate preceding one or two summers. A comprehensive report is to be submitted at the beginning of the VIIth semester. A certificate from the industry signed by an appropriate authority should be submitted along with the report. It will be evaluated by a two member committee constituted by the Head of the Department based on the report and oral examination.

MINI PROJECT:

The objective is to develop skill in applying industrial engineering techniques to real/ practical problems. A student is expected to select a topic in the industrial engineering area such as Forecasting, production planning, scheduling, operations research, facilities planning and lay out, transportation and distribution, quality, supply chain, simulation etc. Identify a problem and collect necessary data and analyse using appropriate tool/ technique. Data can be collected from industry or standard data sets available in literature can be used.

A comprehensive report is to be submitted towards the end of the VIIth semester. It will be
evaluated by a two member committee constituted by the Head of the Department based on the report and oral examination.

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<tr>
<th>IE8701</th>
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**OBJECTIVE**
To cover various aspects of discrete dynamic, stochastic systems modeling and conducting experiments with those models on a computer.

**UNIT I**  INTRODUCTION
3
Systems – Modelling – Types – Systems components – Simulation basics

**UNIT II**  RANDOM NUMBERS / VARIATES
10

**UNIT III**  DESIGN OF SIMULATION EXPERIMENTS
12
Steps on Design of Simulation Experiments – Development of models using of High level language for systems like Queing, Inventory, Replacement, Production etc., - Model validation and verification, Output analysis. Use of DOE tools.

**UNIT IV**  SIMULATION LANGUAGES
12
Need for simulation Languages – Study of GPSS and introduction to ARENA.

**UNIT V**  CASE STUDIES USING SIMULATION LANGUAGES
8
TOTAL: 45 PERIODS

**OUTCOMES:**
- Will be able to analyse, models and simulate experiments to meet real world system and evaluate the performance.

**REFERENCES:**
OBJECTIVE:
To teach the basic principles of supply chains and associated logistics management.

UNIT I INTRODUCTION 5
Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain -Decision Phases in Supply Chain - Competitive and Supply chain Strategies – Drivers of Supply Chain Performance and Obstacles.

UNIT II SUPPLY CHAIN NETWORK DESIGN 10

UNIT III LOGISTICS IN SUPPLY CHAIN 10
Role of transportation in supply chain – factors affecting transportations decision – Design option for transportation network – Tailored transportation – Routing and scheduling in transportation

UNIT IV SOURCING AND COORDINATION IN SUPPLY CHAIN 10
Role of sourcing supply chain supplier selection assessment and contracts- Design collaboration - sourcing planning and analysis -supply chain co-ordination - Bull whip effect – Effect of lack of co-ordination in supply chain and obstacles – Building strategic partnerships and trust within a supply chain

UNIT V SUPPLY CHAIN AND INFORMATION TECHNOLOGY 10
The role IT in supply chain- The supply chain IT frame work Customer Relationship Management – Internal supply chain management – supplier relationship management – future of IT in supply chain –E-Business in supply chain

TOTAL: 45 PERIODS

OUTCOMES:
- The student would understand the framework and scope of supply chain networks and functions.

TEXT BOOKS:

REFERENCES
OBJECTIVES:

- To impart knowledge to design experiments to a problem situation using traditional experimental designs as well as Taguchi Methods.
- To develop skill to conduct experiments and analyze the data to determine the optimal process parameters that optimize the process.

UNIT I  FUNDAMENTALS OF EXPERIMENTAL DESIGNS

Hypothesis testing – single mean, two means, dependant/ correlated samples – confidence intervals, Experimentation – need, Conventional test strategies, Analysis of variance, F-test, terminology, basic principles of design, steps in experimentation – choice of sample size – Normal and half normal probability plot – simple linear and multiple linear regression, testing using Analysis of variance.

UNIT II  SINGLE FACTOR EXPERIMENTS

Completely Randomized Design- effect of coding the observations- model adequacy checking - estimation of model parameters, residuals analysis- treatment comparison methods- Duncan’s multiple range test, Newman-Keuel’s test, Fisher’s LSD test, Tukey’s test- testing using contrasts- Randomized Block Design – Latin Square Design- Graeco Latin Square Design – Applications.

UNIT III  FACTORIAL DESIGNS

Main and Interaction effects - Two and three factor full factorial designs- Fixed effects and random effects model - Rule for sum of squares and Expected Mean Squares- 2^K Design with two and three factors- Yate’s Algorithm- fitting regression model- Randomized Block Factorial Design - Practical applications.

UNIT IV  SPECIAL EXPERIMENTAL DESIGNS

Blocking and Confounding in 2^K Designs- blocking in replicated design- 2^K Factorial Design in two blocks- Complete and partial confounding- Confounding 2^K Design in four blocks- Two level Fractional Factorial Designs- one-half fraction of 2^K Design, design resolution, Construction of one-half fraction with highest design resolution, one-quarter fraction of 2^K Design- introduction to response surface methods, central composite design.

UNIT V  TAGUCHI METHODS

Design of experiments using Orthogonal Arrays, Data analysis from Orthogonal experiments- Response Graph Method, ANOVA- attribute data analysis- Robust design- noise factors, Signal to noise ratios, Inner/outer OA design- case studies.

TOTAL: 45 PERIODS
OUTCOMES:

- Able to apply experimental techniques to practical problems to improve quality of processes/products by optimizing the process/product parameters.

TEXT BOOKS:


REFERENCE:


IE8711 COMPREHENSION

The objective of this comprehension is to achieve an understanding of the fundamentals of contemporary manufacturing systems including materials, manufacturing process, product and process control, computer integrated manufacture and quality. The students work in groups and solve a variety of problems given to them. The problems given to the students should be of real like industrial problems selected by a group of faculty members of the concerned department. A minimum of three small problems have to be solved by each group of students. The evaluation is based on continuous assessment by a group of faculty members constituted by the professor in-charge of the course.

TOTAL: 30 PERIODS

IE8712 DATA ANALYTICS LAB

OBJECTIVE:

To carry out exercises with the help of software packages in the areas of linear and multivariate regression, factor analysis, discriminant analysis, reliability and design of experiments

1. Determine the linear regression model for fitting a straight line and calculate the least squares estimates, the residuals and the residual sum of squares.
2. Determine the multivariate regression model for fitting the straight line.
3. Perform the Correlation analysis to determine the relationships among the variables.
4. Perform the factor analysis for the given set of model data using both Exploratory and Confirmatory methods and evaluate the model adequacy.
5. Determine which continuous variable is discriminate among the given group and
determine which variable is the best predictor.

6. Determine the process is within the control or not by developing the control charts for attributes and variables and estimate the process capability.

7. Estimate the parameters (MTTF, MTBF, failure rate, bathtub curve etc) of components and systems to predict its reliability. (use Reliasoft)

8. Develop the single factor and two factor design of experiment model to predict the significance factor.

9. Develop $2^k$ factorial and $2^{k-p}$ fractional factorial experiment to determine the parameters which affect the system.

TOTAL : 45 PERIODS

Usage of Minitab for:
Linear and multivariate regression
Correlation Factor
analysis Discriminant
analysis Control
charts Process
capability Factorial
experiments

OUTCOMES
- Upon completion of this laboratory course, the students will gain confidence in the use of statistical methods and accomplish the ability to extract meaningful information from data sets for better decision-making.

IE8713 DISCRETE SIMULATION LAB

OBJECTIVE :
To give hands on experience with reference to computer based discrete system simulation experiments

1. Random Number Generation
   Mid Square, Constant Multiplier, Congruential

2. Random variates Generation
   Exponential, Poisson, Normal, Binomial

3. Testing of Random variates
   Chi-Square, KS, Run,Poker

4-5. Monte Carlo Simulation
   Random Walk Problem with graphical application
   Paper Boy Problem
OUTCOMES:
- The students would gain knowledge on computer based discrete system simulation experiments

**IE8811** PROJECT WORK

A project topic must be selected either from published lists or the students themselves may propose suitable topics in consultation with the faculty/guide. It can be a theoretical research project or industry oriented. The objective is to apply the principles/techniques they have learnt to a new or existing problem situation leading to a solution. Generally it is a group project.

The progress of the project is evaluated based on a minimum of three reviews. The review committee shall be constituted by the Head of the Department.

A project report is to be submitted towards the end of the semester. It will be evaluated jointly by the external and internal examiners constituted by the Head of the Department based on oral presentation and the project report.

**IE8001** ACCOUNTING AND FINANCE FOR MANAGEMENT

OBJECTIVE
To enable students to understand the accounting procedure, interpretation of financial accounting with cost account.

**UNIT I** INTRODUCTION

**UNIT II** FINANCIAL ACCOUNTING
Salient features of Balance Sheet and Profit and Loss statement, cash flow and Fund flow analysis (Elementary), working capital management, ratio analysis – Depreciation.
UNTIII COST ACCOUNTING 9
Cost accounting systems: Job Costing, process costing, allocation of overheads, Activity based costing, variance analysis – marginal costing – Break even analysis.

UNIT IV BUDGETING 9
Requirements for a sound budget, fixed budget – preparation of sales and production budget, flexible budgets, zero based budgets and budgetary control.

UNIT V FINANCIAL MANAGEMENT 9
Investment decisions – Investment appraisal techniques – payback period method, accounting rate of return, net present value method, internal rate of return and profitability index method - cost of capital.

TOTAL: 45 PERIODS

OUTCOMES:
- To possess the principles and techniques of accounting and managing finance in an organization

REFERENCES:

IE8002 ADVANCED OPTIMIZATION TECHNIQUES L T P C 3 0 0 3

OBJECTIVES:
- Understand the nonlinear problem.
- Know about multi-objective problem.
- To create awareness of meta heuristic algorithms.

UNIT I DECISION ANALYSIS 9
Decision Trees, Utility theory, Game theory, MCDM – Goal programming, AHP and ANP; Markov Decision processes

UNIT II NON-LINEAR OPTIMIZATION - I 9
Types of Non-linear programming problems, Unconstrained optimization, KKT conditions for constrained optimization, Quadratic programming
UNIT III     NON-LINEAR OPTIMIZATION - II  9
Separable programming, Convex programming, Non-convex programming, Geometric programming, Stochastic programming

UNIT IV     NON-TRADITIONAL OPTIMIZATION - I  9
An overview of Genetic Algorithms, Simulated annealing, Tabu search, Ant Colony Optimization

UNIT V     NON-TRADITIONAL OPTIMIZATION - II  9
Neural network based optimization, Optimization of Fuzzy systems

TOTAL : 45 PERIODS

REFERENCES

IE8003     APPLIED MULTI-VARIATE ANALYSIS  L T P C
3 0 0 3

OBJECTIVE:
To impart knowledge on the applications of multivariate statistical analysis

UNIT I     MULTIVARIATE METHODS  9
An overview of multivariate methods, Multivariate normal distribution, Eigen values and Eigen vectors.

UNIT II     REGRESSION  9
Simple Regression, and Correlation – Estimation using the regression line, correlation analysis, Multiple Regression and Canonical Correlation analysis – Inferences about population parameters.

UNIT III     FACTOR ANALYSIS  9
Principal components analysis – Objectives, estimation of principal components, testing for independence of variables, Factor analysis model – Factor analysis equations and solution.

UNIT IV     DISCRIMINANT ANALYSIS  9
Discriminant analysis – Discrimination for two multi variate normal populations.

UNIT V     CLUSTER ANALYSIS  9
Cluster analysis – Clustering methods, Multivariate analysis of variance.

TOTAL : 45 PERIODS
OUTCOMES:
- Can apply the multivariate, regression, factor, discriminant and cluster analysis techniques for statistical analysis.

TEXT BOOK:

REFERENCE:

IE8004 COMPUTATIONAL METHODS AND ALGORITHMS L T P C 3 0 0 3

OBJECTIVE
A brief introduction to algorithmic design tools with some applications.

UNIT I INTRODUCTION 5
Review of C/C++ - writing and debugging large programs - Controlling numerical errors.

UNIT II ALGORITHM DESIGN METHODS 12
Greedy – Divide and conquer – Backtracking – Branch & bound – Heuristics- Meta heuristics

UNIT III BASIC TOOLS 12
Structured approach – Networks – Trees – Data structures

UNIT IV COMPUTATIONAL PERFORMANCE 6
Time complexity – Space complexity – Algorithm complexity

UNIT V APPLICATIONS 10
Sorting – Searching - Networks – Scheduling – Optimization models – IE applications

TOTAL: 45 PERIODS

OUTCOMES:
- Student must be able to design algorithm computational tools used in manufacturing process.

REFERENCES:
OBJECTIVE:
To impart knowledge on basics of DSS and Knowledge based systems

UNIT I INTRODUCTION
Managerial decision making, system modeling and support - preview of the modeling process-phases of decision making process.

UNIT II ANALYSIS
DSS components- Data warehousing, access, analysis, mining and visualization-modeling and analysis-DSS development.

UNIT III TECHNOLOGIES
Group support systems- Enterprise DSS- supply chain and DSS - Knowledge management methods, technologies and tools.

UNIT IV EXPERT SYSTEMS
Artificial intelligence and expert systems - Concepts, structure, types - Knowledge acquisition and validation - Difficulties, methods, selection.

UNIT V SEMANTIC NETWORKS
Representation in logic and schemas, semantic networks, production rules and frames, inference techniques, intelligent system development, implementation and integration of management support systems.

TOTAL : 45 PERIODS

OUTCOMES:
• The students will be able to make decisions in the semi structured and unstructured problem situations using systems and semantic networks.

REFERENCES:
UNIT I
Conventional Optimization techniques, Overview of evolutionary computation, Historical branches of evolutionary computation

UNIT II
Search operators, Selection schemes, Ranking methods, Importance of representation

UNIT III
Evolutionary combinatorial optimization: evolutionary algorithms, Constrained optimization, Evolutionary multi-objective optimization.

