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MA8166 APPLIED PROBABILITY AND STATISTICS L T P C
3 1 0 4

AIM:
• To introduce the concepts of probability, sampling techniques, estimation to the students.

OBJECTIVE:
• To train the students so that they will be able to design experiments and use these concepts for research.

UNIT I PROBABILITY THEORY 13
Random variables – probability density and distribution functions - moment generating and characteristic functions – Binomial, Poisson, Normal distributions and their applications.

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

UNIT III ESTIMATION THEORY 6
Interval estimation for population mean, standard deviation, difference in means, preparation ratio of standard deviations and variances.

UNIT IV TESTING OF HYPOTHESIS AND ANOVA 8

UNIT V ANOVA 5
Design of experiments – One, Two factor Models

TOTAL: 45 PERIODS

REFERENCES:
1. Levin and Rubin, Statistics for Management, Pearson Education India, 2011

MN8101 AUTOMATED COMPUTER INTEGRATED MANUFACTURING SYSTEMS L T P C
3 0 0 3

AIM:
• To expose the students on the need of automation and integration

OBJECTIVES:
• To teach the role of computers in processing of information knowing across the various stages and various departments in a manufacturing industries
• To train them in process planning.

UNIT I INTRODUCTION 6
UNIT II  AUTOMATED MANUFACTURING SYSTEMS
Storage system performance – storage location strategies – Conventional storage methods and equipments – Automated storage/Retrieval system and Carousel storage system
Deadlocks in Automated manufacturing systems – Petrinet models – Applications in Dead lock avoidance.

UNIT III  GROUP TECHNOLOGY AND FMS

UNIT IV  PROCESS PLANNING
Typical process sheet – case studies in Manual process planning.

UNIT V  TYPES OF PROCESS CONTROL AND AUTOMATIC DATA CAPTURE
Overview of Automatic identification methods – Bar code technology – Other Automatic data capture technologies.

REFERENCES:

TOTAL : 45 PERIODS
AIM:
- To impart the principles of various basic micro manufacturing processes

OBJECTIVE:
- The objective of the course is to acquaint the students with the principles, basic machine tools, and developments in the micro manufacturing process and research trends in the area of micro manufacturing processes.

UNIT I MICRO MACHINING I

UNIT II MICRO MACHINING II

UNIT III NANO POLISHING

UNIT IV MICRO FORMING AND WELDING

UNIT V RECENT TRENDS AND APPLICATIONS

TOTAL: 45 PERIODS

REFERENCES:
8. www.cmxr.com/industrial/
ROBOT DESIGN AND PROGRAMMING

AIM:
- To impart knowledge in the area of Robot designing and programming in Robotic languages.

OBJECTIVES:
- To teach the students about the kinematic arrangement of robots and its applications in the area of manufacturing sectors
- To expose the students to build a robot for any type of application

UNIT I INTRODUCTION
Definition, Need Application, Types of robots – Classifications – Configuration, work volume, control loops, controls and intelligence, specifications of robot, degrees of freedoms, end effectors – types, selection applications.

UNIT II ROBOT KINEMATICS

UNIT III ROBOT DYNAMICS AND TRAJECTORY PLANNING
Lagrangeon mechanics, dynamic equations for sing, double and multiple DOF robots – static force analysis of robots, Trajectory planning – joint space, Cartesian space description and trajectory planning – third order, fifth order - Polynomial trajectory planning

UNIT IV ROBOT PROGRAMMING & AI TECHNIQUES
Types of Programming – Teach Pendant programming – Basic concepts in A1 techniques – Concept of knowledge representations – Expert system and its components.

UNIT V ROBOT SENSORS AND ACTUATORS
Design of Robots – characteristics of actuating systems, comparison, microprocessors control of electric motors, magnetostrictive actuators, shape memory type metals, sensors, position, velocity, force, temperature, pressure sensors – Contact and non contact sensors, infrared sensors, RCC, vision sensors.

REFERENCES

ADVANCED MATERIALS TECHNOLOGY

AIM:
- To impart knowledge on the advanced concepts of material technology
OBJECTIVES:
- To make the students to understand on elastic, plastic and fractured behaviour of engineering materials.
- To train the students in selection of metallic and non-metallic materials for the various engineering applications.

UNIT I  ELASTIC AND PLASTIC BEHAVIOR  10
Elasticity in metals and polymers Anelastic and visco-elastic behaviour – Mechanism of plastic deformation and non metallic shear strength of perfect and real crystals – Strengthening mechanisms, work hardening, solid solutioning, grain boundary strengthening, poly phase mixture, precipitation, particle, fibre and dispersion strengthening. Effect of temperature, strain and strain rate on plastic behaviour – Super plasticity – Deformation of non crystalline materials.

UNIT II  FRACTURE BEHAVIOUR  10

UNIT III  SELECTION OF MATERIALS  10
Motivation for selection, cost basis and service requirements – Selection for mechanical properties, strength, toughness, fatigue and creep – Selection for surface durability corrosion and wear resistance – Relationship between materials selection and processing – Case studies in materials selection with relevance to aero, auto, marine, machinery and nuclear applications – Computer aided materials selection.

UNIT IV  MODERN METALLIC MATERIALS  8

UNIT V  NON METALLIC MATERIALS  7
Polymeric materials – Formation of polymer structure – Production techniques of fibers, foams, adhesives and coating – structure, properties and applications of engineering polymers – Advanced structural ceramics, WC, TiC, TaC, Al₂O₃, SiC, Si₃N₄ CBN and diamond – properties, processing and applications.

TOTAL: 45 PERIODS

REFERENCES:
MN8111   CAD / CAM LAB   L T P C   0 0 4 2

AIM:
• To impart the knowledge on training the students in the area of CAD/CAM

OBJECTIVES:
• To teach the students about the drafting of 3D components and analyzing the same using various CAD packages and programming of CNC machines
• To train them to use the various sensors

CAM LABORATORY
1. Exercise on CNC Lathe: Plain Turning, Step turning, Taper turning, Threading, Grooving & canned cycle

CAD LABORATORY
2D modeling and 3D modeling of components such as
1. Bearing
2. Couplings
3. Gears
4. Sheet metal components
5. Jigs, Fixtures and Die assemblies.

TOTAL: 60 PERIODS

MN8201   MANUFACTURING METROLOGY AND QUALITY ENGINEERING   L T P C   3 0 0 3

AIM:
To expose the students, the importance of measurement and the various latest measuring techniques using Laser, Coordinate measuring machines and Opto-electronics devices. Also to stress upon the Importance of quality in manufacturing.

OBJECTIVES:
• To impart through knowledge in various latest measurement systems such as laser metrology, coordinate measuring machines and electro-optical devices.
• To train them in the area of precision and quality manufacturing

UNIT I   LASER METROLOGY AND PRECISION INSTRUMENTS
10
UNIT II  
**CO-ORDINATE MEASURING SYSTEM**  

UNIT III  
**OPTO ELECTRONICS AND VISION SYSTEM**  

UNIT IV  
**QUALITY IN MANUFACTURING AND DESIGN ENGINEERING**  

UNIT V  
**QUALITY MANAGEMENT SYSTEM AND CONTINUOUS IMPROVEMENT**  

**TOTAL: 45 PERIODS**

**REFERENCES:**

<table>
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**AIM:**
- To inspire the students to expect to the trends in manufacturing of micro components and measuring systems to nano scale.

**OBJECTIVES:**
- To expose the students to the evolution of micro electromechanical systems, to the various fabrication techniques and to make students to be aware of micro actuators.
- Also to impart knowledge to the students about nano materials and various nano measurements techniques.
UNIT I  OVER VIEW OF MEMS AND MICROSYSTEMS 6
Definition – historical development – properties, design and fabrication micro-system, microelectronics, working principle, applications and advantages of micro system. Substrates and wafers, silicon as substrate material, mechanical properties of Si, Silicon Compounds - silicon piezo resistors, Galium arsenide, quartz, polymers for MEMS, conductive polymers.

UNIT II  FABRICATION PROCESSES AND MICRO SYSTEM PACKAGING 10

UNIT III  MICRO DEVICES 8

UNIT IV  SCIENCE AND SYNTHESIS OF NANO MATERIALS 10

UNIT V  CHARACTERIZATION OF NANO MATERIALS 11

TOTAL: 45 PERIODS

REFERENCES:
MN8203  OPTIMIZATION TECHNIQUES IN MANUFACTURING  L  T  P  C
3  0  0  3

AIM:
- To introduce the various optimization techniques and their advancements.

OBJECTIVES:
- To make use of the above techniques while modeling and solving the engineering problems of different fields.

UNIT I  INTRODUCTION

UNIT II  CLASSIC OPTIMIZATION TECHNIQUES

UNIT III  NON-LINEAR OPTIMIZATION

UNIT IV  INTEGER PROGRAMMING AND DYNAMIC PROGRAMMING AND NETWORK TECHNIQUES

UNIT V  ADVANCES IN SIMULATION
Genetic algorithms – simulated annealing – Neural Network and Fuzzy systems

TOTAL: 45 PERIODS

REFERENCES:

MN8204  THEORY OF METAL FORMING  L  T  P  C
3  0  0  3

AIM:
- To impart knowledge on plasticity, surface treatment for forming of various types of metal forming process.

OBJECTIVES:
- To study the basic concepts of metal forming techniques and to develop force calculation in metal forming process.
- To study the thermo mechanical regimes and its requirements of metal forming
UNIT I  THEOREY OF PLASTICITY  

UNIT II  THEORY AND PRACTICE OF BULK FORMING PROCESSES  
Analysis of plastic deformation in Forging, Rolling, Extrusion, rod/wire drawing and tube drawing – Effect of friction – calculation of forces, work done – Process parameters, equipment used – Defects – applications – Recent advances in Forging, Rolling, Extrusion and Drawing processes – Design consideration in forming.

UNIT III  SHEET METAL FORMING  
Formability studies – Conventional processes – H E R F techniques – Superplastic forming techniques – Hydro forming – Stretch forming – Water hammer forming – Principles and process parameters – Advantage, Limitations and application

UNIT IV  POWDER METALLURGY AND SPECIAL FORMING PROCESSES  

UNIT V  SURFACE TREATMENT AND METAL FORMING APPLICATIONS  

TOTAL: 45 PERIODS

REFERENCES:
MN8211  AUTOMATION AND METAL FORMING LABORATORY  L T P C  0 0 4 2

AIM
- To impart practical knowledge on bulk metal forming and sheet metal forming processes

OBJECTIVE
- To train the students to have an hands on having the basic concepts of metal forming processes and to determine some metal forming parameters for a given shape.

EXPERIMENTS
1. Determination of strain hardening exponent
2. Determination of strain rate sensitivity index
3. Construction of formability limit diagram
4. Determination of efficiency in water hammer forming
5. Determination of interface friction factor
6. Determination of extrusion load
7. Study on two high rolling process

TOTAL: 60 PERIODS

MN8001  ADVANCES IN CASTING AND WELDING  L T P C  3 0 0 3

AIM:
- To refresh the knowledge on basic concepts and to impart knowledge on advances in casting and welding processes.

OBJECTIVES:
- To study the metallurgical concepts and applications of casting and welding process.
- To acquire knowledge in CAD of casting and automation of welding process.

UNIT I  CASTING DESIGN  8
Heat transfer between metal and mould — Design considerations in casting — Designing for directional solidification and minimum stresses - principles and design of gating and risering

UNIT II  CASTING METALLURGY  8
Solidification of pure metal and alloys — shrinkage in cast metals — progressive and directional solidification — Degasification of the melt-casting defects — Castability of steel, Cast Iron, Al alloys, Babbit alloy and Cu alloy.

UNIT III  RECENT TRENDS IN CASTING AND FOUNDRY LAYOUT  8
Shell moulding, precision investment casting, CO₂ moulding, centrifugal casting, Die casting, Continuous casting, Counter gravity low pressure casting, Squeeze casting and semisolid processes. Layout of mechanized foundry — sand reclamation — material handling in foundry pollution control in foundry — Computer aided design of casting.

UNIT IV  WELDING METALLURGY AND DESIGN  10
UNIT V  RECENT TRENDS IN WELDING  

REFERENCES:
2. ASM Handbook vol.6, welding Brazing & Soldering, 2003

MN8002  COMPUTER AIDED PRODUCT DESIGN  
L T P C  3 0 0 3

AIM:
• To introduce the computer aided modeling and various concepts of product design.

OBJECTIVES:
• To model a product using CAD software.
• To apply the various design concepts and design tools and techniques while designing a product.

UNIT I  INTRODUCTION  8
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 AND GEOMETRIC  8

UNIT III  PRODUCT DESIGN CONCEPTS AND PRODUCT DATA MANAGEMENT  10
UNIT IV  PRODUCT DESIGN TOOLS & TECHNIQUES  10

UNIT V  PRODUCT DESIGN TECHNIQUES  9

TOTAL: 45 PERIODS

REFERENCES:

MN8003 DESIGN FOR MANUFACTURING AND ASSEMBLY  L  T  P  C
3 0 0 3

AIM:
- To impart the knowledge about the significance of design for manufacturing and assembly

OBJECTIVE:
- To make the students learn about tolerance analysis, allocation and geometrical tolerances.
- Guidelines for design for manufacturing and assembly with examples.

UNIT I  TOLERANCE ANALYSIS  8

UNIT II  TOLERANCE ALLOCATION  8

UNIT III  GD&T  10

UNIT IV  TOLERANCE CHARTING  9

Attested
Salim
DIRECTOR
Centre For Academic Courses
Anna University, Chennai-600 025
UNIT V MANUFACTURING GUIDELINES 10

TOTAL: 45 PERIODS

REFERENCES:

MN8004 FINITE ELEMENT APPLICATIONS IN MANUFACTURING L T P C
3 0 0 3

AIM:
• To impart knowledge in the area of finite element methods and its application in manufacturing.

OBJECTIVE:
• To study the fundamentals of one dimensional and two dimensional problems using FEA in manufacturing.

UNIT I INTRODUCTION 6
Fundamentals – Initial, boundary and eigen value problems – weighted residual, Galerkin and Rayleigh Ritz methods - Integration by parts – Basics of variational formulation – Polynomial and Nodal approximation.

UNIT II ONE DIMENSIONAL ANALYSIS 10
Steps in FEM – Discretization. Interpolation, derivation of elements characteristic matrix, shape function, assembly and imposition of boundary conditions-solution and post processing – One dimensional analysis in solid mechanics and heat transfer.

UNIT III SHAPE FUNCTIONS AND HIGHER ORDER FORMULATIONS 10
Shape functions for one and two dimensional elements- Three noded triangular and four noded quadrilateral element Global and natural co-ordinates—Non linear analysis – Isoparametric elements – Jacobian matrices and transformations – Basics of two dimensional, plane stress, plane strain and axisymmetric analysis.

UNIT IV COMPUTER IMPLEMENTATION 9
Pre Processing, mesh generation, elements connecting, boundary conditions, input of material and processing characteristics – Solution and post processing – Overview of application packages – Development of code for one dimensional analysis and validation

UNIT V ANALYSIS OF PRODUCTION PROCESSES 10

TOTAL: 45 PERIODS
REFERENCES:
7. www.tbook.com
8. www.pollockeng.com

MN8005  FLUID POWER AUTOMATION  L T P C
3 0 0 3

AIM:
• To impart knowledge in the area of hydraulics, pneumatic and fluid power components and its functions.

OBJECTIVE:
• To make the students to learn the basic concepts of hydraulics and pneumatics and their controlling elements in the area of manufacturing process.
• To train the students in designing the hydraulics and pneumatic circuits using various design procedures.

UNIT I  INTRODUCTION

UNIT II  FLUID POWER GENERATING/UTILIZING ELEMENTS

UNIT III  CONTROL AND REGULATION ELEMENTS
Direction flow and pressure control valves-Methods of actuation, types, sizing of ports-pressure and temperature compensation, overlapped and underlapped spool valves-operating characteristics-electro hydraulic servo valves-Different types-characteristics and performance.

UNIT IV  CIRCUIT DESIGN

UNIT V  ELECTRO PNEUMATICS & ELECTRONIC CONTROL OF HYDRAULIC AND PNEUMATIC CIRCUITS
Electrical control of pneumatic and hydraulic circuits-use of relays, timers, counters, Ladder diagram. Programmable logic control of Hydraulics Pneumatics circuits, PLC ladder diagram for various circuits, motion controllers, use of field busses in circuits. Electronic drive circuits for various Motors.

TOTAL: 45 PERIODS
REFERENCES:

MN8006        INDUSTRIAL ERGONOMICS        L T P C

AIM:
• To introduce the concepts of Ergonomics and to indicate the areas of Applications.

OBJECTIVES:
• To make the students familiarize with various concepts of Ergonomics, so that students will able to apply the concepts of ergonomics to Design of man – machine system.

UNIT I       INTRODUCTION

UNIT II      ANTHROPOMETRY
Physical dimensions of the human body as a working machine – Motion size relationships – Static and dynamic anthropometry – Anthropometric aids – Design principles – Using anthropometric measures for industrial design – Procedure for anthropometric design.

UNIT III    DESIGN OF SYSTEMS

UNIT IV     ENVIRONMENTAL FACTORS IN DESIGN

UNIT V       WORK PHYSIOLOGY
 provision of energy for muscular work – Role of oxygen physical exertion – Measurement of energy expenditure Respiration – Pulse rate and blood pressure during physical work – Physical work capacity and its evaluation.

REFERENCES:

TOTAL: 45 PERIODS
AIM:

- To introduce the concepts of manufacturing management and various manufacturing management functions to the students.

OBJECTIVE:

- To train the students on various functions of manufacturing management so that the students will be able to take up these functions as they get into senior managerial positions.

UNIT I  PLANT ENGINEERING  7

UNIT II  WORK STUDY  8

UNIT III  PROCESS PLANNING AND FORECASTING  9
Process planning – Aims of process planning – steps to prepare the detailed work sheets for manufacturing a given component – Break even analysis – Forecasting – Purpose of forecasting – Methods of forecasting – Time series – Regression and Correlation – Exponential smoothing.

UNIT IV  SCHEDULING AND PROJECT MANAGEMENT  12

UNIT V  PERSONNEL AND MARKETING MANAGEMENT  9

TOTAL: 45 PERIODS

REFERENCES
1. Dr. R. Kesavan, C.Elanchezian and B.Vijayaramnath, Production Planning and Control, Anuratha Publications, Chennai – 2008
## AIM
- This course aims to impart knowledge on various techniques of material characterization.

## OBJECTIVE
- On completion of the course the students are expected to be knowledgeable in microstructure evaluation, crystal structure analysis, electron microscopy, Chemical Thermal Analysis, static and dynamic mechanical testing methods.

### UNIT I: MICRO AND CRYSTAL STRUCTURE ANALYSIS (10)

### UNIT II: ELECTRON MICROSCOPY (9)

### UNIT III: CHEMICAL AND THERMAL ANALYSIS (9)

### UNIT IV: MECHANICAL TESTING – STATIC TESTS (8)

### UNIT V: MECHANICAL TESTING – DYNAMIC TESTS (9)

### TEXT BOOKS:

### REFERENCES:

MN8009 MECHATRONICS

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

UNIT I INTRODUCTION

UNIT II SENSORS AND TRANSDUCERS

UNIT III MICROPROCESSORS AND MICROCONTROLLERS
Introduction – Architectures of 8 – bit microcontrollers (8051) series, PIC Microcontrollers (16f xxx) series – Assembly language programming instruction format, addressing modes, instruction sets, Basic program examples interface of keypads, leds, leds, A/D and D/A Converters, RS 232 serial communication interface, classification of memories.

UNIT IV ACTUATORS

UNIT V MECHATRONIC SYSTEMS
Design process-stages of design process – Traditional and Mechatronics design concepts – Case studies – Engine management system, Automatic camera, Automatic wishing machine, Pick and place robots.

TOTAL: 45 PERIODS

REFERENCES:
MN8010 METAL CUTTING THEORY AND PRACTICE  

AIM:
- To impart the knowledge and train the students in the area of metal cutting theory and its importance.

OBJECTIVES:
- To make the students familiar with the various principles of metal cutting, cutting tool materials and its wear mechanisms during the machining operation.

UNIT I INTRODUCTION  
Need for rational approach to the problem of cutting materials-observation made in the cutting of metals-basic mechanism of chip formation-thin and thick zone modes-types of chips-chip breaker-orthogonal Vs oblique cutting-force velocity relationship for shear plane angle in orthogonal cutting-energy consideration in machining-review of Merchant, Lee and Shafter theories-critical comparison.

UNIT II SYSTEM OF TOOL NOMENCLATURE  
Nomenclature of single point cutting tool-System of tool nomenclature and conversion of rake angles-nomenclature of multi point tools like drills, milling-conventional Vs climb milling, mean cross sectional area of chip in milling-specific cutting pressure.

UNIT III THERMAL ASPECTS OF MACHINING  
Heat distribution in machining-effects of various parameters on temperature-methods of temperature measurement in machining-hot machining-cutting fluids.

UNIT IV TOOL MATERIALS, TOOL LIFE AND TOOL WEAR  

UNIT V WEAR MECHANISMS AND CHATTER IN MACHINING  
Processing and Machining – Measuring Techniques – Reasons for failure of cutting tools and forms of wear-mechanisms of wear-chatter in machining-factors effecting chatter in machining-types of chatter-mechanism of chatter.

TOTAL: 45 PERIODS

REFERENCES

MN8011 POLYMERS AND COMPOSITE MATERIALS  

AIM:
- To impart knowledge on types, physical properties and processing of polymer matrix composites, metal matrix composites and ceramics matrix composites.

OBJECTIVES:
- To study matrix material, reinforcements of polymer matrix composites, MMC and ceramic matrix composites.
- To develop knowledge on processing, interfacial properties and application of composites.
UNIT I  PROCESSING OF POLYMERS  

UNIT II  FIBERS AND MATRIX MATERIALS  

UNIT III  PROCESSING OF POLYMER MATRIX COMPOSITES  

UNIT IV  PROCESSING OF METAL MATRIX COMPOSITES  

UNIT V  PROCESSING OF CERAMIC MATRIX COMPOSITES AND CARBON-CARBON COMPOSITES  
Processing of CMCs: cold pressing, sintering, reaction bonding, liquid infiltration, lanxide process – in situ chemical reaction techniques: chemical vapour deposition, chemical vapour impregnation, sol-gel – interfaces in CMCs – mechanical properties and applications of CMCs – Carbon-carbon Composites – applications.

TOTAL: 45 PERIODS

REFERENCES:
AIM:
- To expose the students to the various quality control techniques and also to understand the importance and concept of reliability and maintainability in industries.

OBJECTIVES:
- To make the students to understand the various quality control techniques and to construct the various quality control charts for variables and attributes and also the design concepts for reliable system and maintenance aspects in industries.

UNIT I QUALITY & STATISTICAL PROCESS CONTROL

UNIT II ACCEPTANCE SAMPLING

UNIT III EXPERIMENTAL DESIGN AND TAGUCHI METHOD

UNIT IV CONCEPT OF RELIABILITY
- Definition – reliability vs quality, reliability function – MTBF, MTTR, availability, bathtub curve – time dependent failure models – distributions – normal, weibull, lognormal – Reliability of system and models – serial, parallel and combined configuration – Markove analysis, load sharing systems, standby systems, covariant models, static models, dynamic models.

UNIT V DESIGN FOR RELIABILITY AND MAINTAINABILITY
- Reliability design process, system effectiveness, economic analysis and life cycle cost, reliability allocation, design methods, parts and material selection, derating, stress-strength and analysis, failure analysis, identification determination of causes, assessments of effects, computation of criticality index, corrective action, system safety – analysis of down-time – the repair time distribution, stochastic point processes system repair time, reliability under preventive maintenance state dependent system with repair. MTTR – mean system down time, repair vs replacement, replacement models, proactive, preventive, predictive maintenance maintainability and availability, optimization techniques for system reliability with redundancy heuristic methods applied to optimal system reliability.

TOTAL: 45 PERIODS

REFERENCES:
AIM
- To introduce the various concepts of Research Methodology

OBJECTIVE
- To introduce various types of Research Design
- To introduce various sampling techniques, statistical analysis and interpreting of the results.

UNIT I INTRODUCTION

UNIT II RESEARCH DESIGN

UNIT III SAMPLING DESIGN

UNIT IV PROCESSING AND ANALYSIS OF DATA

UNIT V INTERPRETATION, REPORT WRITING

TOTAL: 45 PERIODS

REFERENCE:
AIM:
- To inspire the students to expect to the trends in development and synthesizing of nano systems and measuring systems to nano scale.

OBJECTIVES:
- To expose the students to the evolution of Nano systems, to the various fabrication techniques.
- Also to impart knowledge to the students about nano materials and various nano measurements techniques.

UNIT I  OVER VIEW OF NANOTECHNOLOGY  6
Definition – historical development – properties, design and fabrication Nanosystems, working principle, applications and advantages of nano system. Nanomaterials – ordered oxides – Nano arrays – potential health effects

UNIT II  NANODEFECTS, NANO PARTICLES AND NANOLAYERS  8

UNIT III  NANO STRUCTURING  8

UNIT IV  SCIENCE AND SYNTHESIS OF NANO MATERIALS  12
Classification of nano structures – Effects of nano scale dimensions on various properties – structural, thermal, chemical, magnetic, optical and electronic properties fluid dynamics – Effect of nano scale dimensions on mechanical properties - vibration, bending, fracture

UNIT V  CHARACTERIZATION OF NANO MATERIALS  11

TOTAL: 45 PERIODS

REFERENCES:
MN8072  FINANCIAL MANAGEMENT  L T P C
3 0 0 3

AIM:
• To introduce the concepts of financial and various functions of financial management so that the students will be able to handle higher level financial decisions.

OBJECTIVES:
• To train students in various functions of finance such as working capital management, current assets management so that students will be able to make investment decisions when they take up senior managerial positions.

UNIT I  FINANCIAL ACCOUNTING  8
Accounting principles - Basic records - Preparation and interpretation of profit and loss statement - balance sheet - Fixed assets - Current assets.

UNIT II  COST ACCOUNTING  12

UNIT III  MANAGEMENT OF WORKING CAPITAL  10
Current assets - Estimation of working capital requirements - Management of accounts receivable - Inventory - Cash - Inventory valuation methods.

UNIT IV  CAPITAL BUDGETING  8
Significance of capital budgeting - payback period - present value method - accounting rate of return method - Internal rate of return method.

UNIT V  PROFIT PLANNING AND ANALYSIS  7
Cost - Volume profit relationship Relevant costs in decision making profit management analysis - Break even analysis.

TOTAL: 45 PERIODS

REFERENCES:
AIM:
- To stress the importance of NDT in engineering.

OBJECTIVES:
- To introduce all types of NDT and their applications in Engineering.

UNIT I NON-DESTRUCTIVE TESTING: AN INTRODUCTION, VISUAL INSPECTION & LIQUID PENETRANT TESTING 6
Introduction to various non-destructive methods, Comparison of Destructive and Non destructive Tests, Visual Inspection, Optical aids used for visual inspection, Applications. Physical principles, procedure for penetrant testing, Penetrant testing materials, Penetrant testing methods-water washable, Post – Emulsification methods, Applications

UNIT II EDDY CURRENT TESTING & ACOUSTIC EMISSION 10

UNIT III MAGNETIC PARTICLE TESTING & THERMOGRAPHY 10
Principle of MPT, procedure used for testing a component, Equipment used for MPT, Magnetizing techniques, Applications. Principle of Thermography, Infrared Radiometry, Active thermography measurements, Applications – Imaging entrapped water under an epoxy coating, Detection of carbon fiber contaminants.

UNIT IV ULTRASONIC TESTING 10
Principle, Ultrasonic transducers, Ultrasonic Flaw detection Equipment, Modes of display A- scan, B-Scan, C- Scan, Applications, Inspection Methods - Normal Incident Pulse-Echo Inspection, Normal Incident Through-transmission Testing, Angle Beam Pulse-Echo testing, TOFD Technique, Applications of Normal Beam Inspection in detecting fatigue cracks, Inclusions, Slag, Porosity and Intergranular cracks - Codes, standards, specification and procedures and case studies in ultrasonics test.

UNIT V RADIOGRAPHY 9
Principle of Radiography, x-ray and gamma ray sources- safety procedures and standards, Effect of radiation on Film, Radiographic imaging, Inspection Techniques – Single wall single image, Double wall Penetration, Multiwall Penetration technique, Real Time Radiography - Codes, standards, specification and procedures and case studies in Radiography test. Case studies on defects in cast, rolled, extruded, welded and heat treated components - Comparison and selection of various NDT techniques

TOTAL: 45 PERIODS

REFERENCES:
4. www.ndt.net
AIM:
- To introduce the concepts of lean manufacturing system.

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

UNIT I  INTRODUCTION TO LEAN MANUFACTURING

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

UNIT III  SET UP TIME REDUCTION, TQM, 5S, VSM
Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.

UNIT IV  SIX SIGMA
Six Sigma – Definition, statistical considerations, variability reduction, design of experiments – Six Sigma implementation

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

TOTAL: 45 PERIODS

REFERENCES:
3. Rother M. and Shook J, 1999 ‘Learning to See: Value Stream Mapping to Add Value and Eliminate Muda’ , Lean Enterprise Institute, Brookline, MA.

QE8071  MATERIALS MANAGEMENT
OBJECTIVE:
- To understand the importance of materials management system and its concepts

OUTCOME:
- To introduce the concepts of materials management with the emphasis on the various material planning, purchasing policies, purchasing system and the concepts of materials management.

UNIT I  INTRODUCTION
Introduction to materials management and productivity, functions, organization structures and role of material management. Materials and profitability and Profit center concept, Contribution to profits,
policy manual, internal interface, External Environment, Centralized Purchasing, Decentralization, Delegations of powers.

**UNIT II MATERIAL PLANNING**

Material Planning, definition, influencing factors, use of standard deviation, Importance of materials Research, Advantages of MIS, Techniques of Materials Intelligence, Environment Conditions, Source of information, Materials requirement planning (MRP) and Manufacturing resource Planning (MRPII), Evolution to ERP and Distribution Requirements Planning (DRP), Pull systems.

**UNIT III PURCHASING**

Importance and objectives of good purchasing system, Prime and organizational functions, purchasing policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, role of purchasing in cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, Vendor relation and selection, vendor rating and standardization, vendor certification plans, supply reliability, developing new source of supply.

**UNIT IV COST REDUCTION**

Cost control vs Cost reduction, price analysis, material cost reduction techniques, variety reduction, cost reduction and value improvement, material holding cost, Acquisition cost, Settlement of Bills, Accounting, Audit in Materials Management, Internal Audit, Operational Audit, techniques of cost control, cost effectiveness, cost analysis for material management, material flow cost control.

**UNIT V INVENTORY MANAGEMENT**

Inventory vs Stores, Functions and types of inventory, Types of inventory control, Handling Uncertainties and safety stock, inventory build-up, EOQ for various inventory models, inventory models with quantity discount, exchange curve concept, coverage analysis, optimal stocking policies, inventory management of perishable commodities, ABC-VED analysis, design of inventory distribution systems, spare parts inventory management, information systems for inventory management, cases studies.

**REFERENCES:**


**TOTAL: 45 PERIODS**