### ANNA UNIVERSITY, CHENNAI

**AFFILIATED INSTITUTIONS**

**R - 2008**

**B.E. PRODUCTION ENGINEERING**

**II TO VIII SEMESTERS CURRICULUM AND SYLLABI**

**SEMESTER II**

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TOTAL : 28 CREDITS

* Common to all B.E. / B.Tech. Programmes

+ Offering English Language Laboratory as an additional subject (with no marks) during 2nd semester may be decided by the respective Colleges affiliated to Anna University Chennai.

A. CIRCUIT BRANCHES

I Faculty of Electrical Engineering

1. B.E. Electrical and Electronics Engineering
2. B.E. Electronics and Instrumentation Engineering
3. B.E. Instrumentation and Control Engineering

II Faculty of Information and Communication Engineering

1. B.E. Computer Science and Engineering
2. B.E. Electronics and Communication Engineering
3. B.E. Bio Medical Engineering
4. B.Tech. Information Technology

B. NON – CIRCUIT BRANCHES

I Faculty of Civil Engineering

1. B.E. Civil Engineering

II Faculty of Mechanical Engineering

1. B.E. Aeronautical Engineering
2. B.E. Automobile Engineering
3. B.E. Marine Engineering
4. B.E. Mechanical Engineering
5. B.E. Production Engineering

III Faculty of Technology

1. B.Tech. Chemical Engineering
2. B.Tech. Biotechnology
3. B.Tech. Polymer Technology
4. B.Tech. Textile Technology
5. B.Tech. Textile Technology (Fashion Technology)
7. B.Tech. Plastics Technology
### SEMESTER III

(Applicable to the students admitted from the Academic year 2008 – 2009 onwards)

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### SEMESTER VII

### ELECTIVE - III

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### SEMESTER VIII

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## ELECTIVE – VI

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<td>Maintenance Engineering</td>
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AIM:
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES:
1. To help students develop listening skills for academic and professional purposes.
2. To help students acquire the ability to speak effectively in English in real-life situations.
3. To inculcate reading habit and to develop effective reading skills.
4. To help students improve their active and passive vocabulary.
5. To familiarize students with different rhetorical functions of scientific English.
6. To enable students write letters and reports effectively in formal and business situations.

UNIT I
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading & predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:
1. Exercises on word formation using the prefix ‘self’ - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings
4. and predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II

Suggested activities:
1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.

UNIT III
Cause and effect expressions – Different grammatical forms of the same word - Speaking – stress and intonation, Group Discussions - Reading – Critical reading - Listening, - Writing – using connectives, report writing – types, structure, data collection, content, form, recommendations .

Suggested activities:
1. Exercises combining sentences using cause and effect expressions – Gap filling exercises using the appropriate tense forms – Making sentences using different grammatical forms of the same word. ( Eg: object – verb / object – noun )
2. Speaking exercises involving the use of stress and intonation – Group discussions – analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, Multiple choice question.

UNIT IV

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs – Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists, Yes/No question form – E-mail communication.

Suggested Activities:
1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation of content.
3. Listening comprehension – entering information in tabular form, intensive listening exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.

UNIT V

Speaking - Discussion of Problems and solutions - Creative and critical thinking – Writing an essay, Writing a proposal.

Suggested Activities:
1. Case Studies on problems and solutions
2. Brainstorming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:

EXTENSIVE READING:
NOTE:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161 MATHEMATICS – II

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

UNIT II VECTOR CALCULUS

UNIT III ANALYTIC FUNCTIONS
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION

UNIT V LAPLACE TRANSFORM
Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:
PH2161 ENGINEERING PHYSICS – II  L  T  P  C  3  0  0  3  

UNIT I CONDUCTING MATERIALS  9

UNIT II SEMICONDUCTING MATERIALS  9

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS  9
Superconductivity : properties – Types of super conductors – BCS theory of superconductivity (Qualitative) – High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.

UNIT IV DIELECTRIC MATERIALS  9

UNIT V MODERN ENGINEERING MATERIALS  9
Metallic glasses: preparation, properties and applications.
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA

TOTAL: 45 PERIODS

TEXT BOOKS:
2. Charles P. Poole and Frank J.Ownen, ’Introduction to Nanotechnology’, Wiley India(2007) (for Unit V)
REFERENCES:

CY2161 ENGINEERING CHEMISTRY – II L T P C
3 0 0 3

AIM
To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES
• The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
• Principles of corrosion control
• Chemistry of Fuels and combustion
• Industrial importance of Phase rule and alloys
• Analytical techniques and their importance.

UNIT I ELECTROCHEMISTRY
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes – Standard Hydrogen electrode – Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometer titrations (redox – Fe²⁺ vs dichromate and precipitation – Ag⁺ vs Cl⁻ titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II CORROSION AND CORROSION CONTROL

UNIT III FUELS AND COMBUSTION

UNIT IV PHASE RULE AND ALLOYS
Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys –
nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT V ANALYTICAL TECHNIQUES

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

ME2151 ENGINEERING MECHANICS

OBJECTIVE
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I BASICS & STATICS OF PARTICLES

UNIT II EQUILIBRIUM OF RIGID BODIES
Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon’s theorem – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples \
UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  12
Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:
UNIT I BASIC CIRCUITS ANALYSIS

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS:
Network reduction: voltage and current division, source transformation – star delta conversion.
Thevenin’s and Norton’s Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V ANALYSING THREE PHASE CIRCUITS
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & unbalanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  CIRCUIT ANALYSIS TECHNIQUES  12
Kirchhoff’s current and voltage laws – series and parallel connection of independent
power transfer and duality – Star-delta conversion.

UNIT II  TRANSIENT RESONANCE IN RLC CIRCUITS  12
Basic RL, RC and RLC circuits and their responses to pulse and sinusoidal inputs –
frequency response – Parallel and series resonances – Q factor – single tuned and
double tuned circuits.

UNIT III  SEMICONDUCTOR DIODES  12
Review of intrinsic & extrinsic semiconductors – Theory of PN junction diode – Energy
band structure – current equation – space charge and diffusion capacitances – effect of
temperature and breakdown mechanism – Zener diode and its characteristics.

UNIT IV  TRANSISTORS  12
Principle of operation of PNP and NPN transistors – study of CE, CB and CC
configurations and comparison of their characteristics – Breakdown in transistors –
operation and comparison of N-Channel and P-Channel JFET – drain current equation –
MOSFET – Enhancement and depletion types – structure and operation – comparison of
BJT with MOSFET – thermal effect on MOSFET.

UNIT V  SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only)  12
Tunnel diodes – PIN diode, varactor diode – SCR characteristics and two transistor
equivalent model – UJT – Diac and Triac – Laser, CCD, Photodiode, Phototransistor,
Photoconductive and Photovoltaic cells – LED, LCD.

TOTAL: 60 PERIODS

TEXT BOOKS:
2. S. Salivahanan, N. Suresh kumar and A. Vallavanraj, “Electronic Devices and
(2008).

REFERENCES:


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

### UNIT II  ELECTRICAL MECHANICS  
12  

### UNIT III  SEMICONDUCTOR DEVICES AND APPLICATIONS  
12  

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

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

**TOTAL: 60 PERIODS**

**TEXT BOOKS:**

**REFERENCES:**
A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS 15

UNIT II BUILDING COMPONENTS AND STRUCTURES 15
Foundations: Types, Bearing capacity – Requirement of good foundations.
TOTAL: 30 PERIODS

B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

UNIT IV I C ENGINES 10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10
TOTAL: 30 PERIODS

REFERENCES:
LIST OF EXPERIMENTS

1. UNIX COMMANDS
   Study of Unix OS - Basic Shell Commands - Unix Editor 15

2. SHELL PROGRAMMING
   Simple Shell program - Conditional Statements - Testing and Loops 15

3. C PROGRAMMING ON UNIX
   Dynamic Storage Allocation-Pointers-Functions-File Handling 15

TOTAL: 45 PERIODS

HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware
- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

LIST OF EXPERIMENTS

1. Determination of Young’s modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Spectrometer dispersive power of a prism.
6. Determination of Young’s modulus of the material – uniform bending.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.
LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using $\text{BaCl}_2$ vs $\text{Na}_2\text{SO}_4$
4. Potentiometric Titration ($\text{Fe}^{2+}$ / $\text{KMnO}_4$ or $\text{K}_2\text{Cr}_2\text{O}_7$)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.

ME2155 COMPUTER AIDED DRAFTING AND MODELING LABORATORY

List of Exercises using software capable of Drafting and Modeling

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

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

**List of Equipments for a batch of 30 students:**

1. Pentium IV computer or better hardware, with suitable graphics facility - 30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.

**TOTAL: 45 PERIODS**

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**LIST OF EXPERIMENTS**

1. Verification of ohm’s laws and kirchoff’s laws.
2. Verification of Thevemin’s and Norton’s Theorem
3. Verification of superposition Theorem
4. Verification of maximum power transfer theorem.
5. Verification of reciprocity theorem
6. Measurement of self inductance of a coil
7. Verification of mesh and nodal analysis.
8. Transient response of RL and RC circuits for DC input.
10. Frequency response of single tuned coupled circuits.

**TOTAL: 45 PERIODS**
1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET

TOTAL: 45 PERIODS

ENGLISH LANGUAGE LABORATORY (Optional)

1. Listening:
   Listening & answering questions – gap filling – Listening and Note taking - Listening to telephone conversations

2. Speaking:
   Pronouncing words & sentences correctly – word stress – Conversation practice.

Classroom Session
   1. Speaking: Introducing oneself, Introducing others, Role play, Debate-
      Presentations: Body language, gestures, postures.
      Group Discussions etc
   2. Goal setting – interviews – stress time management – situational reasons

Evaluation
   (1) Lab Session – 40 marks
      Listening – 10 marks
      Speaking – 10 marks
      Reading – 10 marks
      Writing – 10 marks
   (2) Classroom Session – 60 marks
      Role play activities giving real life context – 30 marks
      Presentation – 30 marks
Note on Evaluation
1. Examples for role play situations:
   a. Marketing engineer convincing a customer to buy his product.
   b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.

2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES:

LAB REQUIREMENTS
1. Teacher – Console and systems for students
2. English Language Lab Software
3. Tape Recorders.

MA 2211 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATION

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OBJECTIVES
The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES

UNIT II FOURIER TRANSFORMS

UNIT III PARTIAL DIFFERENTIAL EQUATIONS
Formation of partial differential equations – Lagrange’s linear equation – Solutions of standard types of first order partial differential equations – Linear partial differential equations of second and higher order with constant coefficients.
UNIT IV  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  9 + 3
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V  Z -TRANSFORMS AND DIFFERENCE EQUATIONS  9 + 3

LECTURES: 45  TUTORIALS: 15  TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

PR 2201  BASIC MACHINING PROCESSES  L  T  P  C
3  0  0  3

OBJECTIVE:
• To impart the knowledge on basic concepts of various machining processes and machine tools

UNIT I  LATHE

UNIT II  SHAPER, PLANER & SLOTTER
Comparison of shaping with slotting – tool holding devices in shaper, planer and slotter – specifications of shaper, planer and slotter simple problems to calculate the velocity – speed, feed and depth of cut.

UNIT III DRILLING

UNIT IV MILLING

UNIT V GRINDING
For all machines, demonstration to be done in a Workshop or using CD to explain the actual operation.

TOTAL: 45 PERIODS

TEXT BOOKS

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

UNIT I  BASIC THERMODYNAMICS  16

UNIT II  AIR CYCLE AND COMPRESSORS  12
Otto, Diesel, Dual combustion and Brayton cycles. Air standard efficiency. Mean effective pressure, Reciprocating compressors.

UNIT III  STEAM AND JET PROPULSION  12

UNIT IV  REFRIGERATION AND AIR-CONDITIONING  10
Principles of Psychrometry and refrigeration - Vapour compression - Vapour absorption types - Co-efficient of performance, Properties of refrigerants – Basic Principle and types Air conditioning.

UNIT V  HEAT TRANSFER  10

L = 45, T = 15, TOTAL = 60 PERIODS

(Use of standard thermodynamic tables, Mollier diagram and Refrigerant property tables are permitted)

TEXT BOOKS

REFERENCES
OBJECTIVE:
- To introduce the various concepts of metallurgy, metallurgical structures and mechanical properties, testing of metals
- To impart the knowledge on metallurgy with respect to foundry and welding processes

UNIT I CONSTITUTION OF ALLOYS AND PHASE DIAGRAMS

UNIT II HEAT TREATMENT

UNIT III FERROUS AND NON FERROUS METALS

UNIT IV MECHANICAL PROPERTIES AND TESTING

UNIT V WELDING AND FOUNDRY METALLURGY

TEXT BOOKS
ME2204 FLUID MECHANICS AND MACHINERY L T P C
(Common to Aeronautical, Mechanical, Automobile & Production) 3 1 0 4

OBJECTIVES

- The student is introduced to the mechanics of fluids through a thorough understanding of the properties of the fluids. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy.
- The applications of the conservation laws to flow through pipes and hydraulics machines are studied.

UNIT I INTRODUCTION 12
Units & Dimensions. Properties of fluids – Specific gravity, specific weight, viscosity, compressibility, vapour pressure and gas laws – capillarity and surface tension. Flow characteristics: concepts of system and control volume. Application of control volume to continuity equation, energy equation, momentum equation and moment of momentum equation.

UNIT II FLOW THROUGH CIRCULAR CONDUITS 12

UNIT III DIMENSIONAL ANALYSIS 9
Dimension and units: Buckingham’s theorem. Discussion on dimensionless parameters. Models and similitude. Applications of dimensionless parameters.

UNIT IV ROTO DYNAMIC MACHINES 16

UNIT V POSITIVE DISPLACEMENT MACHINES 11

TOTAL: 60 PERIODS

TEXT BOOKS:
REFERENCES:

ME2205 ELECTRICAL DRIVES AND CONTROLS  L T P C
(Common to Mechanical, Production &Technology Faculty)  3 0 0 3

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

UNIT I INTRODUCTION 8
Basic Elements – Types of Electric Drives – factors influencing the choice of electrical drives – heating and cooling curves – Loading conditions and classes of duty – Selection of power rating for drive motors with regard to thermal overloading and Load variation factors

UNIT II DRIVE MOTOR CHARACTERISTICS 9
Mechanical characteristics – Speed-Torque characteristics of various types of load and drive motors – Braking of Electrical motors – DC motors: Shunt, series and compound - single phase and three phase induction motors.

UNIT III STARTING METHODS 8
Types of D.C Motor starters – Typical control circuits for shunt and series motors – Three phase squirrel cage and slip ring induction motors.

UNIT IV CONVENTIONAL AND SOLID STATE SPEED CONTROL OF D.C. DRIVES 10
Speed control of DC series and shunt motors – Armature and field control, Ward-Leonard control system - Using controlled rectifiers and DC choppers – applications.

UNIT V CONVENTIONAL AND SOLID STATE SPEED CONTROL OF A.C. DRIVES 10
Speed control of three phase induction motor – Voltage control, voltage / frequency control, slip power recovery scheme – Using inverters and AC voltage regulators – applications.

TOTAL : 45 PERIODS

TEXT BOOKS
 REFERENCES

PR 2207  BASIC MACHINING PROCESS LAB

<table>
<thead>
<tr>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS:
1. Lathe: Facing, Plain turning, Step Turning
2. Lathe: Taper Turning, Threading, Knurling
3. Lathe: Multi start Threading, Burnishing
4. Shaper: Cube
5. Shaper: Cube, V-Block
6. Drilling: Counter sinking, Counter Boring, Tapping
7. Milling Vertical: Surfacing, Pocket Milling
8. Milling Horizontal: Polygonal shape milling
9. Grinding: Surface & Cylindrical grinding
10. Slotting: Machining an internal spline

TOTAL: 45 PERIODS

ME 2208  FLUID MECHANICS AND MACHINERY LAB

<table>
<thead>
<tr>
<th>L</th>
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<th>P</th>
<th>C</th>
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</thead>
<tbody>
<tr>
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<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

((Common to Mechanical & Production)

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

LIST OF EQUIPMENT
(for a batch of 30 students)
1. Orifice meter setup
2. Venturi meter setup
3. Rotameter setup
4. Pipe Flow analysis setup
5. Centrifugal pump/submersible pump setup
6. Reciprocating pump setup
7. Gear pump setup
8. Pelton wheel setup
9. Francis turbine setup
10. Kaplan turbine setup

Quantity: one each.

TOTAL: 45 PERIODS

ME 2209 ELECTRICAL ENGINEERING LABORATORY
(Common to Mechanical & Production)

LIST OF EXPERIMENTS

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

TOTAL: 45 PERIODS

LIST OF EQUIPMENT
(for batch of 30 students)

<table>
<thead>
<tr>
<th>Equipment</th>
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</thead>
<tbody>
<tr>
<td>1. DC Shunt motor</td>
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</tr>
<tr>
<td>2. DC Series motor</td>
<td>1</td>
</tr>
<tr>
<td>3. DC shunt motor-DC Shunt Generator set</td>
<td>1</td>
</tr>
<tr>
<td>4. DC Shunt motor-DC Series Generator set</td>
<td>1</td>
</tr>
<tr>
<td>5. Single phase transformer</td>
<td>2</td>
</tr>
<tr>
<td>6. Three phase alternator</td>
<td>2</td>
</tr>
<tr>
<td>7. Three phase synchronous motor</td>
<td>1</td>
</tr>
<tr>
<td>8. Three phase Squirrel cage Induction motor</td>
<td>1</td>
</tr>
<tr>
<td>9. Three phase Slip ring Induction motor</td>
<td>1</td>
</tr>
<tr>
<td>10. Single phase Induction motor</td>
<td>1</td>
</tr>
</tbody>
</table>

TOTAL: 45 PERIODS
UNIT I TESTING OF HYPOTHESIS

UNIT II DESIGN OF EXPERIMENTS
Completely randomized design – Randomized block design – Latin square design - $2^2$ factorial design.

UNIT III SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

UNIT IV INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION
Lagrange’s and Newton’s divided difference interpolation –Newton’s forward and backward difference interpolation - Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal and Simpson’s 1/3 rules.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

TEXT BOOKS

REFERENCES:
OBJECTIVES

- To gain knowledge of simple stresses, strains and deformation in components due to external loads.
- To assess stresses and deformations through mathematical models of beams, twisting bars or combinations of both.
- Effect of component dimensions and shape on stresses and deformations are to be understood.
- The study would provide knowledge for use in the design courses.

UNIT I  STRESS STRAIN DEFORMATION OF SOLIDS  
Rigid and Deformable bodies – Strength, Stiffness and Stability – Stresses; Tensile, Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

UNIT II  BEAMS - LOADS AND STRESSES  
Types of beams: Supports and Loads – Shear force and Bending Moment in beams – Cantilever, Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Effect of shape of beam section on stress induced – Shear stresses in beams – Shear flow.

UNIT III  TORSION  

UNIT IV  BEAMDEFLECTION  

UNIT V  ANALYSIS OF STRESSES IN TWO DIMENSIONS  
Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr’s circle for biaxial stresses – Maximum shear stress – Strain energy in bending and torsion.

TUTORIALS  15  TOTAL:  60 PERIODS

TEXT BOOKS

REFERENCES
PR 2251  ADVANCED MACHINING PROCESS  L  T  P  C
3  0  0  3

OBJECTIVES:
- To understand the theory of metal cutting
- To understand the concepts of gear manufacture
- To understand CNC machines constructional features, working and programming

UNIT I  MECHANICS OF METAL CUTTING  10

UNIT II  TOOL MATERIAL, TOOL WEAR AND TOOL LIFE  9

UNIT III  GEAR MANUFACTURE  8

UNIT IV  CNC MACHINES  9

UNIT V  CNC PROGRAMMING  9

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVE:
To understand the basic concepts of mechanisms and machinery

UNIT I  MECHANISMS

UNIT II  FRICTION

UNIT III  GEARING AND CAMS

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

UNIT V  VIBRATION

TOTAL: 60 PERIODS

TEXT BOOKS

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

UNIT I  INTRODUCTION TO FLUID POWER & HYDRAULICS PRINCIPLE  12

UNIT II  FLUID POWER DRIVES  12
Fluid Power drives – Pumps – working principle and construction details of Gear, vane and piston pumps, Hydraulic motors, Hydrostatic transmission drives and characteristics, Hydraulic supply components Pneumatic power supply – compressors, air distribution, air motors.

UNIT III  FLUID POWER ELEMENTS  12

UNIT IV  HYDRAULIC AND PNEUMATIC CIRCUITS DESIGN  12

UNIT V  ELECTRO PNEUMATICS AND PLC CIRCUITS  12
Use of electrical timers, switches, solenoid, relays, proximity sensors etc. electro pneumatic sequencing Ladder diagram – PLC – elements, functions and selection – PLC programming – Ladder and different programming methods - Sequencing circuits.

TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
ME2255  ELECTRONICS AND MICROPROCESSORS  L T P C  3 0 0 3
(Common to Mechanical, Automobile & Production)

OBJECTIVE
To enable the students to understand the fundamental concepts of Semi Conductors, Transistors, Rectifiers, Digital Electronics and 8085 Microprocessors

UNIT I  SEMICONDUCTORS AND RECTIFIERS  9
Classification of solids based on energy band theory-Intrinsic semiconductors-Extrinsic semiconductors-P type and N type-PN junction-Zenor effect-Zenor diode characteristics-Half wave and full wave rectifiers -Voltage regulation

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

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

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

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

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
OBJECTIVES:
- To train the students in observation and interpretation of Microstructure of Engineering materials.
- To train students in Heat treatment, hardenability and surface treatment of Engineering Materials
- To train the students in testing of Foundry sand

LIST OF EXPERIMENTS:
1. Specimen preparation for macro – examination.
2. Specimen preparation for micro examination and study of Micro structure of –
   a) Carbon steel s(High, Medium, and Low)
   b) Cast Iron (Gray, White, Nodular, Malleable)
   c) Brass (70/30), Bronze (tin bronze), Al-Si alloy, cupro-nickel, Ti alloy.
4. Cooling curves
   a) Pure Metal (Pb or Sn)
   b) Alloy (Pb-Sn or Pb-Sb)
5. Heat treatments (carry out the following heat treatment and study the micro structure before and after heat treatments)
   a) Annealing
   b) Normalising
   c) Quench Hardening
   d) Tempering
6. Jominy End Quench Test
7. Foundry Sand testing
   a) Sieve analysis
   b) Strength of moulding sand
   c) Permeability of moulding sand
   d) Clay content of moulding sand
   e) Moisture content of moulding sand
8. Electro-chemical Test
   a) Electro deposition
   b) Electro-chemical etching test

TOTAL: 45 PERIODS
OBJECTIVE
To supplement the theoretical knowledge gained in Mechanics of Solids with practical testing for determining the strength of materials under externally applied loads. This would enable the student to have a clear understanding of the design for strength and stiffness.

LIST OF EXPERIMENTS

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

LIST OF EQUIPMENT
(for a batch of 30 students)

1. Universal Tensile Testing machine with double shear attachment – 40 Ton Capacity 1
2. Torsion Testing Machine (60 NM Capacity) 1
3. Impact Testing Machine (300 J Capacity) 1
4. Brinell Hardness Testing Machine 1
5. Rockwell Hardness Testing Machine 1
6. Spring Testing Machine for tensile and compressive loads (2500 N) 1
7. Metallurgical Microscopes 3
8. Muffle Furnace (800 ºC) 1

TOTAL: 45 PERIODS
1. Drawing of automobile components such as piston, connecting rod, valves, manifold and crank shaft.
2. Assembly drawing of screw jack, piston – connecting rod assembly, valve assembly, clutch assembly and gear box assembly.

TOTAL: 60 PERIODS

LIST OF EQUIPMENTS
(for a batch of 30 students)

2. Software
   i) Auto CAD - 15 licenses
   ii) Pro-E - 5 Nos.

GE2021 ENVIRONMENTAL SCIENCE AND ENGINEERING LT P C 3 0 0 3

AIM
- The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional Endeavour that they participates.

OBJECTIVE
- At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14
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 8
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 – solid 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 10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and 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 7

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES BOOKS:

ME 2304 ENGINEERING METROLOGY AND MEASUREMENTS L T P C
(Common to Mechanical, Production and Automobile) 3 0 0 3

OBJECTIVE
• To understand the basic principles of measurements
• To learn the various linear and angular measuring equipments, their principle of operation and applications
• To learn about various methods of measuring Mechanical parameters

UNIT I CONCEPT OF MEASUREMENT 10
General concept – Generalised measurement system-Units and standards-measuring instruments: sensitivity, stability, range, accuracy and precision-static and dynamic response-repeatability-systematic and random errors-correction, calibration - Introduction to Dimensional and Geometric Toleranceing - interchangeability,

UNIT II LINEAR AND ANGULAR MEASUREMENT 12
Definition of metrology-Linear measuring instruments: Vernier, micrometer, Slip gauges and classification, - Tool Makers Microscope - interferometery, optical flats, - Comparators: limit gauges Mechanical, pneumatic and electrical comparators, applications. Angular measurements: -Sine bar, Sine center, bevel protractor and angle Decker..

UNIT III FORM MEASUREMENT 12
Measurement of screw threads: Thread gauges, floating carriage micrometer-measurement of gear tooth thickness: constant chord and base tangent method-Gleason gear testing machine – radius measurements-surface finish: equipment and parameters, straightness, flatness and roundness measurements.

UNIT IV LASER AND ADVANCES IN METROLOGY 12
Precision instruments based on laser-Principles- laser interferometer-application in measurements and machine tool metrology- Coordinate measuring machine (CMM): need, construction, types, applications.- computer aided inspection.

UNIT V MEASUREMENT OF MECHANICAL PARAMETERS 14

TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES

PR2302 METAL FORMING TECHNOLOGY

OBJECTIVES:
To understand the principle, procedure and applications of Bulk Metal Forming and Sheet Metal Forming

UNIT I FUNDAMENTALS OF METAL FORMING

UNIT II FORGING AND ROLLING

UNIT III EXTRUSION AND DRAWING PROCESSES

UNIT IV SHEET METAL FORMING PROCESSES

UNIT V RECENT ADVANCES

TOTAL: 60 PERIODS
TEXT BOOKS:
2. Nagpal G.R. “Metal forming processes”, Khanna publishers, New Delhi, 2004

REFERENCES:

PR2303 ENGINEERING STATISTICS AND QUALITY CONTROL L T P C
3 1 0 4

OBJECTIVES:
- To provide an introduction to fundamental concepts of statistical Process control
  Enhance the student understanding of the complexities of Statistical Analysis and control chart interpretation
- To understand the concept of reliability and it’s improving techniques and design of experiments

UNIT I SAMPLING THEORY AND TESTING OF HYPOTHESIS 11

UNIT II STATISTICAL PROCESS CONTROL 15
Variation in process – Factors – control charts – variables \( \bar{X} \), R and \( \bar{X}, \sigma \), - Attributes P, C and U-Chart Establishing and interpreting control charts process capability – Quality rating – Short run SPC.

UNIT III ACCEPTANCE SAMPLING 15
Lot by lot sampling types – probability of acceptance in single, double, multiple sampling plans – OC curves – Producer’s risk and consumer’s risk. AQL, LTPD, AOQL, Concepts Design of single sampling plan – standard sampling plans for AQL end LTPD – use of standard sampling plans – Sequential sampling plan.

UNIT IV RELIABILITY AND QUALITY 10

UNIT V EXPERIMENTAL DESIGN AND TAGUCHI METHOD 9

TOTAL: 60 PERIODS
TEXT BOOKS:

REFERENCES:

PR2304 MACHINE ELEMENTS DESIGN L T P C
3 1 0 4

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

UNIT I INTRODUCTION

UNIT II DETACHABLE AND PERMANENT JOINTS
Design of Bolts under Static Load, Design of Bolt with Tightening/Initial Stress, Design of Bolts subjected to Fatigue – Keys -Types, Selection of Square and Flat Keys-Design of Riveted Joints and Welded Joints

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

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

UNIT V SPRINGS AND BEARINGS
Design of Helical Spring-Types, Materials, Static and Variable Loads-Design of Leaf Spring-Design of Journal Bearing -Antifriction Bearing-Types, Life of Bearing, Reliability Consideration, Selection of Ball and Roller Bearings

TOTAL: 60 PERIODS

TEXTBOOKS:
REFERENCES:

PR 2305 FOUNDARY AND WELDING TECHNOLOGY

OBJECTIVE:
To understand the principle, procedure and applications of Foundry and Welding Processes

UNIT I CASTING PROCESS

UNIT II WELDING PROCESSES

UNIT III SPECIAL CASTING PROCESSES

UNIT IV SPECIAL WELDING PROCESSES

UNIT V TESTING OF CASTINGS & WELDMENTS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES
LIST OF EXPERIMENTS

1. Study of different control systems and NC codes.
2. Program for Turning, Facing operation.
3. Program for circular interpolation, Taper turning operation
4. Program for thread cutting operation
5. Program using Do-Loop and Sub-routine.
6. Program for profile milling operation, circular interpolation
7. Program for Circular, rectangular pocket milling
8. Program for drilling cycle
9. Program for tool compensation and Program offset
10. NC code generation using CAD software packages
11. Study of cam packages
12. Study of CNC Wire cut EDM

TOTAL: 45 PERIODS

(Requirement for a batch of 30 Students)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
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<tbody>
<tr>
<td>.</td>
<td>CNC Trainer Lathe</td>
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<tr>
<td>.</td>
<td>CNC Trainer milling machine</td>
<td>2 No.</td>
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<tr>
<td>.</td>
<td>Any standard CAM software (Examples : PRO-E, Master CAM, SMART CAM, etc..)</td>
<td>10 users</td>
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</tr>
<tr>
<td>.</td>
<td>CNC wire cut EDM</td>
<td>1</td>
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<tr>
<td>.</td>
<td>Computers (Pentium 4, 128 RAM, 20 GB HDD, 17&quot; Color Monitor)</td>
<td>5</td>
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</tbody>
</table>

46
OBJECTIVES:
- To study the functional aspects of different pneumatic and hydraulic components and its usage in circuits.
- To train the students in designing different pneumatic and hydraulic circuits for different application.

LIST OF EXPERIMENTS
1. Study and use of pneumatic and hydraulic elements.
2. Simulation of speed control circuits in a hydraulic trainer.
3. Simulation of hydraulic circuits in a hydraulic trainer.
4. Simulation of single and double acting cylinder circuits using different directional control values
5. One shot and regenerative pneumatic circuits
6. Sequencing of pneumatic circuits
7. Simulation of Electro-pneumatic latch circuits
8. Simulation of Logic pneumatic circuits
9. Simulation of electro pneumatic sequencing circuits
10. Simulation of PLC based electro pneumatic sequencing circuits
11. Simulation of pneumatic circuits using PLC

TOTAL: 45 PERIODS

(Requirement for a batch of 30 Students)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
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<tr>
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<td>Hydraulic cut section models</td>
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<tr>
<td>2.</td>
<td>Pneumatic cut section models</td>
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<tr>
<td>3.</td>
<td>Hydraulic trainer kit</td>
<td>1 No.</td>
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<tr>
<td>4.</td>
<td>Pneumatic trainer kit</td>
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<td></td>
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<tr>
<td>5.</td>
<td>Electro Pneumatic trainer kit</td>
<td>1 No.</td>
<td></td>
<td></td>
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<tr>
<td>6.</td>
<td>PLC Trainer Kit</td>
<td>1 No.</td>
<td></td>
<td></td>
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<tr>
<td>7.</td>
<td>Hydraulic Simulation Software</td>
<td>5 Licenses</td>
<td></td>
<td></td>
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<tr>
<td>8.</td>
<td>Pneumatic Simulation software</td>
<td>5 Licenses</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OBJECTIVE
To supplement the theoretical knowledge with practical use of electronic components and programming and control using micro-processors

LIST OF EXPERIMENTS

**Electronics**
- VI Characteristics of PN Junction Diode
- VI Characteristics of Zener Diode
- Characteristics of CE Transistor
- Characteristics of JFET
- Characteristics of Uni Junction Transistor
- RC or Wein Bridge Oscillator
- Study of Logic Gates (Basic Gates)
- Half Adder and Full Adder
- Shift Registers and Counters
- Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non-Inverting)

**MICROPROCESSORS**
- Block Transfer
- 8 bit Addition, Subtraction
- Multiplication and Division
- Maximum and minimum of block of data
- Sorting
- Stepper Motor Interfacing

**LIST OF EQUIPMENT**
(for a batch of 30 students)
- Voltmeters 5 No.
- Ammeters 5 No.
- PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters 1 set.
- Digital Logic Trainer Kits 1 No.
- Breadboards 1 No.
- Microprocessor Kits – 8085 5 No.
- D/A Converter Interface 1 No.
- Stepper Motor Interface 1 No.
- CRO 1 No.
- Waveform Generator 1 No.
- Multimeter 1 No.

**TOTAL: 45 PERIODS**
(Requirement for a batch of 30 Students)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
<th>Quantity available</th>
<th>Deficiency %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Voltmeters</td>
<td>5 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Ammeters</td>
<td>5 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>PN Diode, BJT, JFET, Logic Gates, Shift Registers and Counters</td>
<td>1 Set.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Digital Logic Trainer Kits</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Breadboards</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>D/A Converter Interface</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Stepper Motor Interface</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>CRO</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Waveform Generator</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Multimeter</td>
<td>1 No.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GE2321 COMMUNICATION SKILLS LABORATORY

(Fifth / Sixth Semester)

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES:

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

I. PC based session (Weightage 40%) 24 periods

A. ENGLISH LANGUAGE LAB (18 Periods)

1. LISTENING COMPREHENSION: (6)
   Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.
2. **READING COMPREHENSION:** (6)
Filling in the blanks - Close exercises - Vocabulary building - Reading and answering questions.

3. **SPEAKING:** (6)

Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B. **DISCUSSION OF AUDIO-VISUAL MATERIALS** (6 PERIODS)

(Samples are available to learn and practice)

1. **RESUME / REPORT PREPARATION / LETTER WRITING** (1)
Structuring the resume / report - Letter writing / Email Communication - Samples.

2. **PRESENTATION SKILLS:** (1)
Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples

3. **SOFT SKILLS:** (2)
Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples

4. **GROUP DISCUSSION:** (1)
Why is GD part of selection process? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

5. **INTERVIEW SKILLS:** (1)
Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews- Video samples.

<table>
<thead>
<tr>
<th>II. Practice Session</th>
<th>(Weightage – 60%)</th>
<th>24 periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Resume / Report Preparation / Letter writing: Students prepare their own resume and report.</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>2. Presentation Skills: Students make presentations on given topics.</td>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td>3. Group Discussion: Students participate in group discussions.</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td>4. Interview Skills: Students participate in Mock Interviews</td>
<td>(8)</td>
<td></td>
</tr>
</tbody>
</table>

**REFERENCES:**

LAB REQUIREMENTS:

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

Requirement for a batch of 60 students

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Server</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>o PIV system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 1 GB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o OS: Win 2000 server</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Audio card with headphones (with mike)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o JRE 1.3</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Client Systems</td>
<td>60 No.</td>
</tr>
<tr>
<td></td>
<td>o PIII or above</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o 256 or 512 MB RAM / 40 GB HDD</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o OS: Win 2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Audio card with headphones (with mike)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o JRE 1.3</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Handicam Video Camera (with video lights and mic input)</td>
<td>1 No.</td>
</tr>
<tr>
<td>4.</td>
<td>Television - 29”</td>
<td>1 No.</td>
</tr>
<tr>
<td>5.</td>
<td>Collar mike</td>
<td>1 No.</td>
</tr>
<tr>
<td>6.</td>
<td>Cordless mikes</td>
<td>1 No.</td>
</tr>
<tr>
<td>7.</td>
<td>Audio Mixer</td>
<td>1 No.</td>
</tr>
<tr>
<td>8.</td>
<td>DVD Recorder / Player</td>
<td>1 No.</td>
</tr>
</tbody>
</table>
OBJECTIVES:
To introduce the concept of FEM and to apply in the field of Manufacturing Engineering

UNIT I INTRODUCTION

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

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

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

UNIT V APPLICATION OF FINITE ELEMENT ANALYSIS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
PR2352  COMPUTER AIDED PRODUCT DESIGN  L T P C
3104

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

UNIT I  INTRODUCTION TO COMPUTER AIDED DESIGN  12
Introduction to Engineering Design – Various phases of systematic design – sequential engineering and concurrent engineering – Computer hardware & Peripherals – software packages for design and drafting.

UNIT II  COMPUTER GRAPHICS FUNDAMENTALS  12

UNIT III  GEOMETRIC MODELING  12

UNIT IV  PRODUCT DESIGN CONCEPTS  12

UNIT V  PRODUCT DATA MANAGEMENT  12

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
AIM
To impart the knowledge of computer technology in all of the operational and information processing activities related to manufacturing.

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

PRE-REQUISITES:
Students must have sound knowledge on various Manufacturing types, – system and operations

UNIT I  INTRODUCTION  12

UNIT II  AUTOMATED PRODUCTION SYSTEMS AND MATERIAL HANDLING AND STORAGE SYSTEM  12


Storage systems – Performance, storage location strategies, conventional methods – Automated Storage and Retrieval systems – carousel storage systems.

UNIT III  GROUP TECHNOLOGY AND CELLULAR MANUFACTURING  12


UNIT IV  FLEXIBLE MANUFACTURING SYSTEM  12
Quantitative analysis of FMS – various bottle neck model – Sizing the FMS – Illustrative examples.
UNIT V  AUTOMATED ASSEMBLY, COMPUTER PROCESS CONTROL AND SHOP FLOOR CONTROL

Automated assembly – Fundamental – system configuration, part delivery at work station – Design for automated assembly

Computer process control – continuous, discrete process, control requirement, capabilities, Level of process control – Computer process control – Computer process interface, computer process monitoring, Direct Digital control, Supervisory control – Distributed control system and personal computer.


TOTAL: 60 PERIODS

TEXT BOOK:

REFERENCES:

UNIT V  DESIGN AND DRAWING DIES, JIGS AND FIXTURES  9+3
Progressive die – compound die – Bending and drawing dies – Drill Jigs – Milling fixtures, turning fixtures.

TEXT BOOKS:

REFERENCES:
3. ASTME, Fundamentals of Tool design, Prentice Hall 1974

PR2355  METAL FORMING LAB AND SPECIAL MACHINES LAB  L T P C
0 0 4 2

AIM:
To understand the basic principles of Metal forming process and to impart practical knowledge in special machines.

OBJECTIVES:
- To establish hands-on experience in sheet metal forming, bulge forming and Super plastic forming.
- To get hands on experience in machining gear, V-block, dovetail, etc.
- To study tool wear, acceptance test for machine tool

Metal Forming Lab:
1. Construction Flow Stress – Strain curve
2. Erichsen cupping Test
3. Determination of interface friction factor using ring compression test
4. Construction of FLD of sheet metal
5. Water hammer forming
6. Determination of Power consumption in sheet rolling process
7. Determination of strain rate sensitivity index of given specimen
8. Superplastic forming studies on Pb-Sn alloys
9. Deep drawing
10. Forward Extrusion process
11. Micro-forming
12. Simulation studies on metal forming

Special Machine Lab:
1. Gear Hobbing
   a. Spur Gear
   b. Helical Gear
2. Planning Machine  
   a. V-Block  
   b. Dove Tail  
3. Centreless Cylindrical Grinding  
4. Milling Machine  
   a. Spur Gear  
5. Tool And Cutter Grinding  
6. Tool Wear Studies  
7. Acceptance Test Of Machine Tool As Per ISI Test Chart  
8. EDM  
9. Capstan And Turret Lathe  
10. Measurement Of Cutting Force  

TOTAL: 60 PERIODS

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Universal Testing Machine 10T</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Erichsen cupping Tester</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Hydraulic Press 50T</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Water hammer forming apparatus</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Two high Rolling mill</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Top open muffle furnace (Max 1200 oC)</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Dies for deep drawing</td>
<td>1 set</td>
</tr>
<tr>
<td>8.</td>
<td>Dies for Micro forming</td>
<td>1 set</td>
</tr>
<tr>
<td>9.</td>
<td>Dies for super plastic forming</td>
<td>1 set</td>
</tr>
<tr>
<td>10.</td>
<td>FEM package (ABAQUS, ANSYS…)</td>
<td>Any one</td>
</tr>
<tr>
<td>11.</td>
<td>Dies for Constructing FLD of sheet metals</td>
<td>1 set</td>
</tr>
</tbody>
</table>

PR2356 METROLOGY AND INSPECTION LAB  

LIST OF EXPERIMENTS  
1. Measurements of angle using Sine bar / bevel protractor  
2. Measurement of External and internal Taper angle  
3. Measurement of Bore Diameter  
4. Calibration of Dial gauge  
5. Measurement of Roundness  
6. Measurements of Screw Thread Parameters using three-wire method  
7. Measurements of Surface Roughness  
8. Measurements using toolmaker Microscope  
9. Measurements using Profile Projector  
10. Measurements using Vision Measuring System  
11. Measurements using CMM  

TOTAL: 45 PERIODS
OBJECTIVE
To familiarize the students with test procedures followed in foundry and to practice various types of welding processes.

LIST OF EXPERIMENTS

Welding
Study of different welding equipments and accessories: Gas, Electric Welding Oxy-acetylene gas welding of Lap joint, Butt Joint and T Joint.

Electric are welding of Lap Joint, Butt Joint, and T Joint.
Welding of pipes in different positions.
Brazing practice – furnace brazing.
Brazing welding of cast iron.
Thermit welding of thick material like rod plates etc.

Foundry
Preparation of green moulding sand using a 5 kg muller and testing for Compression, shear, tensile, transverse strengths, hardness
in green condition:
i. in dry condition after drying in oven at 150 ° C for one and half hour.
   Permeability testing.
   Determining the clay content.
   Sieve analysis of dry silica sand.
   Determining the moisture content by various methods.
   Melting any non-ferrous metal and making simple castings - Demonstration.

TOTAL: 60 PERIODS

LIST OF EQUIPMENTS
(for a batch of 30 students)
5 Kg Muller - 1 No.
Sand rammer - 1 No.
Weighing balance - 1 No.
Universal sand strength testing with all accessories - 1 Set.
Permeability tester - 1 No.
Quick moisture tester - 1 No.
Infra-red drier - 1 No.
Sieve shaker with Sieves - 1 Set.
Crucible furnace - 1 No.
Oxy acetylene gas welding equipment - 1 Set.
Electric Welding Transformer, welding booth - 5 No.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vernier Calipers 0-150</td>
<td>5 Nos.</td>
</tr>
<tr>
<td></td>
<td>Vernier Calipers 0-300</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>2.</td>
<td>Micrometer 0-25</td>
<td>5 Nos.</td>
</tr>
<tr>
<td></td>
<td>Micrometer 25-50</td>
<td>2 Nos.</td>
</tr>
<tr>
<td></td>
<td>Micrometer 50-75</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>3.</td>
<td>Dial gauges LC 10micrometer</td>
<td>3 Nos.</td>
</tr>
<tr>
<td></td>
<td>Dial gauge L.C. 2micrometer, 1</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>4.</td>
<td>Height gauge Analog</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>Height gauge Digital</td>
<td>1 No.</td>
</tr>
<tr>
<td>5.</td>
<td>Slip gauge set</td>
<td>2 sets</td>
</tr>
<tr>
<td>6.</td>
<td>Sin~ Bar 100 mm</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>Sine Bar 200 mm</td>
<td>1 No.</td>
</tr>
<tr>
<td>7.</td>
<td>Toolmakers microscope</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>Profile Projector</td>
<td>1 No.</td>
</tr>
<tr>
<td>8.</td>
<td>Gear tooth verniers</td>
<td>2 Nos.</td>
</tr>
<tr>
<td></td>
<td>Flangemic 25-50</td>
<td>1 No.</td>
</tr>
<tr>
<td>10.</td>
<td>Floating carriage micrometer</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>Thread plug gauges m24 x 3</td>
<td>1 No.</td>
</tr>
<tr>
<td></td>
<td>Thread plug gauges m20 x 2.5</td>
<td>1 No.</td>
</tr>
<tr>
<td>11.</td>
<td>3 wire set box</td>
<td>1 No.</td>
</tr>
<tr>
<td>12.</td>
<td>Surface roughness measuring Instrument with accessories</td>
<td>1 No.</td>
</tr>
<tr>
<td>13.</td>
<td>Precision spheres different dias</td>
<td>1 set</td>
</tr>
<tr>
<td>15.</td>
<td>Precision level</td>
<td>1 No.</td>
</tr>
<tr>
<td>16.</td>
<td>Digital Micrometer</td>
<td>1 No.</td>
</tr>
<tr>
<td>17.</td>
<td>Digital Vernier 0-150</td>
<td>1 No.</td>
</tr>
<tr>
<td>20.</td>
<td>CMN</td>
<td>1 System</td>
</tr>
<tr>
<td>21.</td>
<td>Vision measuring system</td>
<td>1 System</td>
</tr>
<tr>
<td>22.</td>
<td>Boredial gauge 16-35, 35-60</td>
<td>1 Box each</td>
</tr>
<tr>
<td>23.</td>
<td>Depth Vernier 0-150</td>
<td>1 No.</td>
</tr>
<tr>
<td>24.</td>
<td>Depth micrometer with 6 rods</td>
<td>1 No.</td>
</tr>
<tr>
<td>25.</td>
<td>Internal micrometer with Extn sleeves</td>
<td>1 No.</td>
</tr>
<tr>
<td>26.</td>
<td>Precision Rollers 8</td>
<td>2 Nos.</td>
</tr>
<tr>
<td>27.</td>
<td>Surface plate</td>
<td>1 No.</td>
</tr>
<tr>
<td>28.</td>
<td>Bench centre</td>
<td>1 No.</td>
</tr>
</tbody>
</table>
UNIT I  INTRODUCTION  

UNIT II  TQM PRINCIPLES  
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III  TQM TOOLS & TECHNIQUES I  

UNIT IV  TQM TOOLS & TECHNIQUES II  

UNIT V  QUALITY SYSTEMS  

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
OBJECTIVE
To understand the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical and Electronic Systems.

UNIT I MECHATRONICS, SENSORS AND TRANSDUCERS

UNIT II ACTUATION SYSTEMS

UNIT III SYSTEM MODELS AND CONTROLLERS

UNIT IV PROGRAMMING LOGIC CONTROLLERS

UNIT V DESIGN OF MECHATRONICS SYSTEM

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES:
ME 2027       PROCESS PLANNING AND COST ESTIMATION       L T P C
               (Common to Production and Mechanical)       3 0 0 3

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

UNIT I WORK STUDY AND ERGONOMICS 10

UNIT II PROCESS PLANNING 10

UNIT III INTRODUCTION TO COST ESTIMATION 7

UNIT IV COST ESTIMATION 8
Types of estimates – methods of estimates – data requirements and sources- collection of cost- allowances in estimation.

UNIT V PRODUCTION COST ESTIMATION 10
Estimation of material cost, labour cost and over heads, allocation of overheads – Estimation for different types of jobs.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
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, programming of robots
- To discuss about the various applications of robots, justification, implementation and safety of robot

UNIT I  FUNDAMENTALS OF ROBOT  7

UNIT II  ROBOT DRIVE SYSTEMS AND END EFFECTORS  10
Pneumatic Drives – Hydraulic Drives – Mechanical Drives – Electrical Drives – D.C. Servo Motors, Stepper Motor, A.C. Servo Motors – Salient Features, Applications and Comparison of All these Drives

End Effectors – Grippers – Mechanical Grippers, Pneumatic and Hydraulic Grippers, Magnetic Grippers, Vacuum Grippers; Two Fingered and Three Fingered Grippers; Internal Grippers and External Grippers; Selection and Design Considerations

UNIT III  SENSORS AND MACHINE VISION  10

UNIT IV  ROBOT KINEMATICS AND ROBOT PROGRAMMING  10
Forward Kinematics, Inverse Kinematics and Differences; Forward Kinematics and Reverse Kinematics of Manipulators with Two, Three Degrees of Freedom (In 2 Dimensional), Four Degrees of Freedom (In 3 Dimensional) – Deviations and Problems Teach Pendant Programming, Lead through programming, Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effector commands, and Simple programs.

UNIT V  IMPLEMENTATION AND ROBOT ECONOMICS  8
RGV, AGV; Implementation of Robots in Industries – Various Steps; Safety Considerations for Robot Operations; Economic Analysis of Robots – Pay back Method, EUAC Method, Rate of Return Method.

TOTAL: 45 PERIODS

TEXT BOOK
REFERENCES

ME2404 COMPUTER AIDED SIMULATION AND ANALYSIS LABORATORY

LIST OF EXPERIMENTS

A. Simulation
8
Simulation of Air conditioning system with condenser temperature and evaporator temperatures as input to get COP using C /MAT Lab.
Simulation of Hydraulic / Pneumatic cylinder using C / MAT Lab.
Simulation of cam and follower mechanism using C / MAT Lab.

B. Analysis (Simple Treatment only)
37
Stress analysis of a plate with a circular hole.
Stress analysis of rectangular L bracket
Stress analysis of an axi-symmetric component
Stress analysis of beams (Cantilever, Simply supported, Fixed ends)
Mode frequency analysis of a 2D component
Mode frequency analysis of beams (Cantilever, Simply supported, Fixed ends)
Harmonic analysis of a 2D component
Thermal stress analysis of a 2D component
Conductive heat transfer analysis of a 2D component
Convective heat transfer analysis of a 2D component

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS
(for a batch of 30 students)

Computer System
17” VGA Color Monitor
Pentium IV Processor
40 GB HDD
512 MB RAM

Color Desk Jet Printer
01

Software
Suitable analysis software
C / MATLAB
30 licenses
5 licenses
LIST OF EXPERIMENTS

1. Design and testing of fluid power circuits to control
   (i) Velocity (ii) direction and (iii) force of single and double acting actuators
2. Design of circuits with logic sequence using Electro pneumatic trainer kits.
3. Simulation of basic Hydraulic, Pneumatic and Electric circuits using software
4. Circuits with multiple cylinder sequences in Electro pneumatic using PLC
5. Speed Control of AC & DC drives
6. Servo controller interfacing for DC motor
7. PID controller interfacing
8. Stepper motor interfacing with 8051 Micro controller
   (i) full step resolution (ii) half step resolution
9. Modeling and analysis of basic electrical, hydraulic and pneumatic systems
   Using appropriate softwares
11. Computerized data logging system with control for process variables like pressure,
    flow and temperature.

TOTAL: 45 PERIODS

LIST OF EQUIPMENT
(for a batch of 30 students)

1. Basic Pneumatic Trainer Kit with manual and electrical controls/
   PLC Control - 1 each
2. Basic Hydraulic Trainer Kit - 1 No.
4. 8051 - Microcontroller kit with stepper motor and drive circuit - 2 sets
5. Simulation Softwares and Sensors to measure Pressure, 
   Flow rate, direction, speed, velocity and force. - 2 sets

PR2404 DESIGN AND FABRICATION PROJECT

The objective of this project is to provide opportunity for the students to implement their 
skills acquired in the previous semesters to practical problems.

The students in convenient groups of not more than 4 members have to take one small 
item for design and fabrication. Every project work shall have a guide who is the member 
of the faculty of the institution and if possible with an industry guide also.

The item chosen may be small machine elements (Example-screw jack, coupling, 
machine vice, cam and follower, governor etc), attachment to machine tools, tooling (jigs, 
fixtures etc), small gear box, automotive appliances, agricultural implements, simple heat 
exchangers, small pumps, hydraulic /pneumatic devices etc.

The students are required to design and fabricate the chosen item in the college and 
demonstrate its working apart from submitting the project report. The report should 
contain assembly drawing, parts drawings, process charts relating to fabrication.

TOTAL: 60 PERIODS
OBJECTIVES
To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions.

UNIT I INTRODUCTION TO ECONOMICS

UNIT II VALUE ENGINEERING
Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest formulae and their applications –Time value of money, Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present worth factor- equal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Effective interest rate, Examples in all the methods.

UNIT III CASH FLOW
Methods of comparison of alternatives – present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of return method, Examples in all the methods.

UNIT IV REPLACEMENT AND MAINTENANCE ANALYSIS
Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT V DEPRECIATION

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES

PR2451 COMPREHENSION

OBJECTIVE
The objective of comprehension is to provide opportunity for the student to apply the knowledge acquired during the earlier semesters to real life problems which he / she may have to face in future as an engineer. While learning as how to solve the real life problems, student will receive guidance from the faculty and also review various courses learnt earlier.

Further 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 has 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: 45 PERIODS

PR2452 PROJECT WORK

OBJECTIVE
The objective of the project work is to enable the students in convenient groups of not more than 4 members on a project involving theoretical and experimental studies related to the branch of study. Every project work shall have a guide who is the member of the faculty of the institution. Six periods per week shall be allotted in the time table and this time shall be utilized by the students to receive the directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars on the progress made in the project.
The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design and manufacture of a device, a research investigation, a computer or management project or a design problem.

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

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusion. This final report shall be typewritten form as specified in the guidelines.

The continuous assessment shall be made as prescribed in the regulations (vide clause 10.3 of Regulations 2004 for B.E., B.Tech. programmes)

**MG 2021**  
MARKETING MANAGEMENT  
L T P C  
3 0 0 3

**OBJECTIVE:**

- To understand the various processes involved in Marketing and its Philosophy.
- To learn the Psychology of consumers.
- To formulate strategies for advertising, pricing and selling

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

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

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

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

**UNIT V  ADVERTISING, SALES PROMOTION AND DISTRIBUTION**  
Characteristics, impact, goals, types, and sales promotions- point of purchase- unique selling proposition. Characteristics, wholesaling, retailing, channel design, logistics, and modern trends in retailing.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**


REFERENCES:

ME2021 QUALITY CONTROL AND RELIABILITY ENGINEERING
(Common to Mechanical, Automobile and Production) 3 0 0 3

OBJECTIVE:
• To introduce the concept of SQC
• To understand process control and acceptance sampling procedure and their application.
• To learn the concept of reliability.

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

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

UNIT III ACCEPTANCE SAMPLING

UNIT IV LIFE TESTING - RELIABILITY
UNIT V  QUALITY AND RELIABILITY

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:

ME2026  UNCONVENTIONAL MACHINING PROCESSES
(Common to Mechanical and Production)  L T P C
3 0 0 3

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

UNIT I  INTRODUCTION

UNIT II  MECHANICAL ENERGY BASED PROCESSES

UNIT III  ELECTRICAL ENERGY BASED PROCESSES

UNIT IV  CHEMICAL AND ELECTRO-CHEMICAL ENERGY BASED PROCESSES
Chemical machining and Electro-Chemical machining (CHM and ECM)-Etchants-maskant-techniques of applying maskants-Process Parameters – Surface finish and
UNIT V  THERMAL ENERGY BASED PROCESSES  10
Laser Beam machining and drilling (LBM), plasma Arc machining (PAM) and Electron Beam Machining (EBM). Principles – Equipment – Types - Beam control techniques – Applications.

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:

PR2021  PRECISION ENGINEERING  L T P C
  3 0 0 3

OBJECTIVES:
To impart knowledge in the increasing quality concepts of parts, accuracy requirement of machine tools and also to introduce latest topics in Manufacturing like micro machining and smart materials so as to equip them to join core electronic manufacturing industries.

UNIT I  CONCEPTS OF ACCURACY AND MACHINE TOOLS  9

UNIT II  STIFFNESS, THERMAL EFFECTS AND FINISH MACHINING  12

UNIT III  DIMENSIONING  6
Definition of terms – Key dimension – Superfluous dimension – dimensional stepped shaft – assigning tolerances in the constituent dimensions – dimensional chains.

UNIT IV  MICRO-MACHINING MICRO FABRICATION  9
UNIT V  SMART STRUCTURES, MATERIALS AND MICRO ACTUATORS

TOTAL: 45 PERIODS

TEST BOOKS:

REFERENCES:

PR2022  FUZZY LOGIC AND ANN  L T P C
3 0 0 3

UNIT I  INTRODUCTION TO FUZZY LOGIC PRINCIPLES

UNIT II  ADVANCED FUZZY LOGIC APPLICATIONS

UNIT III  INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS
Applications of back propagation algorithms.

UNIT IV  OTHER ANN ARCHITECTURES
UNIT V  RECENT ADVANCES

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

PR2023  INSTRUMENTATION AND CONTROL  L  T  P  C
3  0  0  3

UNIT I  INTRODUCTION
Static and dynamic characteristics of measurement systems, standards and calibration, error and uncertainty analysis, statistical analysis of data, and curve fitting.

UNIT II  MECHANICAL MEASUREMENTS AND INDUSTRIAL INSTRUMENTATION
Measurement of displacement, velocity (linear and rotational), acceleration, shock, vibration, force torque power, strain, stress, pressure temperature.

UNIT III  DATA DISPLAY AND RECORDING DEVICES
Data display-CRO,LED, LCD, magnetic tape recorders, x-y recorders, UV recorders, Oscilloscope recorders, digital printers and data loggers.

UNIT IV  CONTROL
Introduction to control systems, mathematical model of physical systems in transfer function and state space forms, response of dynamic systems, concept of pole and zero of a system, realization of transfer functions.

UNIT V  STABILITY ANALYSIS
Stability criteria bode plots, routh and Nyquist criteria.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

PR2024 SURFACE ENGINEERING

UNIT I METAL CLEANING AND PREVIEW ON SURFACE ENGINEERING  8

UNIT II THERMAL SPRAYING PROCESSES AND ELECTRODEPOSITED COATINGS  10

UNIT III HOT DIP COATING AND DIFFUSION COATINGS  10

UNIT IV NON-METALLIC COATING OXIDE AND COVENSION COATINGS  9

UNIT V QUALITY ASSURANCE, TESTING AND SELECTION OF COATINGS  8

TOTAL: 45 PERIODS

TEXT BOOKS:
1. STAND GRAINGER engineering coatings – design and application jaico publishing House, 1994
REFERENCES:
1. N.V. Parthasarathy, Electroplating Handbooks, Prentice Hall, 1992
4. Niku-Lavi, advances in surface treatments, Pergamon, 1990

PR2025 DESIGN OF MACHINE TOOL STRUCTURE

UNIT I INTRODUCTION

UNIT II STRENGTH AND RIGIDITY OF MACHINE TOOL STRUCTURES

UNIT III SLIDEWAYS

UNIT IV SPINDLES AND SPINDLE SUPPORTS

UNIT V MACHINE TOOL DYNAMICS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  PRINCIPLES OF MANAGEMENT AND PERSONNEL MANAGEMENT  7
General principles of management – management functions – organization – types –
comparison – functions of personnel management – recruitment training
leadership/motivation – communication – Conflict industrial relations – trade union.

UNIT II  INVENTORY MANAGEMENT  11
Purpose of Inventory – Cost related to inventors – Basic EOQ model – variations in EOQ

UNIT III  OPERATIONS MANAGEMENT  10
Plant Location – Layout – Materials Handling – Method Study – Time Study –
Ergonomics – Aggregate Planning – Value Analysis

UNIT IV  FINANCIAL MANAGEMENT  10
Capital – Types – sources – break even analysis – financial statements – income
statement – balance – balance sheet – capital budgeting – working capital management
– inventory pricing.

UNIT V  MARKETING MANAGEMENT  7
Functions of marketing – Sales promotion methods – advertising – product packaging –
marketing variables – distribution channels – organization – market research market
research techniques.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. R. Kesavan, C.Elancezhian and T.Sundar Selwyn – Engineering management –
   Eswar Press, 2005
2. K. Panneerselvam – Production and Operations Management – Prentice Hall of India,
   2003

REFERENCES:
OBJECTIVES:
To introduce the concepts of man machine systems and techniques of providing human comfort in man-making work systems.

UNIT I INTRODUCTION

UNIT II WORK SPACE DESIGN
Anthropometry – workspace design for standing and seated workers – Arrangements of components within a physical space – Interpersonal aspect of workplace design.

UNIT III DESIGN OF EQUIPMENT
Programme factors to be considered, design of displays and controls – design for maintainability – heat stresses – manual lifting.

UNIT IV DESIGN FOR ENVIRONMENT

UNIT V RECENT ADVANCES AND TRENDS
Legislative trends – Trends in work system design – occupational diseases – Application of Ergonomics in automobiles.

TOTAL: 45 PERIODS

TEXT BOOK:

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

UNIT I INTRODUCTION, LAMINA CONSTITUTIVE EQUATIONS & MANUFACTURING

UNIT II FLAT PLATE LAMINATE CONSTITUTE EQUATIONS

UNIT III LAMINA STRENGTH ANALYSIS

UNIT IV THERMAL ANALYSIS

UNIT V ANALYSIS OF LAMINATED FLAT PLATES

TOTAL: 45 PERIODS

TEXT BOOK:
REFERENCES:

PR2028    PROCESSING OF POLYMER AND COMPOSITES

UNIT I    INTRODUCTION

UNIT II    POLYMER MATRIX COMPOSITES

UNIT III    METAL MATRIX COMPOSITES

UNIT IV    CERAMICS MATRIX COMPOSITES

UNIT V    ADVANCES IN POLYMERS & COMPOSITES

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:
5. Brydson, Hand book of plastic processing

PR2029 ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

UNIT I FINANCIAL ACCOUNTING

UNIT II PROFIT VALUE ANALYSIS

UNIT III WORKING CAPITAL MANAGEMENT

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

UNIT V ENGINEERING ECONOMICS

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:
2. Charles T.Homgren, Cost Accounting, PHI 1985

PR2030 PURCHASING AND MATERIALS MANAGEMENT  L  T  P  C
                                                  3  0  0  3

UNIT I  FUNCTIONS OF MATERIALS MANAGEMENT  6
Introduction to materials management – objectives – Organization – Functions – Operating Cycle – Value analysis – Make or buy decisions.

UNIT II PURCHASING MANAGEMENT  8
Purchasing policies and procedures – Selection of sources of supply – Vendor development – Vendor evaluation and rating – Methods of purchasing – Imports – Buyer – Seller relationship – Negotiations - Insurance and claims managements

UNIT III STORES MANAGEMENT  8

UNIT IV MATERIALS PLANNING  12
Forecasting - ABC analysis – Materials requirements planning - Inventory systems – Quantity – periodic – Deterministic models – Aggregate planning – JIT.

UNIT V INVENTORY MANAGEMENT  11

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To create awareness about optimization in utilization of resources.
- To understand and apply operations research techniques to industrial operations.

UNIT I  LINEAR MODEL  10

UNIT II  NETWORK MODELS  8

UNIT II  INVENTORY MODEL  9
Types of Inventory- EOQ –ERL- Deterministic inventory problems – Price breaks - Stochastic inventory problems- selective inventory control techniques.

UNIT II  REPLACEMENT MODELS  9
Replacement of items that deteriorate with time – value of money changing with time – not charging with time – optimum replacement policy – individual and group replacement. Sequencing problem: models with n jobs with 2 machines – problem with n jobs with m machines.

UNIT III  QUEUING THEORY  9

TEXT BOOK:

REFERENCES:

TOTAL: 45 PERIODS
PR2031  NON-DESTRUCTIVE TESTING METHODS  L  T  P  C  3 0 0 3

AIM:
To impart knowledge on Non Destructive Testing procedures.

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

PRE-REQUISITES: Basic knowledge on various process defects

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

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

UNIT III  EDDY CURRENT TESTING AND ACOUSTIC EMISSION TESTING  10
Principles, Instrumentation for ECT, Various Techniques – High sensitivity Techniques, Single, Multi and high frequency ECT, Applications
Principle of AET, AE signal parameters, Applications.

UNIT IV  ULTRASONIC TESTING  10
Principle, Ultrasonic transducers, Inspection Methods – Normal Incident Pulse-echo Inspection, Through - transmission Testing, angle Beam Pulse-echo testing, Techniques for Normal Beam Inspection, Ultrasonic Flaw detection Equipment, Modes of display – A-scan, B-Scan & C-Scan- Applications

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

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
3. www.ndt.net
OBJECTIVE:
To introduce the concepts of simulation and to apply them for manufacturing system

UNIT I  INTRODUCTION  8
Basic concept of system – elements of manufacturing system - concept of simulation –
simulation as a decision making tool – types of simulation – system modeling – types of
modeling.

UNIT II  RANDOM NUMBERS  10
Probability and statistical concepts of simulation – Pseudo random numbers – methods of
generating random numbers – discrete and continuous distribution – testing of random
numbers – sampling - simple, random and simulated.

UNIT III  DESIGN OF SIMULATION EXPERIMENTS  10
Problem formulation – data collection and reduction – time flow mechanical – key
variables - logic flow chart starting condition – run size – experimental design
consideration – output analysis, interpretation and validation – application of simulation in
engineering industry.

UNIT IV  SIMULATION LANGUAGE  9
Study of GPSS (Basic blocks only) Generate, Queue, Depart, Size, Release, Advance,
Terminate, Transfer, Enter and Leave.

UNIT V  CASE STUDIES  10
Development of simulation models using GPSS for queuing, production, inventory,
maintenance and replacement systems, (Students may be asked to prepare and present
the case studies)

TOTAL: 45 PERIODS

TEXT BOOK:
1991

REFERENCES:
3. Jeffrey L.Written, Lonnie D, Bentley and V.M. Barice, “System analysis and Design
Methods”, Galgotia publication, 1995
International Editions, 1991
OBJECTIVES:
To stress the importance of reliability in Engineering and products also the concept of maintainability, failure modes and testing methods.

UNIT I  CONCEPTS OF RELIABILITY, SYSTEM AND MODELS  12

UNIT II  DESIGN FOR RELIABILITY AND MAINTAINABILITY  12

UNIT III  OPTIMIZATION OF SYSTEM RELIABILITY  7
Optimization techniques for system reliability with redundancy – heuristic methods applied to optimal system reliability- redundancy allocation by dynamic programming – reliability optimization by non linear programming.

UNIT IV  THE ANALYSIS OF FAILURE DATA AND RELIABILITY TESTING  7

UNIT V  PACKAGING AND TRANSPORTATION FOR RELIABILITY  7

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

PR2034 MACHINE TOOL CONTROL & CONDITION MONITORING

OBJECTIVES:
- To understand the control system of machine tools and its applications
- To understand the objectives, aims and methodology of machine tool condition monitoring and diagnostics.

UNIT I OVERVIEW OF AUTOMATIC CONTROLS IN MACHINE TOOLS
Open loop – closed loop system – block diagram representation of machine tool control systems.

UNIT II COMPUTER CONTROL SYSTEM

UNIT III DRIVE SYSTEMS IN MACHINE TOOLS
Electrical, hydraulic and pneumatic types – servo motor-stepper motor-ball screw mechanism. Feed back devices-Synro, resolver, diffraction gratings, potentiometer, and inductosyn-encoders-application in machine tools.

UNIT IV CONDITION MONITORING
Condition monitoring techniques – Visual, temperature, vibration, lubricant, thickness, noise and sound. Condition monitoring of machine tools.

UNIT V MACHINE TOOL DIAGNOSTICS
Objectives-aims-examples of monitoring and diagnosis-control structures for machine diagnosis-utilization of diagnostic results.

TOTAL: 45 PERIODS

REFERENCES:
OBJECTIVES:
1. The students in batches (not exceeding three in a batch) have to take up a project in the area of manufacturing engineering.
2. Each batch is guided by a faculty member. The students have to select a suitable problems, design, prepare the drawings, produce the components, assemble and commission the project.
3. The students have to prepare and present a detailed project report at the end of the VIII semester.
4. The evaluation will be made for the continuous internal assessment for the Project by a committee nominated by the Head of the Department.

GE2025 PROFESSIONAL ETHICS IN ENGINEERING

UNIT I ENGINEERING ETHICS

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

UNIT III ENGINEER’S RESPONSIBILITY FOR SAFETY

UNIT IV RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL: 45 PERIODS

TEXT BOOKS:
OBJECTIVE:
- 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

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

UNIT III  BUSINESS

UNIT IV  FINANCING AND ACCOUNTING

UNIT V  SUPPORT TO ENTREPRENEURS

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

PR2036 MACHINE VISION

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

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

UNIT II IMAGE ACQUISITION AND CONVERSION

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

UNIT IV PATTERN RECOGNITION

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

TOTAL: 45 PERIODS

REFERENCES:
1. Milan sonka, Vaclav hlavac, roger boyie, image processing, analysis and machine vision publisher, 1995
2. Richard O.Duda, Peter E. Hurt, Pattern Classification and Scene Analysis Publisher, 1973
OBJECTIVE:
To introduce the advanced OR models and to apply them for Engineering problems

UNIT I  INTRODUCTION  5

UNIT II  CLASSIC OPTIMIZATION TECHNIQUES  10

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

UNIT IV  INTEGER PROGRAMMING  11

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

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II PREPARATION METHODS
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography

UNIT IV PREPARATION ENVIRONMENTS
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.

UNIT V CHARACTERISATION TECHNIQUES
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To understand the various components and functions of production planning and control such as work study, product planning, process planning, production scheduling, Inventory Control.
- To know the recent trends like manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

UNIT I  INTRODUCTION

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

UNIT II  WORK STUDY

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

UNIT III  PRODUCT PLANNING AND PROCESS PLANNING

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

UNIT IV  PRODUCTION SCHEDULING


UNIT V  INVENTORY CONTROL AND RECENT TRENDS IN PPC

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

TOTAL: 45 PERIODS

TEXT BOOK:


REFERENCES:


ME 2037 MAINTENANCE ENGINEERING L T P C
(Common to Mechanical and Production) 3 0 0 3

OBJECTIVES:

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

UNIT I PRINCIPLES AND PRACTICES OF MAINTENANCE PLANNING 10

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

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

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

UNIT V REPAIR METHODS FOR MATERIAL HANDLING EQUIPMENT 7
Repair methods for Material handling equipment - Equipment records –Job order systems -Use of computers in maintenance.

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

7.