UNIT IV
Genetic programming – Steps, Search operators on trees, examples, Hybrid genetic algorithms, Combining choices of heuristics

UNIT V
Pareto optimality, Analysis of evolutionary algorithms

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be able to make decisions in the semi structured and unstructured problem situations.

REFERENCES:
UNIT II DATA FLOW DIAGRAMS and ER DIAGRAMS 10
System Requirements specifications, Feasibility analysis, Data flow diagrams – logical and physical DFDs, Process specification methods, Decision tables. Logical database design – ER model, Normalizing relations; Data input methods; Structured Systems Analysis and Design.

UNIT III MANAGEMENT INFORMATION SYSTEMS 10
Development of MIS, Choice of Information technology, Applications in manufacturing and service sector, Enterprise management systems.

UNIT IV TECHNOLOGY and INFORMATION SYSTEMS 10
Database management systems, Object oriented technology, Client-server architecture, Local area network, network topology.

UNIT V APPLICATIONS 9
Data warehouse design and implementation, Models of E-business, MIS and E-business, Web enabled business management, Introduction to ERP, Case studies.

TOTAL : 45 PERIODS

OUTCOMES:
- The Student must be able to design data flow and ER diagrams, manage information system and apply modern concepts to business organizations.

REFERENCES:

IE8008 MAINTENANCE ENGINEERING AND MANAGEMENT L T P C 3 0 0 3

OBJECTIVE:
- To provide maintenance concepts and maintenance policies with maintenance management tools and techniques.

UNIT I MAINTENANCE CONCEPT 7

UNIT II MAINTENANCE MODELS 11
UNIT III MAINTENANCE QUALITY 8

UNIT IV V MAINTENANCE MANAGEMENT 11

UNIT V TOTAL PRODUCTIVE MAINTENANCE 8

TOTAL : 45 PERIODS

OUTCOMES:
• The students would gain knowledge on maintenance logistics, fault diagnosis and TPM.

REFERENCES:

IE8009 METROLOGY AND INSPECTION L T P C
3 0 0 3

OBJECTIVE:
To impart knowledge about linear and angular measuring instruments.

UNIT I LINEAR MEASUREMENT AND ANGULAR MEASUREMENT 12

UNIT II STANDARDS FOR LINEAR AND ANGULAR MEASUREMENTS 8
Shop floor standards and their calibration, light interference, Method of coincidence, Slip gauge calibration, Measurement errors, Limits, fits, Tolerance, Gauges, Gauge design.

UNIT III MEASUREMENT APPLICATION 8
Measurement of screw threads and gears – Radius measurement – surface finish measurement
UNIT IV MODERN CONCEPTS
Image processing and its application in Metrology, Co-ordinate measuring machine, Types of CMM, Probes used, Application, Non-contact CMM using Electro-optical sensors for dimensional metrology.

UNIT V INTRODUCTION TO MEASUREMENT SYSTEMS
System configuration, basic characteristics of measuring devices, Displacement, force and torque measurement, standards, Calibration, Sensors, Basic principles and concepts of temperature, Pressure and flow measurement. Destructive testing – Nondestructive testing.

OUTCOMES:
The student must be able to
- Apply various linear and angular measuring instruments.
- Apply measure linear, angular and surface profile using CMM.
- Apply non-destructive techniques.
- Students will be able to apply the maintenance philosophies and techniques to upkeep the systems with economic life cycle cost.

TEXT BOOK:

REFERENCES:

IE8010 MODELING OF MANUFACTURING SYSTEMS

OBJECTIVES:
- To introduce the students different models used to describe the manufacturing systems and use of them for effective operations of manufacturing industries.

UNIT I INTRODUCTION
Manufacturing systems types and concepts, manufacturing automation, performance measures types, classification and uses of manufacturing system models

UNIT II FOCussed Factories
Focused flow lines – Work cells- work centers, Group technology, Process planning types, General serial systems – Analysis of paced and unpaced lines, system effectiveness, impact of random processing times, FMS planning and scheduling – Part selection and loading
problems.

UNIT III  MARKOV AND PETRINET MODELS  9
Stochastic processes in manufacturing, Markov chain models – DTMC and CTMC, steady state analysis, Petrinets in manufacturing – Basic concepts, stochastic petrinets.

