### B.E. PRODUCTION ENGINEERING (PART – TIME)

#### I – VII SEMESTERS CURRICULA AND SYLLABI

#### SEMESTER I

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UNIT I  MATRICES

UNIT II  FUNCTIONS OF SEVERAL VARIABLES

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

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

UNIT V  LAPLACE TRANSFORMS

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE BOOKS
UNIT I ULTRASONICS

UNIT II LASERS

UNIT III FIBER OPTICS & APPLICATIONS
Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing - Splicing, Loss in optical fibre – attenuation, dispersion, bending - Fibre optical communication system (Block diagram) - Light sources - Detectors - Fibre optic sensors - temperature & displacement - Endoscope.

UNIT IV QUANTUM PHYSICS

UNIT V CRYSTAL PHYSICS
Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – NaCl, ZnS, diamond and graphite structures – Polymorphism and allotropy - Crystal defects – point, line and surface defects- Burger vector.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

PTCY 2111 APPLIED CHEMISTRY
(Common to all branches of B.E / B.Tech (PT) Programmes)

UNIT I WATER TREATMENT AND POLLUTION CONTROL

UNIT II FUELS
Classification of fuels-Proximate and ultimate analysis of coal- coke manufacture- Otto Hoffman by product method-cracking-thermal and catalytic (fixed bed and fluidized bed)-petroleum-refining-factions-composition and uses synthetic petrol-fischer drops methods- Bergius process- knocking-octane number and cetane number-Preparation, composition and uses of producer gas, water gas and natural gas. Flue gas analysis- Orsat apparatus- gross and net calorific values- calculation of minimum requirement of air(simple calculations)- Explosive range – spontaneous ignition temperature

UNIT III THERMODYNAMICS AND SURFACE CHEMISTRY

UNIT IV ELECTROCHEMISTRY - CORROSION AND CATALYSIS
UNIT V POLYMERS-COMPOSITES AND NANOCHEMISTRY 9
Polymers-definition-classification-thermoplastics and thermosetting plastics differences Preparation, properties and uses of polystyrene, bakelite, PET, polyurethane, Teflon, ureafomaldehyde, polycarbonates-Elastomers-Preparation, properties of Buna-S, nitrile, neoperene and butyl rubber, silicon rubber. Composites-FRP. Nanochemistry-introduction to nanochemistry- preparation and properties of nonmaterial-nano rods, nano wires-nanotubes-carbon nanotubes and their applications.

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCE BOOKS

PTGE2112 FUNDAMENTALS OF COMPUTING AND PROGRAMMING 3 0 0 3

AIM : To provide an awareness to Computing and Programming

OBJECTIVES :
• To enable the student to learn the major components of a computer system
• To know the correct and efficient ways of solving problems
• To learn to use office automation tools
• To learn to program in C

UNIT I INTRODUCTION TO COMPUTERS 9

UNIT II COMPUTER SOFTWARE 9
UNIT III   PROBLEM SOLVING AND OFFICE APPLICATION SOFTWARE  
Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode - Application Software Packages- Introduction to Office Packages (not detailed commands for examination).

UNIT IV   INTRODUCTION TO C  
Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.

UNIT V   FUNCTIONS AND POINTERS  

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

PTGE2152   BASIC ELECTRICAL AND ELECTRONICS ENGINEERING    L T P C
(Common to branches under Civil, Mechanical and Technology faculty)  3 0 0 3

UNIT I   ELECTRICAL CIRCUITS & MEASURMENTS  

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.
UNIT II  ELECTRICAL MECHANICS  9

UNIT III  SEMICONDUCTOR DEVICES AND APPLICATIONS  9

UNIT IV  DIGITAL ELECTRONICS  9
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  9
Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

PTMA 2266  STATISTICS AND NUMERICAL METHODS  L T P C
(3 0 0 3)

UNIT I  TESTING OF HYPOTHESIS  9

UNIT II  DESIGN OF EXPERIMENTS  9
Completely randomized design – Randomized block design – Latin square design - 2² - factorial design.
UNIT III  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS  9
Newton-Raphson method - Gauss Elimination method – Pivoting - Gauss-Jordan
methods – Iterative methods of Gauss-Jacobi and Gauss-Seidel - Matrix Inversion by
Gauss-Jordan method - Eigenvalues of a matrix by Power method.

UNIT IV  INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL
INTEGRATION  9
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  9
Taylor’s series method - Euler’s method - Modified Euler’s method - Fourth order Runge-
Kutta method for solving first and second order equations - Milne’s predictor-corrector
methods for solving first order equations - Finite difference methods for solving second
order equation.

TOTAL : 45 PERIODS

TEXT BOOKS:
   Engineers”, Pearson Education, Asia, 7th edition, 2007 (For units 3, 4 and 5).

REFERENCES:
1. R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, “Probability and Statistics for
   Education Asia, New Delhi, 2006.

PTGE2151  ENGINEERING MECHANICS  L T P C
                                      3 0 0 3

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  9

UNIT II  EQUILIBRIUM OF RIGID BODIES  9

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  9

UNIT IV  DYNAMICS OF PARTICLES  9

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  9
Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 45 PERIODS

TEXT BOOK:

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  10

UNIT II  HEAT TREATMENT  10

UNIT III  FERROUS AND NON FERROUS METALS  9

UNIT IV  MECHANICAL PROPERTIES AND TESTING  8

UNIT V  WELDING AND FOUNDRY METALLURGY  8

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

PTPR 2305 FOUNDARY AND WELDING TECHNOLOGY L T P C
3 0 0 3

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

UNIT I CASTING PROCESS 10

UNIT II WELDING PROCESSES 9

UNIT III SPECIAL CASTING PROCESSES 8

UNIT IV SPECIAL WELDING PROCESSES 9

UNIT V TESTING OF CASTINGS & WELDMENTS 9

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 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: 45 PERIODS

TEXT BOOKS

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

UNIT I BASIC THERMODYNAMICS
9

UNIT II AIR CYCLE AND COMPRESSORS
9
Otto, Diesel, Dual combustion and Brayton cycles. Air standard efficiency. Mean effective pressure, Reciprocating compressors.

UNIT III STEAM AND JET PROPULSION
9

UNIT IV REFRIGERATION AND AIR-CONDITIONING
9
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
9

TOTAL 45 PERIODS

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

TEXT BOOKS

REFERENCES
OBJECTIVES

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

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

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

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

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

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

TOTAL : 45 PERIODS

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

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

UNIT III
FLUID POWER ELEMENTS

UNIT IV
HYDRAULIC AND PNEUMATIC CIRCUITS DESIGN

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

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
LIST OF EXPERIMENTS

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

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
Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs – stresses in helical coil springs under torsion loads

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.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
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:
PTPR2302  METAL FORMING TECHNOLOGY   L T P C  3 0 0 3

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

UNIT I  FUNDAMENTALS OF METAL FORMING  9

UNIT II  FORGING AND ROLLING  9

UNIT III  EXTRUSION AND DRAWING PROCESSES  9

UNIT IV  SHEET METAL FORMING PROCESSES  9

UNIT V  RECENT ADVANCES  9

TOTAL: 45 PERIODS

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

REFERENCES:
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
9

UNIT II    DETACHABLE AND PERMANENT JOINTS
9
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
9
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
9
Design of Spur, Helical, Bevel and Worm Gear drives-Design of Belt drives-Flat and V Belts

UNIT V    SPRINGS AND BEARINGS
9
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: 45 PERIODS

TEXTBOOKS:

REFERENCES:
AIM:
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 participate.

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

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.
Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and
overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
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

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

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

UNIT IV RELIABILITY AND QUALITY

UNIT V EXPERIMENTAL DESIGN AND TAGUCHI METHOD

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
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  9
Introduction to Engineering Design – Various phases of systematic design – sequential engineering and concurrent engineering – Computer hardware & Peripherals – software packages for design and drafting.

UNIT II  COMPUTER GRAPHICS FUNDAMENTALS  9

UNIT III  GEOMETRIC MODELING  9

UNIT IV  PRODUCT DESIGN CONCEPTS  9

UNIT V  PRODUCT DATA MANAGEMENT  9

TOTAL: 45 PERIODS

TEXT BOOKS:

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

UNIT I  LOCATION AND CLAMPING DEVICES IN JIGS AND
FIXTURES  9
Principles of Jigs and Fixture – Design concepts – Different types of locating devices –
different types of clamps – Drill bushes – types – Elements of fixtures.

UNIT II  DESIGN OF ELEMENTS OF JIGS AND FIXTURE  9
Design concepts of Template Jig, Plate Jig, Sandwich Jig, Vice Jaw Jig, Latch Jig,
Turnover jig, Box jig – Fixtures for Milling, Grinding, Turning, Welding, and Assembly –
Modular fixtures.

UNIT III  PRESS WORKING OPERATION AND FORMING DIES  9
Blanking, Piercing, lancing, notching, bending design features of dies for drawing,
extrusion, wire drawing and forging.

UNIT IV  ELEMENTS OF DIE  9
Design concepts of the following elements of progressive, compound and
Combination dies – Die block – Die shoe – Bolster plate – punch – punch plate – punch
of standard die sets – strip layout and development.

UNIT V  DESIGN AND DRAWING DIES, JIGS AND FIXTURES  9
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
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

UNIT II AUTOMATED PRODUCTION SYSTEMS AND MATERIAL HANDLING AND STORAGE SYSTEM

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

UNIT III GROUP TECHNOLOGY AND CELLULAR MANUFACTURING

UNIT IV FLEXIBLE MANUFACTURING SYSTEM
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 workstation – 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.


TEXT BOOKS:

REFERENCES:

PTPR 2306  CNC MACHINE LAB  L T P C
0 0 3 2

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>1</td>
<td>CNC Trainer Lathe</td>
<td>2 No.</td>
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<tr>
<td>2</td>
<td>CNC Trainer milling machine</td>
<td>2 No.</td>
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<td>3</td>
<td>Any standard CAM software (Examples: PRO-E, Master CAM, SMART CAM, etc..)</td>
<td>10 users</td>
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<tr>
<td>4</td>
<td>CNC wire cut EDM</td>
<td>1</td>
<td></td>
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<tr>
<td>5</td>
<td>Computers (Pentium 4, 128 RAM, 20 GB HDD, 17” Color Monitor)</td>
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PTGE 2022 TOTAL QUALITY MANAGEMENT L T P C

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

PTME2401 MECHATRONICS
(Common to Mechanical and Production) L T P C
3 0 0 3

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  9

UNIT V  DESIGN OF MECHATRONICS SYSTEM  9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

PTME2027  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  

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

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

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PTMG2451   ENGINEERING ECONOMICS AND COST ANALYSIS   L T P C
(Common to Mechanical, Production, Automobile)  3 0 0 3

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:
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.
TEXT BOOKS:

REFERENCES:

PTPR2452 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)
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

UNIT V THERMAL ENERGY BASED PROCESSES
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 BOOKS:

REFERENCES:
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 9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
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

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

TOTAL: 45 PERIODS
OBJECTIVES:
- 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:
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 10
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 8
Control chart for attributes - control chart for non conformings - p chart and np chart - control chart for non conformities - C and U charts, State of control and process out of control identification in charts, pattern study.

UNIT III ACCEPTANCE SAMPLING 9
Lot by lot sampling - types - probability of acceptance in single, double, multiple sampling techniques - O.C. curves - producer’s Risk and consumer’s Risk. AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD- uses of standard sampling plans.

UNIT IV LIFE TESTING - RELIABILITY 9
Life testing - Objective - failure data analysis, Mean failure rate, mean time to failure, mean time between failure, hazard rate - Weibull model, system reliability, series, parallel and mixed configuration - simple problems. Maintainability and availability - simple problems. Acceptance sampling based on reliability test - O.C Curves.

UNIT V QUALITY AND RELIABILITY 9
Reliability improvements - techniques- use of Pareto analysis - design for reliability - redundancy unit and standby redundancy - Optimization in reliability - Product design - Product analysis - Product development - Product life cycles.

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCES:

PTPR2022 Fuzzy Logic and ANN

UNIT I INTRODUCTION TO FUZZY LOGIC PRINCIPLES
Basic concepts of fuzzy set theory – operations of fuzzy sets – properties of fuzzy sets –
Crisp relations – Fuzzy relational equations – operations on fuzzy relations – fuzzy
systems – propositional logic – Inference – Predicate Logic – Inference in predicate logic –
fuzzy logic principles – fuzzy quantifiers – fuzzy inference – fuzzy rule based systems –
fuzzification and defuzzification – types.

UNIT II ADVANCED FUZZY LOGIC APPLICATIONS
Fuzzy logic controllers – principles – review of control systems theory – various industrial
applications of FLC adaptive fuzzy systems – fuzzy decision making – Multiobjective
decision making – fuzzy classification – means clustering – fuzzy pattern recognition –
image processing applications – syntactic recognition – fuzzy optimization – various

UNIT III INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS
Fundamentals of neural networks – model of an artificial neuron – neural network
architectures – Learning methods – Taxonomy of Neural network architectures –
Standard back propagation algorithms – selection of various parameters – variations
Applications of back propagation algorithms.

UNIT IV OTHER ANN ARCHITECTURES
Associative memory – exponential BAM – Associative memory for real coded pattern
pairs – Applications adaptive reasonance theory – introduction – ART 1 – ART2 –
Applications – neural networks based on competition – kohenen self organizing maps –
learning vector quantization – counter propagation networks – industrial applications.

UNIT V RECENT ADVANCES
Fundamentals of genetic algorithms – genetic modeling – hybrid systems – integration of
fuzzy logic, neural networks and genetic algorithms – non traditional optimization
techniques like ant colony optimization – Particle swarm optimization and artificial
immune systems – applications in design and manufacturing.

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

PTPR2023 INSTRUMENTATION AND CONTROL

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:

PTPR2025  DESIGN OF MACHINE TOOL STRUCTURE  L T P C
          3 0 0 3

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:

PTME2030 COMPOSITE MATERIALS

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  9

UNIT V  ANALYSIS OF LAMINATED FLAT PLATES  9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

PTPR2028  PROCESSING OF POLYMER AND COMPOSITES  L T P C
3 0 0 3

UNIT I  INTRODUCTION  8

UNIT II  POLYMER MATRIX COMPOSITES  12
UNIT III  METAL MATRIX COMPOSITES  9

UNIT IV  CERAMICS MATRIX COMPOSITES  9

UNIT V  ADVANCES IN POLYMERS & COMPOSITES  7

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
5. Brydson, Hand book of plastic processing

PTPR2031   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

UNIT II  RANDOM NUMBERS  10

UNIT III  DESIGN OF SIMULATION EXPERIMENTS  10

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:

REFERENCES:
UNIT I  PRINCIPLES OF MANAGEMENT AND PERSONNEL MANAGEMENT

UNIT II  INVENTORY MANAGEMENT
Purpose of Inventory – Cost related to inventors – Basic EOQ model – variations in EOQ model – Finite Production quality discounts – ABC Analysis – MRP Analysis.

UNIT III  OPERATIONS MANAGEMENT

UNIT IV  FINANCIAL MANAGEMENT

UNIT V  MARKETING MANAGEMENT

TOTAL: 45 PERIODS

TEXT BOOKS:

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 seatedworkers – 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 Ergonomcis in automobiles.

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
OBJECTIVES:
To stress the importance of reliability in Engineering and products also the concept of maintability, failure modes and testing methods.

UNIT I CONCEPTS OF RELIABILITY, SYSTEM AND MODELS

UNIT II DESIGN FOR RELIABILITY AND MAINTAINABILITY

UNIT III OPTIMIZATION OF SYSTEM RELIABILITY
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

UNIT V PACKAGING AND TRANSPORTATION FOR RELIABILITY

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

PTPR2034 MACHINE TOOL CONTROL & CONDITION MONITORING L T P C
3 0 0 3

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-Syncro, 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:

PTPR 2035 MINI PROJECT L T P C
0 0 6 3

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 ne made for the continuous internal assessment for the Project by a committee nominated by the Head of the Department.

PTGE2025 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

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:

REFERENCES:

PTME2035 ENTREPRENEURSHIP DEVELOPMENT L T P C
(Common to Mechanical, Production & Automobile) 3 0 0 3

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
Small Enterprises – Definition, Classification – Characteristics, Ownership Structures –
Project Formulation – Steps involved in setting up a Business – identifying, selecting a
Good Business opportunity, Market Survey and Research, Techno Economic Feasibility
Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources
of Information – Classification of Needs and Agencies.

UNIT IV   FINANCING AND ACCOUNTING
Need – Sources of Finance, Term Loans, Capital Structure, Financial Institution,
management of working Capital, Costing, Break Even Analysis, Network Analysis

UNIT V   SUPPORT TO ENTREPRENEURS
Sickness in small Business – Concept, Magnitude, causes and consequences,
Corrective Measures – Government Policy for Small Scale Enterprises – Growth
Strategies in small industry – Expansion, Diversification, Joint Venture, Merger and Sub
Contracting.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. S.S.Khanka “Entrepreneurial Development” S.Chand & Co. Ltd. Ram Nagar New
   Delhi, 1999.

REFERENCES:
   Delhi, 1998.
4. EDII “ Faulty and External Experts – A Hand Book for New Entrepreneurs

PTPR2029 ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

UNIT I   FINANCIAL ACCOUNTING
Accounting principles – basic records depreciation – depreciation methods – preparation
and interpretation of profit and loss statement – balance sheet – fixed assets – current
assets.

UNIT II   PROFIT VALUE ANALYSIS
Cost valume profit relationship – relevant costs in decision making profit management
analysis – break even analysis – margin of safety Angle of incident & multi product break
even analysis – Effect of changes in volume selling price fixed cost and variable cost on
profit.
UNIT III WORKING CAPITAL MANAGEMENT 8

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

UNIT V ENGINEERING ECONOMICS 7

TOTAL: 45 PERIODS

TEXT BOOKS:

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

PTPR2036 MACHINE VISION L T P C
3 0 0 3

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

UNIT I INTRODUCTION TO MACHINE VISION 6
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 6

UNIT III IMAGE PROCESSING DECISION MAKING 12
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    9

UNIT V    MACHINE VISION APPLICATIONS    12
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

PTPR 2037    ADVANCES IN OPERATIONS RESEARCH    L T P C
3 0 0 3

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:

PTGE2023 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

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 5
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:

PTME2036 PRODUCTION PLANNING AND CONTROL L T P C
3 0 0 3

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

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

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

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

UNIT IV PRODUCTION SCHEDULING
UNIT V  INVENTORY CONTROL AND RECENT TRENDS IN PPC

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

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:

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

UNIT II  PURCHASING MANAGEMENT  
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  

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

UNIT V  INVENTORY MANAGEMENT  

TOTAL: 45 PERIODS

TEXT BOOK:

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

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES: