

ELECTIVES

Course Name : **THEORY OF METAL CUTTING**
Course Code : **PE 410**
Credits : **4**
L T P : **4 0 0**
Pre-Req. : **PR 201, PR 204**
Lecture wise breakup

No. of Lectures

MECHANISM OF CHIP FORMATION **(18)**

Steady of deformation, mechanism of deformation slip, twinning & dislocation, types of chips, single hear plane model and zone theory for determination of dynamic shear strain. Chip formation in drilling, chip formation in milling, effect of cutting variables on chip reduction coefficients. Numerical problems.

MECHANISM OF CUTTING **(18)**

force system in turning, merchant circle diagram, friction and shear force, shear stress in turning, energy in cutting process, Kronenberg relation and velocity relation, chip deviation and other effects on cutting forces. Force system in drilling, force system in milling (Vulf & simulated Model), Numerical problems.

DETERMINATION OF CUTTING FORCES **(10)**

Theoretical determination of cutting forces--shear angle relation (Ernst & Merchant, kronenberg, Lee & shaffer), practical determination of cutting forces--Design fundamental of tool force dynamometers turning, drilling, milling and grinding dynamometers (mainly strain gauge type).Tool Life, Machine-ability, Metal Cutting Optimization (Gilbert Model), tool life test (mainly facing tool life test) Machined surface finish --variables that effect surface finish.

TOOL LIFE & MACHINEABILITY **(8)**

Tool life, factors affecting tool life, criteria for tool life, mechanism of tool failure, machine- ability, measurement of machineability

DESIGN OF CUTTING TOOLS **(4)**

Design of turning tool mainly high production tool, design of twist drills, design of form milling cutters, designs of round internal broach (pull type) of thin strips and circular discs.

BOOKS:

1. Metal Cutting by Juneja & Shakho

REFERENCES:

1. Text Metal Cutting Theory by A Bhattacharyya, New Central Book Agency
2. Metal Cutting Principles by M.C.Shaw

Course Name : **MATERIALS MANAGEMENT**
Course Code : **PE 411**
Credits : **4**
L T P : **4 0 0**
Pre-Req. : **--**

Lecture wise breakup

No. of Lectures

CONCEPT OF MODERN MATERIALS MANAGEMENT:	(10)
Management of Material resources, integrated concept of Materials Management, objectives, functions and Materials Management profit center concept.	
ORGANIZATION OF MATERIALS MANAGEMENT	(8)
Traditional and non-integrated organization, classical materials management organization, extended and integrated materials management organization, organization based on commodities, location, function, interdepartmental relations.	
MATERIALS PLANNING AND BUDGETING	(6)
Factors affecting materials planning, techniques of materials planning, guidelines for effective planning.	
MATERIALS PURCHASING	(12)
Indenting, Source selection, vendor development, rating vendors, purchasing parameters, quality, time, price, delivery and purchase systems, purchase requirements, blanket orders, purchasing of capital equipments, importing, importing rules and procedures, buying, rate contract, seasonal purchases, public buying, DGSD Buyer seller relationships. Make or buy decisions, Value analysis and Value Engineering.	
INVENTORY CONTROL	(10)
Selective inventory Control, ABC, VED, SDE, FSN, HML, GOLF and XYZ analysis, economic, inventory replenishment systems, two-bins, fixed order quantity, fixed price review system, safety stock, work-in process and finished goods inventory, MRP-I and Just in-time systems, concept of zero inventory and Evaluation for inventory performance.	
STORES MANAGEMENT:	(8)
Location and layout of stores, Sores systems and procedures, receipts, issue and control, Stores accounting, verification, obsolescence, surplus and scrap management.	
MATERIALS HANDLING AND STANDARDIZATION IN MATERIALS MANAGEMENT	(8)
Costs involved, handling principles, time and cost reductions, equipments used, computerized materials management systems. ISO procedures and international standards, procedures, clauses involved in materials management.	

BOOKS:

1. Materials management- An integrated approach: Gopal Krishnan and Sundareshan.

REFERENCES

Materials management-Procedures and case studies: Datta, Second Edn, Prentice hall of India.

Purchasing and Materials management: Dobler, Lee and Burnt, Tata Mc- Graw Hill.

Course Name : ROBOTICS
Course Code : PE 412
Credits : 4
Design Points : 2

L T P : 4 0 0

Pre-Req. : --

Lecture wise breakup

No. of Lectures

ROBOT TECHNOLOGY

(6)

Fundamentals, General Characteristics, Basic Components, Robot Anatomy, Robot Selection.

ROBOT CLASSIFICATION

(8)

Classification, Arm Geometry, Degrees of Freedom, Power Sources, Types of Motion

ROBOT SYSTEM ANALYSIS:

(12)

Robot kinematics & dynamics, Dynamic properties of robots.

ROBOT END EFFECTORS

(8)

Types of end-effectors, Mechanical Grippers, Gripper force analysis, other type of grippers, special purpose grippers, gripper selection and design, process tooling.

SENSORS

(10)

Robot sensors, sensor classification, Proximity sensors, photoelectric sensors, Micro switches, Rotary position sensors, usage and selection of sensors, Machine vision

ROBOT PROGRAMMING AND INDUSTRIAL APPLICATION

(10)

Robot programming, programming methods, robot industrial applications.

BOOKS:

1. Robot Technology Fundamentals by J G Keramas, Delmar Publications

REFERENCES:

1. Robotics Engineering by Klafter, Chmielewski and Negin, Prentice Hall
2. Robotics for Engineers by Yorem Korem, McGraw Hill.
3. Industrial Robotics by Groover. Weiss, Nagel and Ordrey, McGraw Hill.

Course Name : PRODUCTIVITY ENGINEERING & MANAGEMENT

Course Code : PE 413

Credits : 4

L T P : 4 0 0

Pre-Req. : --

Lecture wise breakup

No. of Lectures

INTRODUCTION

(08)

Productivity concept and definition; Productivity and economic development; image of productivity change of wages and prices; the productivity cycle; Factors affecting productivity in macroeconomic context, international comparisons of productivity.

MEASUREMENT OF PRODUCTIVITY

(20)

Productivity measurement at firm level; Partial Productivity ratio: total productivity ratio, productivity index; the production function approach to measuring productivity, level: comparison of different models; the multifactor productivity model; the objective matrix, Computer algorithms for measuring total & partial Productivity, computerized version of MFPM. Productivity Measurements of Services, white collar productivity.

PRODUCTIVITY EVALUATION & PLANNING (10)

Methodologies for evaluation; the productivity evaluation tree; total productivity change: short term and long term productivity planning.

PRODUCTIVITY IMPROVEMENT (16)

Causes of poor productivity: approaches to productivity improvement; basic productivity improvement techniques; principles of productivity improvement, productivity improvement programs - technology based, material-based, employee-based & product design.

BOOKS:

1. Productivity Engineering. & Management by D.J Sumanth; McGraw Hill

REFERENCES:

1. Productivity Management A system Approach by Prem Vrat, Sardana, Sahay
2. Productivity Management, Planning Measurement & Evaluation: S.Sink, John Wiley

Course Name : MANAGEMENT INFORMATION SYSTEMS

Course Code : PE 414

Credits : 4

L T P : 4 0 0

Pre-Req. : --

Lecture wise breakup **No. of Lectures**

MANAGEMENT INFORMATION SYSTEMS (MIS): (12)

Concept, characteristics and importance of MIS, elements of MIC, types of management systems, role of computers, hierarchy of data processing systems, storage and retrieval of data, management reports, designing of the information systems, inter-relations with departments.

INFORMATION AND DECISION MAKING: (12)

Concept of Information, hardware, software, conventional techniques, data Verses information, characteristics of information, classification, value of information, Use of information in decision making process, Decision support systems, decision making models and role of information systems. Information based support systems for planning, control and decision making.

COMPUTER NETWORKS AND DATA COMMUNICATIONS: (10)

Computer networks, Local area network, characteristics of topologies network systems, switching for multi-vendor network, LAN standards, application of networks, data communications and communication protocols.

DATABASE MANAGEMENT SYSTEMS: (10)

Database organizing, designing, relational data base management. Introduction to MS-Office tools like Word, Excel and MS-access and its use in MIS.

QUALITY OF MIS AND RECENT TRENDS: (12)

Quality assurance, evaluation of information resource systems, organization and management of Information function. Future trends and development of internet supporting devices and information support networks.

BOOKS:

1. Management Information Systems: by Gordon Davis, Maryrethe Olson, Tata McGraw Hill Publications.

REFERENCES:

1. Information system for modern management: Mudrick, Ross and Clagget- Prentice Hall of India.
2. Information System for management: Lucas, McGraw Hill.

Course Name : FLEXIBLE MANUFACTURING SYSTEM
Course Code : PE 415
Credits : 4
L T P : 4 0 0
Pre-Req : --

Lecture wise breakup

No. of Lectures

Introduction to Manufacturing Systems, Different types of manufacturing systems. Volume Variety relationships for understanding manufacturing systems, Flexibility and automation Different types of flexibility in manufacturing, Different types of FMS building blocks of flexible manufacturing system; Work station, Storage retrieved system, material handling systems and computer control system. Machining system of FMS; Horizontal & Vertical machining Centers. Integrated Material Handling , Automated Guided Vehicles Automatic Storage and Retrieved System. FMS control System. Group technology; Part classification and coding production flow analysis, Machine Cell design, Computer Aided Process Planning. (38)

Layout consideration for flexible manufacturing Scheduling of flexible manufacturing system. FMS simulation (18)

BOOKS:

Automation, Production Systems and Computer integrated Manufacturing by MP. Groover (TEXT).

REFERENCES:

Hand-book of Flexible Manufacturing Systems by Nand K. Jha.

Course Name : PLASTIC PRODUCT DESIGN & MANUFACTURING
Course Code : PE 416

Credits : 4

L T P : 4 0 0

Pre-Req. : --

Lecture wise breakup

No. of Lectures

INTRODUCTION:

(16)

Glossary of the terms associated with plastic engineering. The family of Plastics: Thermoplastic and thermosetting process, various types and their properties in general.

MOLDING OF THERMOPLASTICS

(4)

- Injection molding and compression molding of thermoplastics and thermosets.
- DESIGN OF MOULDS FOR INJECTION MOLDING** (3)
Mould bases, Plate moulds, runner moulds, gates, venting, parting line, ejection Skipper, cam action etc. Standard designs.
- DESIGN OF EXTRUDERS** (2)
- DESIGN OF MOULDS FOR THERMOSETS:** (3)
Compression moulds, transfer moulds, injection moulds, runner and gate design, vents.
- THERMOFORMING PLASTIC FILM AND SHEET:** (4)
Concepts, methods of forming, machines, forming temperatures, furnishing of parts special techniques.
- BLOW MOULDING AND ROTATIONAL MOULDING:** (4)
Process, molds, die shaping.
- CASTING:** (4)
Casting of acrylics, phenolics & epoxies, polyster, nylons, liquid rescue moulding.
- DESIGN OF MOULDED PRODUCTS** (4)
Basic design theory, wall thickness, fillets and radii, ribs, undercuts, draft, holes threads, inserts, parting lines, surface treatment, part design for avoiding warpage.
- STANDARDS FOR TOLERANCES ON MOULDED ARTICLES:** (3)
Design considerations
- JOINING AND ASSEMBLING PLASTICS:** (3)
Processes
- DESIGN STANDARDS OF INSERTS** (3)
Screw machine inserts, cold forged inserts, leak proof inserts, non metallic inserts
- PERFORMANCE TESTES OF PLASTIC PRODUCTS:** (4)
Tensile properties, Rockwell hardness, compressive properties, indentation hardness, etc.

BOOKS:

1. Plastic Engg. Handbook by Frades

REFERENCES:

1. Plastic Technology by Patten

Course Name : PRODUCT DESIGN AND DEVELOPMENT

Course Code : PE 417

Credits : 4

L T P : 4 0 0

Pre-Req. : ---

Lecture wise breakup

No of Lectures

Course Contents

(20)

Designing, Origin of Design concept, Purpose of Design, Process of Design, Essential factors in designing, phases of design, morphology of design and creativity in design. Concept generation and concept design. Basic design considerations, brainstorming, case

and effect analysis, design specifications, sources of information, checklists in designing, role of a designer, material selection, standardization, concept of total product design. Considerations of Engineering factors like strength, rigidity, toughness, stiffness. **(20)** Design for function, design for product, design for use, design for production, maintenance, handling, safety, reliability, easy access, ergonomic and aesthetic designs. Design for casting, forming, machining, assembly, fabrication, plastic materials, Failure modes, product life cycle, product testing and product liability. Technological innovations, Tools for integration like Simulation, Group **(16)** Technology, Rapid Prototyping, Concurrent Engineering, Probability approach and introduction to C.A.D. and C.A.M Patents and Intellectual rights. Costs in Product designing, Communication in designing, Case studies and examples.

BOOKS:

1. “Fundamentals of Design and Manufacturing” – Edn 2005, by GK Lal, Vijay Gupta & N Venkata Reddy, Narosa Publishing House.

REFERENCES

1. Product Design and Manufacturing” by : A K Chitale & R C Gupta: Edn: 2004, Prentice Hall of India.
2. Product Design and Development, “Karl Ulrich” Tata M/c Graw Hill.
3. Engineering Design” by : George E. Dieter, M/c Graw Hill Publicaions. Manufacturing Materials & Processes: Degarmo

Course Name : PRODUCTION AND OPERATIONS MANAGEMENT
Course Code : PE 418
Credits : 4

L T P : 4 0 0

Pre-Req. : --

Lecture wise breakup **No of Lectures**

INTRODUCTION TO OPERATIONS MANAGEMENT **(4)**

Factors affecting Operations Management, Operations as system, Decision making in POM

OPERATIONS STRATEGIES IN GLOBAL ECONOMY **(4)**

Global business conditions, Operations strategy, Forming Operations Strategies.

DEMAND FORECASTING **(3)**

Qualitative Forecasting Methods, Quantitative Forecasting Models.

PRODUCT, PROCESS, AND SERVICE DESIGN **(8)**

Process planning and design, Major factors affecting progress design decisions, Types of process designs, Interrelations among product design, Process design & Inventory policy.

JUST-IN-TIME & LEAN MANUFACTURING **(14)**

Philosophy, Benefits of JIT manufacturing , Success and JIT manufacturing, JIT in service companies.

Lean Manufacturing: Introduction-definition and scope-continuous vs. lean production-benefits and methodology-process oriented continuous improvement teams-lean

manufacturing education-product oriented continuous improvement teams-cell manufacturing training-redesign of plant layout- cross training of team members.

INVENTORY MANAGEMENT (6)

Nature of inventories, Opposing views of inventories, Fixed- order Period and Quantity systems, Inventory models, inventory planning.

MANUFACTURING OPERATIONS SCHEDULING (6)

Scheduling process- Focused Manufacturing, Scheduling product focused manufacturing, computerized scheduling system.

MAINTENANCE MANAGEMENT (10)

Planned production maintenance, preventive maintenance, machine reliability, secondary maintenance department responsibilities.

BOOKS:

1. Operations Management by Gaither, Frazier – Thomson South Western

REFERENCES:

1. Productions and Operations Management by Adam & Ebert Prentice Hall.
2. Productions and Operations Management by Chase & Aquilano & Richard Irwin.
3. Management of Systems by Nauhria & Prakash
4. Practical Plant Layout by Richard Muther

Course Name : MODERN MANUFACTURING PROCESSES

Course Code : PE 419

Credits : 4

L T P : 4 0 0

Pre-Req : --

Lecture wise breakup No. of Lectures

INTRODUCTION (4)

History, Classification, Comparison between conventional and non-conventional machining process selection.

MECHANICAL PROCESS:

Ultrasonic machining (USM) : Introduction, Equipment, tool materials & tool Size, Abrasive slurry, Cutting tool system design : Magnetostriction assembly, Tool cone (Concentrator), Exponential concentrator of circular cross section & rectangular cross section Hallow cylindrical concentrator. Mechanics of cutting : Theory of Miller & Shaw Effect of parameter : Effect of various process parameters., Applications, Advantages & Disadvantages of USM. (6)

ABRASIVE JET MACHINING (AJM): Introduction, Equipment, Variables in AJM: carrier Gas Type of abrasive, Size of abrasive grain, velocity of the abrasive jet, Mean No. abrasive particles per unit volume of the carrier gas, Work material, stand off distance (SOD) nozzle design shape of cut. Process characteristics – Material removal rate, Nozzle wear, Accuracy & surface finish. Applications, Advantages & Disadvantages of AJM.

WATER JET MACHINING (4)

Fundamental Principles, application possibilities, process parameters, schematic layout of machine and operational characteristics, conclusion

ABRASIVE JET MACHINING AND ABRASIVE FLOW MACHINING (4)

Fundamental Principles, application possibilities, process parameters, schematic lay out of machine and operational characteristics, conclusion

ELECTROCHEMICAL AND CHEMICAL METAL REMOVAL PROCESS: (10)

Electrochemical machining (ECM): Introduction, Study of ECM machine, Elements of ECM process : Cathode tool, Anode work piece, source of DC power, Electrolyte, Chemistry of the process ECM process characteristics – Material removal rate, Accuracy, Surface finish. Economics of ECM, Applications such as Electrochemical turning, Electrochemical Grinding, Electrochemical Honing, deburring, Advantages, Limitations.

Chemical Machining (CHM): Introduction, Elements of process Chemical blanking process :-Preparation of workpiece. Preparation of masters, masking with photo resists, etching for blanking, applications of chemical blanking, chemical milling (Contour machining) :-Process steps – masking, Etching, process characteristics of CHM :-material removal rate accuracy, surface finish, Hydrogen embrittlement, Advantages & application of CHM.

THERMAL METAL REMOVAL PROCESSES (10)

Electric Discharge Machining: Introduction, machine, mechanism of metal removal, dielectric fluid, spark generator, EDM tools (electrodes) Electrode feed control, Electrode manufacture, Electrode wear, EDM tool design : Choice of matching operation, electrode material selection, under sizing and length of electrode Machining time. Flushing – Pressure flushing synchronized with electrode movement, EDM process characteristic: Metal removal rate, Accuracy surface finish, Heat affected Zone. Machine tool selection, Application: EDM accessories / applications, electrical discharge grinding, Travelling wire EDM.

PLASMA ARC MACHINING (PAM) (4)

Introduction, equipment non-thermal generation of plasma, selection of gas, Mechanism of Metal removal, PAM parameters, Process characteristics. Safety precautions, Applications, Advantages and limitations.

LASER BEAM MACHINING (3)

Introduction, background of laser action, production of photon cascade in a solid optical laser, machining application of laser, other application of laser in workshop technology.

ELECTRON BEAM MACHINING (3)

Introduction, background of electron beam action, a dimensionless analysis to establish correlation between EBM parameters generation of electron beam, advantage and limitation of EBM.

BOOKS:

Modern Machining Process - Pandey And Shahn, TATA Mc Graw Hill 2000.

REFERENCES:

1. Advanced Machining Processes, Vijay K. Jain, Allied Publishers Limited, 2002
New Technology- Bhattacharaya 2000.

Course Name : TECHNOLOGY MANAGEMENT

Course Code : PE 420
Credits : 4
L T P : 4 0 0
Pre-Req : --

Lecture wise breakup **No. of Lectures**

TECHNOLOGY MANAGEMENT (3)
Issue and application, Concepts of technology; Role and importance of technology management, Dimensions of technology management, technology management in India.

TECHNOLOGY CHANGE: (3)
Nature of technology change, Motivation for technology change. Invention and Innovation. Technology Life Cycle, Technology monitoring.

TECHNOLOGY FORECASTING (4)
Objectives and approaches, Methodology of technological forecasting, Delphin technique, growth curves, Morphological analysis technological discontinuities Indian Technology Vision 2020.

TECHNOLOGY PLANNING (4)
Technology and Socio Economic Planning, Choice of Technology, Process of Technology generation. Integrating business and technology strategies, Technology development approaches, technology audit. Organization for technology management; technological change and manufacturing complexity, risk in new technology projects, implementing technology.

MANAGEMENT OF R & D (3)
Corporate strategy, Selection of R & D projects, Managing R & D, Marketing of R & D

MANAGEMENT OF INNOVATION (3)
Radical and Cyclic Innovation Processes. Technology Strategy and innovation.

TECHNOLOGY ABSORPTION AND DIFFUSION (3)
Technology dependence. Concepts in technology absorption, constraints in technology absorption. Management of technology absorption, technology absorption and adaptation scheme (TAAS), Concept of diffusion of technology, perspective on diffusion, developing diffusion strategies.

TECHNOLOGY TRANSFER (3)
Models of Technology Transfer, Technology Transfer modes, Dimensions of Technology Transfer, Dimensions of technology transfer, Pricing of technology Government policies of technology transfer.

ROLE OF INTELLECTUAL PROPERTY RIGHTS (3)
Nature of IPR, Patent, Trademark and copy rights Legal aspects.

MANAGING PROCESS TECHNOLOGY (3)
Continuous improvement technology integration, product and process technology techniques of improvement, economics if improvement.

TECHNOLOGY AS A COMPETITIVE STRATEGY (4)
Competitive analysis, core competitive competencies, technology leadership, adoption of new technology, marketing of new technology.
Case studies on technology management

BOOKS:

1. Strategic Technology Management by Betz, McGraw Hill

REFERENCES:

1. Technological Innovation in Education by Yao Tzuli, Van-o-strand

Course Name : TOTAL QUALITY MANAGEMENT
Course Code : PE 421
Credits : 4
L T P : 4 0 0
Pre-Req : --

Lecture wise breakup

No. of Lectures

INTRODUCTION (5)

Importance, Evolution, contribution of Deming, Juran, Crosby, Taguchi etc. Current understandings.

QUALITY; ELEMENTS OF QUALITY (5)

Quality of design, quality of conformance; quality costs- interrelationship of costs, economics of quality of design and quality of conformance.

QUALITY CONTROL SYSTEMS (5)

Q.C function, system concept, Q.C. system, quality planning, quality policies, quality audit, new design review, Q.C. organization. Quality system standards ISO 9000.

ELEMENTS OF STATISTICAL INFERENCE (14)

Distribution of sample means, their characteristics and central limit theorem, process variation, process capability, sampling plans; single and double sampling plans, sequential sampling plans, QC curve for sampling plans, AQL and ASN concepts. Theory of control charts, chance causes and assignable causes, In control process and out of control process, Control charts for process control X & R, P & C charts.

QUALITY ASSURANCE (5)

Sporadic process control, chronic quality problems process- tools and techniques, improvement, Break through, Managements Role .

QUALITY (5)

Training, problem solving techniques, team building, motivation, Q.C. circles.

BOOKS:

1. Total Quality Management by Dale. H Besterfield, Glen H Besterfield

REFERENCES:

1. Total Quality Management for Engineers by Zaire

OPEN ELECTIVES

Course Name : FINITE ELEMENT METHOD
Course Code : PE 425
Credits : 4
L T P : 4 0 0
Pre-Req : --

Lecture wise breakup

No. of Lectures

INTRODUCTION (8)

What is Finite Element Method, General Steps in Finite Element, Historical background – Matrix approach – Application to the continuum – Discretisation – Matrix algebra – Gaussian elimination – Governing equations for continuum – Classical Techniques in FEM – Weighted residual method – Ritz method

ONE DIMENSIONAL PROBLEM (8)

Finite element modeling – Coordinates and shape functions- Potential energy approach – Galarkin approach – Assembly of stiffness matrix and load vector – Finite element equations – Quadratic shape functions – Applications to plane trusses

TWO DIMENSIONAL CONTINUUM (12)

Introduction – Finite element modelling – Scalar valued problem – Poisson equation – Laplace equation – Triangular elements – Element stiffness matrix – Force vector – Galarkin approach - Stress calculation – Temperature effects

AXISYMMETRIC CONTINUUM (12)

Axisymmetric formulation – Element stiffness matrix and force vector – Galarkin approach – Body forces and temperature effects – Stress calculations – Boundary conditions – Applications to cylinders under internal or external pressures – Rotating discs

ISOPARAMETRIC ELEMENTS FOR TWO DIMENSIONAL CONTINUUM (9)

The four node quadrilateral – Shape functions – Element stiffness matrix and force vector – Numerical integration - Stiffness integration – Stress calculations – Four node quadrilateral for axisymmetric problems.

BENDING OF BEAMS (5)

Introduction; Finite Element Formulation, load Vector, Boundary Considerations, Shear force and Bending Moment, Beams on Elastic Supports, Examples.

FINITE ELEMENT MODELING USING SOFTWARE PACKAGE (6)

BOOKS:

1. Chandru;lkpatla T.R., and Belegundu A.D., “Introduction to Finite Elements in Engineering”, Pearson Education 2002,

REFERENCES

J. N. Reddy, “An Introduction to the Finite Element Method”, McGraw-Hill, Inc., New York

Course Name : VALUE ENGINEERING

Course Code : PE 426

Credits : 4

L T P : 4 0 0

Pre-Req : --

Lecture wise breakup

No. of Lectures

INTRODUCTION (12)

Value Engineering concept, advantages, applications, problem recognition, role of creativity, criteria for comparison, elements of choice.

ANALYSIS OF FUNCTIONS (10)

Anatomy of functions, use esteem and exchange values, basic versus secondary versus unnecessary functions.

VALUE ENGINEERING TECHNIQUES

(20)

Selecting products and operations for V.E. action timing; V.E. Programme formats and V.E. Job plan, determining and evaluation of functions; assigning rupee equivalents; developing alternative means to required functions decision making for optimum, alternative use of decision matrix, queuing theory and Monte carlo methods, make or buy decision, measuring profit, reporting results, follow up. Use of advanced techniques like FAST (Function Analysis System Techniques) and quantitative evaluation ideas.

ORGANIZATION

(10)

Level of V.E. in organization, size and skill of V.E. staff, small plant V.E. activity.

BOOKS:

1. Techniques of Value Analysis and Engineering- Miles, McGraw Hill.

REFERENCES

- 1 Value Engineering in Manufacture ASTME, Prentice Hall.
- 2 Value Engineering, Mudge

Course Name : WELDING TECHNOLOGY

Course Code : PE 427

Credits : 4

L T P : 4 0 0

Pre-Req : --

Lecture wise breakup

No. of Lectures

INTRODUCTION

(08)

Classification of welding processes, physics of arc, arc blow, welding symbol, types of V-I characteristics, different types of power sources,

WELDING CONSUMABLES

(08)

Classification and selection of welding electrodes, coding of electrodes welding fluxes.

WELDING PROCESSES

(16)

Principle , advantages, disadvantages and applications of gas, welding, SMAW,MIG,TIG, SAW, Electro-slag, Plasma, EBM and LBM processes

WELDABILITY

(12)

Definition of weld-ability, methods weld-ability evaluation, weld-ability of carbon steel, stainless, steel , cast Iron, and aluminum, welding defects, brazing, soldering and spraying

INSPECTION & TESTING

(12)

NDT techniques, code & standards

BOOKS:

1. Welding technology by RS Parmar

REFERENCES:

AWS Hand Books Volume 1-5

Course Name: HUMANITIES III (BUSINESS ENVIRONMENT & INDUSTRIAL LEGISLATION)

Course Code: HU 402

Credits: 4

L T P : 4-0-0

Pre Req:

Lecture Wise Breakup

No. of Lectures

- 1. INTRODUCTION (07)**
Scope of business, Characteristics of business and its forms.
- 2. BUSINESS ENVIRONMENT (07)**
Economic, Political and Technological.
- 3. SOCIAL RESPONSIBILITY OF BUSINESS (05)**
Ecological and Global Environment and their relevance in present scenario.
- 4. GLOBALIZATION (07)**
Concept, Social Responsibility toward different interest groups and Business Ethics.
- 5. WTO (07)**
Meaning, Rationale for globalization, features of current globalization, Pros and Cons of globalization.
- 6. CORPORATE GOVERNANCE (05)**
Functions of WTO. WTO structure, and Implications for India.
- 7. CONTRACT ACT (05)**
Concept, Essentials of good Corporate Governance, One case study.
- 8. SALE OF GOOD ACT (05)**
Concept of Contract, types and its essentials.
- 9. SALE OF GOOD ACT (05)**
Essential of sale of goods Act.

BOOKS:

- 1 Francis Cherunilam, Business Environment, Himalaya Publications.
- 2 K.C.Garg, V.K.Sareen, Mukesh Sharma and R.C.Chawla, Commercial & Labour Laws, Kalyani Publishers.

REFERENCES:

1. K Aswathappa, Essential of Business Environment, Himalaya Publication.
2. S.S.Gulshan, Mercantile Law, Excel Books.
3. S.S. Gulshan & G.K. Kapoor, Business Law, New Age International (p) Ltd., Publisher.
4. S Singh, Corporate Governance – Global Concepts & Practices, Excel Books.
5. Roger Benett, International Business, Addison Wesley Longhran, Delhi.
6. Y K Bhushan, Business Organization & Management, Sultan Chand & Sons.

HU402H (Humanities III) -In addition to the contents of HU402, additional topics:

Cluster Growth Model Vs SEZ

Innovative Dynamics of the Company

Foreign Market Entry Strategies

Competition Policy and Law

Corporate Social Responsibility-Two Case Studies

Course Name: HUMANITIES III (CORPORATE FINANCE)

Course Code : HU 404

Credits-4 : L T P: 4-0-0

Pre Req:

Lecture wise breakup

No. of Lectures

- 1. INTRODUCTION (07)**
Finance, Financial Decisions, Objectives of Corporate Financial Decisions and factors influencing financial decisions.
- 2. INDIAN FINANCIAL SYSTEM (07)**
Nature and role of financial system in Indian Economy.
- 3. FINANCIAL MARKETS (08)**
Concepts, Type of markets and their relevance in present scenario.
- 4. FINANCIAL INSTRUMENTS AND FINANCIAL SERVICES (08)**
Capital and Money Market Instruments, Services.
- 5. WORKING CAPITAL (05)**
Types and factors affecting the requirements of working capital.
- 6. SOURCES OF FINANCE (05)**
Short term and long term.
- 7. TIME VALUE OF MONEY AND CAPITAL BUDGETING (05)**
Concept of Compounding and Discounting, Nature of Investment Decisions, Investment, Evaluation Criteria: Pay Back Period Method, Accounting Rate of Return Method, Internal Rate of Return Method and Net Present Value Method.
- 8. FINANCIAL LEVERAGE (03)**
Meaning (trading on equity) and measures.
- 9. DIVIDEND POLICY (05)**

Objectives of Dividend Policy, factors influencing firm's dividend policy.
- 10. CAPITAL STRUCTURE (03)**

Essentials of Capital Structure, Approaches to establish target capital structure.

BOOKS:

1. Pandey I.M., Financial Management, Vikas Publishing House Pvt.Ltd.
2. Khan M Y, Indian Financial System, Tata McGraw Hill.
3. Bhole LM and Mahakud Jitendra, Financial Institutions and Markets,

Tata McGraw Hill

REFERENCES:

1. Chandra Prasanna, Financial Management Theory and Practice, Tata McGraw Hill
2. Lasher William R., Practical financial Management, Thomson
3. Van Horne J.C., Financial Management and Policy, Prentice Hall
4. Apte, P.G., International Financial Management, Tata McGraw Hill

HU404H (Humanities III) -In addition to the contents of HU404, additional topics:

Capital Market Intermediaries and their Regulation.
Functions and Operations of Money Market.
Foreign Exchange Market –From FERA to FEMA.
Role of Banks and Financial Institutions in Economic Development.

Course Name : MACHINE TOOL DESIGN
Course Code : PE-405
Credits : 4
Design Points : 2
L T P : 4 0 0
Pre-Req. : PE 202

Lecture wise breakup

No. of Lectures

INTRODUCTION: (2)
Classification of Machine Tools, Working and Auxiliary Motions in Machine Tools, Parameters Defining Working Motions of a Machine Tool, General Requirements of Machine Tool Design.

MACHINE TOOL DRIVES: (18)
Selection of Electrical Motor, Stepped and Stepless Output, Upper and Lower limits of Machine Tools, Layouts of Intermediate Spindle Speeds, Selection of Values of Common Ratio, Speed and Feed Gear box Design, Gearboxes with Clutched Drives, Feed in Reciprocating Machines, Feed in Drilling Machines, Feed in Milling Machines, Feed in Lathe, Cutting Screw Threads, Double-bound Gears, Mechanical Drives for Reciprocation. Stepless Drives, Mechanical, Hydraulic, Electrical Stepless Drives.

STRENGTH AND RIGIDITY OF MACHINE TOOL STRUCTURES: (12)
Design Criteria for Machine Tool Structures, Static and Overall Compliance of Machine Tool, Design of Lathe Beds, Design of Radial Drill Column, Force Analysis of a Shaping

Machine Ram, Analysis of Straining Actions on a Milling Machine Structure, Analysis and Design of Tailstock Assembly.

ANALYSIS OF GUIDEWAYS AND POWER SCREWS: (12)

Design of Slideways for Wear Resistance, Design of Slideways for Stiffness, Guideways Operating under Liquid Friction Conditions, Design of Power Screws.

ANALYSIS OF SPINDLES AND SPINDLE SUPPORTS: (12)

Functions of Spindle Unit and Requirements, Design calculations of Spindles, Sliding Bearings, Hydrodynamic and Hydrostatic Journal Bearings.

PE 405H MACHINE TOOL DESIGN

In addition to the contents of PE 402 the following additional topics are included:

1. Vibration of machine tools
2. Acceptance tests for machine tools

BOOKS:

1. G C Sen, A Bhattacharyya, Principles of Machine Tools,
2. N K Mehta, Machine Tool Design and Numerical Control, Tata McGraw-Hill,

REFERENCES:

1. N Acherken, Machine Tool Design, Vol. I-IV, Mir Publishers, Moscow,
2. S A Tobias, Machine Tool Vibration, Blackie, London.

Course Name : DESIGNING FOR AUTOMATION
Course Code : PE 406
Credits : 4
Design Points : 2
L T P : 4 0 0
Pre-Req. : --

Lecture wise break up

No. of lectures

OVERVIEW OF INDUSTRIAL AUTOMATION (6)

Automation in production systems, Automation principles and strategies, Levels of automation, Automation at device level.

PNEUMATIC CONTROL (12)

Production, distribution and conditioning of compressed air, Pneumatic control components, Pneumatic actuators, Pneumatic valves, Air-hydraulic equipment, Pneumatic control system design, Logic control circuits, Pneumatic circuit design for various applications.

HYDRAULIC CONTROL (8)

Components of hydraulic control system, Hydraulic actuators, Hydraulic valves, Accumulators, Hydraulic circuit design and analysis

ELECTRICAL CONTROL (10)

Electrical actuators: Stepper motors, DC and AC motors, Motor selection

SYSTEM MODEL ANALYSIS (10)

System model analysis, Model formulation, Transfer functions, System response, Linear system analysis.

PROGRAMMABLE LOGIC CONTROLLERS (10)

PLC system overview, PLC features, Basic PLC programming, PLC selection, Examples of PLC industrial applications

BOOKS:

1. Fluid Power with Applications. A. Esposito, Pearson Education.

REFERENCES:

1. Pneumatic Control : An Introduction to the Principles, W. Deppert, K. Stoll, Vogel Buchverlag Wurzburg.
2. Automation, Production Systems and Computer-Integrated Manufacturing, M.P. Groover, Pearson Education.
3. Programmable Logic Controllers, R. Ackermann, J. Franz, T. Hartmann, A. Hopf, M. Kantel, B. Plagemann, Festo Didactic.

PE 406H: DESIGNING FOR AUTOMATION

In addition to the contents of PE 402 the following additional topics are included:

- 1) Introduction to assembly automation
- 2) Flexible automation: Micro- controllers

Course Name : DEPARTMENTAL LAB- VI
Course Code : PE-407
Credits : 2
Design Points : 2
L T P : 0 0 3
Pre-Req. :

2. To develop the trajectory of the Mitsubishi Movemaster RV-MI robot for pick and place operations of objects.
 3. To run the Mitsubishi Movemaster RV-MI robot and the TRIAC VMC as a FMS cell.
 4. To optimize the path of a robot for a spot welding operation on the inner back door of an automobile.
 5. To study the drive mechanisms of the ATLAS robot.
- 5-10 Design and simulate the automation circuits for given industrial problems using FluidSim software.

Course Name : DEPARTMENTAL LAB- VII
Course Code : PE-408
Credits : 2
Design Points : 2

L T P : **0 0 3**

Pre-Req. :

1. Fabrication exercise by using MIG welding machine.
2. Fabrication exercise by using TIG welding machine.
3. Fabrication exercise by using MMA welding machine.
4. Analyze the effects of welding parameters on bead geometry of the weld.
5. Fabrication exercise by using spot welding machine.
6. Analyze the effects of welding parameters on the weld characteristics of spot welding machine.
7. Analyze the effects of welding parameters on the weld characteristics of arc welding processes.
8. Study of overlaying processes.
9. Study of friction welding processes.