UNIT IV  QUEUING MODELS OF MANUFACTURING  9
Basic queuing models, Queuing networks in manufacturing – Jackson and Gordon Newell, product form solution

UNIT V  LEAN SYSTEMS  9
Characteristics of lean systems, Pull method of work flow, lot size reduction, Kanban system, Value stream mapping, JIT principles

TOTAL: 45 PERIODS

OUTCOMES:
- The Student must be able to apply the principles behind focused factory, Markov and Petrinet Models, Queuing models, lean system to model modern manufacturing systems.

REFERENCES:

IE8011  OPERATIONS SCHEDULING  L T P C  3 0 0 3

OBJECTIVE:
- To impart knowledge on various scheduling algorithms applicable to single machine, parallel machines, flow shop and job shop models.

UNIT I  SCHEDULING THEORY  8

UNIT II  SINGLE MACHINE SCHEDULING  10
UNIT III PARALLEL MACHINE SCHEDULING


UNIT IV FLOW SHOP SCHEDULING


UNIT V JOB SHOP SCHEDULING


TOTAL: 45 PERIODS

OUTCOMES:
- Students will be able to design, analyse and implement single machine, parallel machine, flow shop, and job shop scheduling algorithms.

REFERENCES:

IE8012 PRODUCT DESIGN AND VALUE ENGINEERING

OBJECTIVES:
- The course aims at providing the basic concepts of product design, product features and its architecture so that student can have a basic knowledge in the common features a product has and how to incorporate them suitably in product.

UNIT I VALUE ENGINEERING BASICS

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Difference between Value analysis and Value Engineering, Types of Value, function - Basic and Secondary functions, concept of cost and worth, creativity in Value Engineering.

UNIT II VALUE ENGINEERING JOB PLAN AND PROCESS

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioural and organizational aspects of Value Engineering. Ten principles of Value analysis, Benefits of
Value Engineering.

UNIT III  IDENTIFYING CUSTOMER NEEDS and PRODUCT SPECIFICATIONS  9
Product Development process – Product development organizations. Gather raw data –
Interpret raw data- organize the needs into a hierarchy – Relative importance of the needs.
Specifications – Refining specifications.

UNIT IV  CONCEPT GENERATION, SELECTION AND PRODUCT ARCHITECTURE  9
Clarify the problem – Search internally – Search externally – Explore systematically. Concept
Screening – Concept scoring. Product architecture – Implication of architecture – Establishing
the architecture – Related system level design issues.

UNIT V  INDUSTRIAL DESIGN, PROTOTYPING AND ECONOMICS OF PRODUCT DEVELOPMENT  9
Need for industrial design – Impact of industrial design – Industrial design process –
Management of industrial design process – Assessing the quality of industrial design.
Estimate the manufacturing cost – Reduce the component cost – Reduce the assembly cost –
Reduce the support cost – Impact of DFM decisions on other factors. Principles of prototyping –
Planning for prototypes. Elements of economic analysis – Base – Case financial model –
Sensitivity analysis – Influence of the quantitative factors.

TOTAL : 45 PERIODS

OUTCOMES:
• The student will be able to design some products for the given set of applications; also the knowledge gained through prototyping technology will help the student to make a prototype of a problem and hence product design and development can be achieved.

TEXT BOOKS:

REFERENCES:

IE8013  PRODUCTIVITY MANAGEMENT AND RE-ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
• To introduce the basic principles of Productivity Models and the applications of Re-EngineeringConcepts required for various organizations.
UNIT I INTRODUCTION
Basic concept and meaning of Productivity – Significance of Productivity – Factors affecting Productivity – Productivity cycle, Scope of Productivity Engineering and Management.

UNIT II PRODUCTIVITY MEASUREMENT AND EVALUATION

UNIT III PRODUCTIVITY PLANNING AND IMPLEMENTATION
Need for Productivity Planning – Short term and long term productivity planning – Productivity improvement approaches, Principles - Productivity Improvement techniques – Technology based, Material based, Employee based, Product based techniques – Managerial aspects of Productivity Implementation schedule, Productivity audit and control.

UNIT IV REENGINEERING PROCESS

UNIT V BPR TOOLS AND IMPLEMENTATION
Analytical and Process Tools and Techniques - Role of Information and Communication Technology in BPR – Requirements and steps in BPR Implementation – Case studies.

TOTAL : 45 PERIODS

OUTCOMES:
The Student must be able to:
- Measure and evaluate productivity
- Plan and implement various productivity techniques.
- Reengineer the process for improving the productivity
- Implement BPR tools for improving the productivity.

REFERENCES:
OBJECTIVES:
- To outline the need for Project Management
- To highlight different techniques of activity planning

UNIT I  INTRODUCTION TO PROJECT MANAGEMENT AND PROJECT SELECTION  9

UNIT II  PROJECT PLANNING AND IMPLEMENTATION  9

UNIT III  PROJECT MONITORING AND CONTROL  9

UNIT IV  PROJECT CLOSURE  9
Project evaluation- Project Auditing – Phases of project Audit- Project closure reports- Guidelines for closeout reports.

UNIT V  SPECIAL TOPICS IN PROJECT MANAGEMENT  9

TOTAL : 45 PERIODS

OUTCOMES:
- To apply project management principles in business situations to optimize time and resource utilization

REFERENCES:
To impart knowledge on safety engineering fundamentals and safety management practices.

UNIT I  INTRODUCTION  9
Evolution of modern safety concepts – Fire prevention – Mechanical hazards – Boilers, Pressure vessels, Electrical Exposure.

UNIT II  CHEMICAL HAZARDS  9
Chemical exposure – Toxic materials – Radiation Ionizing and Non-ionizing Radiation - Industrial Hygiene – Industrial Toxicology.

UNIT III  ENVIRONMENTAL CONTROL  9
Industrial Health Hazards – Environmental Control – Industrial Noise - Noise measuring instruments, Control of Noise, Vibration, - Personal Protection.

UNIT IV  HAZARD ANALYSIS  9
System Safety Analysis –Techniques – Fault Tree Analysis (FTA), Failure Modes and Effects Analysis (FMEA), HAZOP analysis and Risk Assessment.

UNIT V  SAFETY REGULATIONS  9

TOTAL : 45 PERIODS

OUTCOMES:
• Students must be able to identify and prevent chemical, environmental mechanical, fire hazard through analysis and apply proper safety techniques on safety engineering and management.

REFERENCES:

IE8016  SYSTEMS ENGINEERING  L T P C
3 0 0 3

OBJECTIVES:
• To introduce system engineering concepts to design the manufacturing system for optimum utilization of source for effective functioning.

UNIT I  INTRODUCTION  9
Definitions of Systems Engineering, Systems Engineering Knowledge, Life cycles, Life-cycle phases, logical steps of systems engineering, Frame works for systems engineering.

UNIT II  SYSTEMS ENGINEERING PROCESSES  9
Formulation of issues with a case study, Value system design, Functional analysis, Business Process Reengineering, Quality function deployment, System synthesis, Approaches for generation of alternatives.

UNIT III ANALYSIS OF ALTERNATIVES - I
Cross-impact analysis, Structural modeling tools, System Dynamics models with case studies, Economic models: present value analysis – NPV, Benefits and costs over time, ROI, IRR; Work and Cost breakdown structure,

UNIT IV ANALYSIS OF ALTERNATIVES – II
Reliability, Availability, Maintainability, and Supportability models; Stochastic networks and Markov models, Queuing network optimization, Time series and Regression models, Evaluation of large scale models

UNIT V DECISION ASSESSMENT
Decision assessment types, Five types of decision assessment efforts, Utility theory, Group decision making and Voting approaches, Social welfare function; Systems Engineering methods for Systems Engineering Management,

TOTAL : 45 PERIODS

OUTCOMES:
• The Student must be able to apply systems engineering principles ot make decision for optimization.
• Hence an understanding of the systems engineering discipline and be able to use the core principles and processes for designing effective system.

TEXT BOOK:

REFERENCES:

IE8017 TECHNOLOGY MANAGEMENT L T P C 3 0 0 3

OBJECTIVES:
Study of this subject provides an understanding of the Technology Management principles to the various organizations.

UNIT I
Technology management - Scope, components, and overview. Technology and environment, Technology and society, Technology Impact analysis, environmental, social, legal, political aspects, techniques for analysis - steps involved. Technology policy strategy: Science and
technology Policy of India, implications to industry.

**UNIT II**


**UNIT III**

Technology Choice and Evaluation - Methods of analysing alternate technologies, Techno-economic feasibility studies, Need for multi-criteria considerations such as, social, environmental, and political, Analytic hierarchy method, Fuzzy multi-criteria decision making, and other methods.

**UNIT IV**

Technology Transfer and Acquisition - Import regulations, Implications of agreements like Uruguay Round and WTO, Bargaining process, Transfer option, MOU- Technology Adoption and Productivity - Adopting technology-human interactions, Organisational redesign and re-engineering, Technology productivity.

**UNIT V**


**TOTAL : 45 PERIODS**

**OUTCOMES:**

Upon completion of the course, students will be able to

- Have clear understanding of managerial functions like planning, organizing, staffing, leading and controlling
- Have same basic knowledge on international aspect of management

**REFERENCES:**

Human resource management in organizations

UNIT I INDIVIDUAL BEHAVIOR 9

UNIT II GROUP BEHAVIOR 9
Group Organization, Group Dynamics, Emergence of Informal Leader, Leadership Styles-theories, Group decision making, Inter personal Relations, Communication -Team.

UNIT III DYNAMICS OF ORGANIZATIONAL BEHAVIOR 9
Organizational Climate, the Satisfactory – Organizational change – The Change Process and Change Management.

UNIT IV HUMAN RESOURCES PLANNING 9
Requirements of Human Resources – HR audit, Recruitment-Selection-Interviews

UNIT V HUMAN RESOURCES DEVELOPMENT 9

TOTAL: 45 PERIODS

OUTCOMES:
• To understand the process of effective Human Resource Management.

TEXT BOOK:

REFERENCES:

MA8353 NUMERICAL METHODS L T P C
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
UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

UNIT II INTERPOLATION AND APPROXIMATION
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

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS
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.

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:

GE8751 ENGINEERING ETHICS AND HUMAN VALUES L T P C
3 0 0 3

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 10

UNIT II ENGINEERING ETHICS 9

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9
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 9
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

TEXT BOOK :

REFERENCES:

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

MG8653  PRINCIPLES OF MANAGEMENT  L T P C
3 0 0 3

AIM :
To learn the different principles and techniques of management in planning, organizing, directing and controlling.

OBJECTIVES
- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization
UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS


UNIT II PLANNING


UNIT III ORGANISING


UNIT IV DIRECTING


UNIT V CONTROLLING

System and process of controlling – Budgetary and non - Budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting.

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:
1. Stephen A. Robbins and David A. Deegan and Mary Coulter, “Fundamentals of
ME8076 ENTREPRENEURSHIP DEVELOPMENT L T P C 3 0 0 3

OBJECTIVES:
- Study of this subject provides an understanding of the scope of an entrepreneur, key areas of development, financial assistance by the institutions, methods of taxation and tax benefits, etc.

UNIT I ENTREPRENEURSHIP 9

UNIT II MOTIVATION 9

UNIT III BUSINESS 9

UNIT IV FINANCING AND ACCOUNTING 9

UNIT V SUPPORT TO ENTREPRENEURS 9

TOTAL: 45 HOURS
OUTCOMES:
- Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

TEXT BOOKS:

REFERENCES:

IE8019 PRINCIPLES OF MARKETING MANAGEMENT L T P C 3 0 0 3

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

UNIT I INTRODUCTION 9

UNIT II MARKETING PLANNING AND STRATEGY FORMULATION 9
UNIT III  BUYING BEHAVIOUR AND MARKET SEGMENTATION  
Building customer value, Consumer behavior – Influencing factors, motivation, perception, learning, buying decisions process. Segmentation - Levels, demographic, psychographic geographic and behavioural segmentation, process, patterns.

UNIT IV  PRODUCT PRICING AND MARKETING RESEARCH  
Pricing Objectives, decisions and methods, Pricing management, Marketing Research – Introduction, uses, system, process of marketing research.

UNIT V  ADVERTISING, SALES PROMOTION & DISTRIBUTION  
Advertising – objectives, types, developing Advertising campaign, Sales promotion, Retailing, Wholesaling, Market Logistics, Modern trends.

OUTCOMES:
- To acquire the knowledge of analytical skills in solving marketing to related problems and create awareness about marketing management process.

TEXTBOOKS.

REFERENCES:

IE8018  COMPUTER INTEGRATED MANUFACTURING SYSTEMS  L T P C  3 0 0 3

OBJECTIVE:
To provide some aspects of Fixed, Flexible and integrated automation along with their applications

UNIT I  GT AND FMS  
Part families, production flow analysis, cellular manufacturing, ROC, Flexible manufacturing systems- components, FMS applications, FMS analysis – Bottleneck model.

UNIT II  COMPUTER-AIDED DESIGN  
Fundamentals of CAD – design process, manufacturing database – Computer graphics – functions, constructing the geometry, transformation, wire frame Vs solid modelling.
UNIT III MANUFACTURING SUPPORT SYSTEMS
Product design and CAD, CAD/CAM and CIM, Computer aided process planning- Variant and generative approaches, Concurrent engineering and design for manufacture, Lean production, Agile manufacturing.

UNIT IV FUNDAMENTALS OF COMMUNICATIONS
Information, Communications matrix, Computer communications, Network architecture, Tools and techniques.

UNIT V DATABASE AND CIM MANAGEMENT
Manufacturing data, database technology, Database management, Management of CIM – role, cost justification, expert systems

TOTAL: 45 PERIODS

OUTCOMES:
- The students will gain knowledge and find placement in industries which uses hardware and software of CIM control systems.

REFERENCES:

MF8072 ELECTRONICS MANUFACTURING TECHNOLOGY L T P C
3 0 0 3

OBJECTIVES:
- To understand wafer preparation and PCB fabrication, the types of Mounting Technologies and components for electronics assembly and SMT process in detail.
- To know various Defects, Inspection Equipments SMT assembly process and repair, rework and quality aspects of Electronics assemblies.

UNIT I INTRODUCTION TO ELECTRONICS MANUFACTURING
History, definition, wafer preparation by growing, machining, and polishing, diffusion, microlithography, etching and cleaning, Printed circuit boards, types- single sided, double sided, multi layer and flexible printed circuit board, design, materials, manufacturing, inspection.

UNIT II COMPONENTS AND PACKAGING
Introduction to packaging, types-Through hole technology(THT) and Surface mount technology(SMT), Through hole components – Axial, radial, multi leaded, odd form. Surface-mount components - Active, passive. Interconnections - Chip to lead interconnection, die bonding, wire bonding, TAB, flip chip, chip on board, multi chip module, direct chip array module, leaded, leadless, area array and embedded packaging, miniaturization and trends.

UNIT III SURFACE MOUNT TECHNOLOGY PROCESS
Introduction to the SMT Process, SMT equipment and material handling systems, handling of components and assemblies - Moisture sensitivity and ESD, safety and precautions needed, IPC and other standards, stencil printing process - Solder paste material, storage
and handling, stencils and squeegees, process parameters, quality control. Component placement- equipment type, flexibility, accuracy of placement, throughput, packaging of components for automated assembly, Cp and Cpk and process control. soldering- Reflow process, process parameters, profile generation and control, solder joint metallurgy, adhesive, underfill and encapsulation process - applications, materials, storage and handling, process and parameters.

UNIT IV INSPECTION AND TESTING

Inspection techniques, equipment and principle - AOI, X-ray. Defects and Corrective action - Stencil printing process, component placement process, reflow soldering process, underfill and encapsulation process, electrical testing of PCB assemblies- In circuit test, functional testing, fixtures and jigs.

UNIT V REPAIR, REWORK, QUALITY AND RELIABILITY OF ELECTRONICS ASSEMBLIES

Repair tools, methods, rework criteria and process, thermo-mechanical effects and thermal management, Reliability fundamentals, reliability testing, failure analysis, design for manufacturability, assembly, reworkability, testing, reliability, and environment.

TOTAL: 45 PERIODS

OUTCOMES:
- Perform fabrication of PCBs and use of mounting technology for electronic assemblies.
- Perform quality inspection on the PCBs

TEXT BOOKS:

REFERENCE BOOKS:
OBJECTIVES:
- To understand the Modern manufacturing systems
- To understand the concepts and applications of flexible manufacturing systems

UNIT I  PLANNING, SCHEDULING AND CONTROL OF FLEXIBLE MANUFACTURING SYSTEMS  9

UNIT II  COMPUTER CONTROL AND SOFTWARE FOR FLEXIBLE MANUFACTURING SYSTEMS  9

UNIT III  FMS SIMULATION AND DATA BASE  9

UNIT IV  GROUP TECHNOLOGY AND JUSTIFICATION OF FMS  9

UNIT V  APPLICATIONS OF FMS AND FACTORY OF THE FUTURE  9

OUTCOMES:
- Ability to perform Planning, Scheduling and control of Flexible Manufacturing systems
- Perform simulation on software’s use of group technology to product classification

TEXT BOOK:

REFERENCE BOOKS:

IE8020 ROBOTICS ENGINEERING L T P C 3 0 0 3

OBJECTIVES:
• To introduce the basic concepts, parts of robots and types of robots.
• To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
• To discuss about the various applications of robots, justification and implementation of robot.

UNIT I FUNDAMENTALS OF ROBOT 7

UNIT II ROBOT DRIVE SYSTEMS AND END EFFECTORS 10

UNIT III SENSORS AND MACHINE VISION 10
Sensory Devices - Non optical - Position sensors - Optical position sensors - Velocity sensors-Proximity sensors - Contact and noncontact type - Touel and slip sensors - Force and torque sensors - AI and Robotics.

UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING 10
Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional)-Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effector commands, and Simple programs.

UNIT V ROBOT CELL DESIGN, CONTROL AND ECONOMICS 8
Work cell Control - Robot and machine Interface - Robot cycle time Analysis - Economic
Analysis of Robots - Pay back Method, EUAC Method, Rate of Return Method.

TOTAL : 45 PERIODS

OUTCOMES:
- Able to suggest a suitable robot drive, gripper and sensors required for particular application.
- Able to analyze robot arm kinematics and understand simple programs.
- Able to analyze the robot cycle time and economics of robot implementation.

TEXT BOOK:

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)
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 stake-
holders- Institutional Processes 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: