**SHRI G. S. INSTITUTE OF TECHNOLOGY AND SCIENCE**
**DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING**
**M.E./M. TECH I YEAR (INDUSTRIAL ENGINEERING AND MANAGEMENT)**

**Semester -A**

**IP 81006: INDUSTRIAL DESIGN AND PROCESSES**

| Unit No. | No. of Lectures | Intended Coverage of Syllabus |
|---|---|---|
| (Unit I) | 1 | Definition of design and product design. Design by evolution and design by innovation |
| | 1 | Essential factors in product Design. |
| | 1 | Production consumption cycle. |
| | 2 | Morphology of design (seven phases). |
| | 1 | Asimov's model of product design (25 steps). |
| | 1 | Product analysis and product characteristics. |
| | 5 | General guidelines for design for manufacture assembly and environment. |
| | 1 | Role of aesthetics in product design. |
| (Unit II) | 2 | Creative techniques – Brain storming, Gordon technique check listing technique etc. |
| | 2 | Factors conducive to creativity and road blocks to creativity. |
| | 1 | Physical realizability and design tree. |
| (Unit III) | 1 | Scale models, prototypes and mockups. |
| | 1 | Optimum design and reliability based design. |
| (Unit IV) | 2 | Primary and secondary mfg. processes and their classification. |
| | 1 | Introduction to casting processes. |
| | 1 | Introduction to forming processes. |
| | 1 | Powder metallurgy. |
| (Unit V) | 1 | Production system as an input-output model and productivity. |
| | 1 | Eilon's classification of production systems. |
| | 1 | Optimized production technology. |
| | 3 | Group Technology and coding & classification of parts. |
| | 4 | Standardization and variety reduction Ray nard's series |
| | 1 | FM and effects analysis. |
| | 3 | Value Engineering Job Plan and definition of value, examples of VE. Ten tests of Value engineering. |
| (Unit VI) | 1 | Case studies with examples of DFX. |
| **Total** | **40** | |

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## Semester –A

### IP 81007: QUANTITATIVE TECHNIQUES FOR MANAGMENT

| UNIT S. NO. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 1 | History and development of O.R. |
| | 1 | Linear programming- Models |
| | 1 | Assignment model |
| | 1 | Numerical |
| | 1 | Introduction to Transportation model |
| | 1 | Allocation Methods for IBFS |
| | 1 | Optimization of transportation problem |
| | 1 | Degeneracy & unbalanced problems |
| | 1 | Transshipment, Special cases in Transportation Problem |
| | 1 | Linear programming- Applications |
| | 1 | Simplex Method, Big-M method |
| | 1 | Numerical |
| (Unit II) | 1 | Degeneracy, Duality in LP method |
| | 1 | Sensitivity Analysis |
| | 1 | Revised Simplex method |
| | 1 | Numerical |
| | 1 | Integer programming- Introduction & Applications |
| | 1 | Branch and Bound Method |
| | 1 | Numerical |
| (Unit III) | 1 | Waiting line model-introduction, classification, states in queue |
| | 1 | Probability of arrivals and service time . Single server model |
| | 1 | Multi server model |
| | 1 | Single server model with finite capacity |
| | 1 | Numerical |
| | 1 | Computer application in operations research |
| (Unit IV) | 1 | Game theory –rectangular , two persons zero sum games |
| | 1 | Maximin and minimax principal , saddle point |
| | 1 | Dominance |
| | 1 | Graphical method of solution |
| | 1 | Algebraic method of solution |
| | 1 | Dynamic programming-characteristics |
| | 1 | Salesmen problem |
| | 1 | shortest route problem, Forward and backward recursion |
| | 1 | Solution by transforming into linear programming problem |
| (Unit V) | 1 | Simulation: Introduction and Applications of Simulation Model |
| | 1 | Monte-Carlo Simulation: Inventory and Queuing problems |
| | 1 | Basic Concepts, Introduction to Simulation Software |
| | 1 | Non linear Programming: Introduction and applications |
| | 1 | Decision Making under uncertainty. Decision Tree |
| | 1 | Computer Application in O.R. and Case Study |
| **TOTAL** | **40** | |

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## Semester –A

### IP- 81008: PRINCIPLES & PRACTICES OF MANAGEMENT

| Unit No. | No. of Lectures | Intended Coverage of Syllabus |
|---|---|---|
| (Unit I) | 2 | Definition, Importance & Nature of Management |
| | 2 | Managerial Principles & Managerial Functions |
| | 2 | Roles of Manager |
| | 2 | Schools of Management Thought |
| (Unit II) | 2 | Significance, Components of Planning |
| | 2 | Policy Formulation |
| | 2 | Decision Making: Definition, Types, Process, Administrative Model, Problems, Bounded Rationality. |
| (Unit III) | 2 | Principles of Organization |
| | 2 | Organization Structures & Departmentation Basis |
| (Unit IV) | 2 | PM Functions -1 Manpower Planning |
| | 2 | PM Functions -2 Recruitment & Selection- Case Study |
| | 2 | PM Functions -3 Training & Development- Case Study |
| | 2 | PM Functions -4 Performance Appraisal |
| (Unit V) | 1 | Concept & Significance- Case Study |
| | 2 | Process Theories |
| | 2 | Content Theories |
| | 2 | Motivation for Managers |
| (Unit VI) | 1 | Concepts & Characteristics of Leader- Case Study |
| | 1 | Leadership Styles |
| | 1 | Leadership Theories |
| (Unit VII) | 1 | Importance, Process, Channels- Case Study |
| | 1 | Effective Communication-Barriers & Guidelines |
| (Unit VIII) | 1 | Process, Types of Control- Case Study |
| | 1 | Control Methods |
| **Total** | **40** | |

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# Semester –A

## IP 81009: STATISTICAL QUALITY CONTROL AND TQM

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 2 | Quality and Quality Control |
| | 1 | Quality of Design and quality of conformance |
| | 1 | History of QC and Variability |
| | 2 | QC and Inspection, Quality assurance |
| | 1 | Economics and costs of quality systems |
| (Unit II) | 1 | Variability and causes of variability |
| | 1 | Concepts of process limit, control limits and specification limits |
| | 2 | X and R charts |
| | 2 | Analysis of X and R Charts, process capability studies |
| | 1 | Variables and attributes |
| | 2 | P,np and C-Chart |
| (Unit III) | 2 | Acceptance sampling, Producer's and Consumer's risk, AQL, IQL, RQL etc. |
| | 1 | OC Curve |
| | 1 | Sampling plans |
| | 2 | Design and selection of sampling plans |
| | 1 | Special sampling plans |
| (Unit IV) | 2 | TQM History, Elements, Tools |
| | 1 | Deming wheel, 14 points |
| | 2 | Juran philosophy, Philip Crosby |
| | 1 | Quality circles |
| | 2 | ISO-9000 |
| | 1 | Quality Awards |
| | 2 | Case Studies and discussions |
| (Unit V) | 1 | Reliability, failure pattern of product |
| | 1 | Measurement of Reliability MTBF, MTTR |
| | 2 | System reliability (Series parallel, mixed) |
| | 2 | FMEA, Ishikawa diagram |
| **Total** | **40** | |

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# Semester –A

## IP 81010: WORK STUDY AND PRODUCTIVITY MANAGEMENT

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 2 | Definition & place of Industrial Engineering in business and industry. History of I.E. |
| | 1 | Introduction concept and definition of productivity. its relation with standard of living. |
| | 1 | Partial, Total and total factor productivity. Factors influencing productivity. Productivity Models. |
| | 1 | Concept of work content, excess work content and in effective time. |
| | 1 | Reaching close to basic work content and improvement of productivity. |
| (Unit II) | 2 | Introduction and scope of method study. Steps; Recording Techniques: Symbols used in charts, flow diagram, outline process chart, and Man machine chart. |
| | 1 | Flow process charts: Man, material and equipment type. Multiple activities chart. |
| | 1 | String Diagram and two handed process chart. Method improvement |
| | 1 | Therbiligs and their use in SIMO chart. Example of SIMO chart. |
| | 1 | Principles of motion economy. |
| | 1 | Micro motion study, cycle graph and chrono cycle graph. Memo motion study. |
| | 1 | Critical examination. Installation and maintenance of improved methods. |
| (Unit III) | 1 | Definition, objectives, uses and Overview of techniques of WM. |
| | 1 | Time study procedure equipment and steps. Breaking the job into elements. Types of elements. |
| | 1 | Concept of qualified worker and rating. Various types of rating. Factors affecting performance rating. |
| | 1 | Various types of allowances and computation of standard time, |
| | 2 | Work sampling. Determination of sample size and standard time Advantages and disadvantages of work sampling. Numerical |
| | 2 | Use of standard data for determination of standard time, MTM, PMTS, its use and conventions for recording MTM data. Introduction to MOST. |
| (Unit IV) | 2 | Job evaluation procedure, objectives and definition. Job analysis, job description and specification. Job evaluation systems and merit rating. |
| | 1 | Measured day work: Definition, general concepts, duties and responsibilities of workers, supervisors and engineers. |
| | 1 | Establishing standards and reporting performance. Operating principles and Measured day work. |
| | 1 | Incentives: Definition and classification. Comparison of individual and group incentives. Steps to install an incentive scheme. |
| | 1 | Pre-requisites of a wage incentive plan. Characteristics of a good wage incentive plan. |
| | 2 | Straight piece rate methods. Their characteristics, Differential piece rate methods. Taylor's differential piece rate system.. Merrick's differential piece rate system. |
| | 1 | Time and piece rate methods. Gnatt task and bonus scheme. |
| | 2 | Efficiency based plans. Emerson's efficiency plan, Premium bonus schemes. The Halsey system. |
| | 2 | The Rowan system: Illustration.The Bedaux Point System. Characteristics, illustration |
| (Unit V) | 2 | Introduction: Ergonomics as a multi-disciplinary field, its components. Importance of ergonomics in equipment and work design. |
| | 1 | Concept of man-machine system; Types and characteristics of Man-machine systems. |
| | 2 | Anthropometry and Workplace Design. |
| **Total** | **40** | |

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# Semester –B

## IM 81504 : FINANCIAL MANAGEMENT

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 2 | Financial Management – Concept, functions and goals |
| | 2 | Forms of organizations. |
| | 2 | Economic and regulatory environment |
| (Unit II) | 2 | Accounting & Book keeping, Types of A/c, Books of A/c |
| | 2 | Fund flow statement – Concept, objectives and preparation |
| | 2 | GAAP, Revenue cost, Journalisation – Rules of Debit & Credit, Ledger, Trial Balance |
| | 2 | Financial statements : Trading & P&L A/c and Balane sheet |
| | 2 | Financial statements : Numerical with and without adjustment |
| | 2 | Fund flow statement – Exercise |
| (Unit III) | 2 | Financial analysis – Ratio analysis – Use and limitations |
| | 2 | Exercise with interpretation: Liquidity, profitability, activity & Leverage Ratios |
| | 2 | Leverages – Financial, operating and combined |
| | 2 | Break even analysis with numerical |
| | 2 | working capital management |
| (Unit IV) | 2 | Cost of capital – WACC & specific Cocs |
| | 2 | Capital structuring |
| | 2 | Dividend theories & models |
| (Unit V) | 2 | Capital Budgeting – Objectives and methods, time value of money |
| | 2 | Discounted and non discounted cash flow methods, NPV vs IRR |
| | 2 | Risk analysis, cash study |
| **Total** | **40** | |

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# Semester –B

## IP 81506 : MARKETING MANAGEMENT

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 1 | Introduction: Core concepts. Needs, Wants, demands, products, exchange and transactions. |
| | 1 | Marketing philosophies: Sales, production, marketing and societal marketing philosophies and their examples. |
| | 1 | Difference between marketing and sales concept of customer value and satisfaction. Customer retention. |
| | 1 | Marketing system and its environment various types of environments. |
| | 1 | Demand states and marketing tasks. Suitable examples. |
| | 1 | Marketing organization: Stages in evolution of the marketing department. Responsibilities of marketing managers. |
| | 1 | Interaction of product manager, marketing's relation with other departments. |
| | 1 | Sales objectives, sales force strategy and structure, its recruitment selection and training. |
| | 1 | Motivating and evaluating sales representatives. |
| (Unit II) | 1 | Marketing information system: Its various components, internal records system. |
| | 1 | Marketing intelligence system: Definition and concept application with examples. |
| | 1 | Marketing Research System: Suppliers of marketing research, marketing research process. |
| | 1 | Research approaches and research instruments, sampling plan and contact methods. |
| | 1 | Characteristics of good marketing research and over coming barriers to the use of marketing research. |
| | 2 | Marketing Decision support system: Its definition and types. |
| | 1 | Brief overview of quantitative tools used in marketing decision support system. |
| | 2 | Consumer behavior: Model, major factors influencing buyer behavior. |
| | 1 | Buying process: Five roles. Types of buying behavior. |
| | 1 | Stages of the buying decision process. |
| | 1 | Stages continued. Suitable examples and concept application. |
| (Unit III) | 1 | Market segmentation: Levels of market segmentation Patterns of market segmentation and segmentation procedure. |
| | 1 | Basis for segmentation of consumer markets. |
| | 1 | Market Targeting: Evaluation and selection of marketing segments for targeting. |
| | 1 | Product positioning: Tools for competitive differentiation. Product differentiation |
| | 1 | Services and personnel differentiation, channel and image differentiation. |
| | 1 | Developing a positioning strategy. Perceptual map. |
| | 1 | New product development strategy: Various steps, consumer adoption process. |
| | 1 | Product life cycle: Various stages common patterns style and fashion. |
| | 2 | Marketing strategies throughout PLC. |
| | 1 | Product mix decisions: Levels and hierarchy of product. Product line decisions. Brand decisions in brief. |
| (Unit IV) | 2 | Communication process. Developing effective communication, promotion mix. |
| | 1 | Relative spending on promotion of consumer and industrial goods. Five M's of advertising. |
| | 1 | Evaluating advertising effectiveness and determining budget. |
| (Unit V) | 1 | Marketing channels, functions and flows. Channel levels. Channel Design decisions. |
| | 1 | Selecting, motivating and evaluating channel members. Choosing distribution channel according to stage in PLC. |
| | 1 | Channel Dynamics: Vertical marketing systems. Corporate VMS. Administered and contractual VMS. Management of channel conflict. |
| **Total** | **40** | |

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## Semester –B

### IP 81507 : PRODUCTION AND OPERATIONS MANAGEMENT

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 1 | Operations Management: Introduction and Evolution, Changes & Challenges |
| | 2 | Objectives, Decision Making |
| | 1 | Understanding similarities and difference among Products, Goods and Services |
| | 1 | Systems Concept |
| (Unit II) | 1 | Plant layout and Material Handling Principles |
| | 4 | Quantitative Layout Analysis, ALB |
| | 1 | Facilities Location Strategies |
| | 2 | PPC: Functions, Objectives, Organisation |
| | 2 | Forecasting methods |
| (Unit III) | 1 | APP: Functional framework, Strategies |
| | 1 | MPS: Concept, RCCP |
| | 2 | MRP: Assumptions, Logic |
| | 3 | Scheduling: Influencing Factors.Sequencing rules & Algorithms |
| (Unit IV) | 1 | Materials Management: Functions, Organisation |
| | 1 | Purchase: Importance, Principles, Procedure, Methods |
| | 2 | Inventory: Concept, Costs, Models, Selective Inventory Control |
| | 2 | JIT: Elements |
| | 1 | Make or Buy Decision making |
| (Unit V) | 1 | Maintenance Planning and Control (Reliability, Availability, Maintainability). |
| | 1 | Types of Maintenance, Costs |
| | 2 | TPM: Concept, OEE, Pillars |
| | 2 | Individual and Group replacement policies |
| (Unit VI) | 1 | Service Operations Management |
| | 1 | Lean systems |
| | 1 | Constraint management - TOC |
| | 1 | Agile Manufacturing |
| | 1 | DSS for Operations Management |
| **Total** | **40** | |

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## Semester –B

# IP 81508: SUPPLY CHAIN & LOGISTICS MANAGEMENT

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| (Unit I) | 2 | Understanding supply chain, SC in India, Logistics & SC, and Value Chain. |
| | 1 | SC performance; Performance Measures, |
| | 2 | SC drivers and obstacles. |
| | 2 | Supply Chain Decision-Making, Process view of SC. |
| (Unit II) | 2 | Demand forecasting in supply chain |
| | 2 | Planning supply and demand; Aggregate planning in SC |
| | 2 | Managing predictable variability. |
| | 2 | Inventory Optimization in SC. |
| (Unit III) | 1 | Use of Stochastic Models |
| | 1 | SC Facilities Layout |
| | 1 | Capacity Planning along SC |
| | 1 | Managing uncertainty in a supply chain |
| | 1 | Managing uncertainty in a supply chain |
| (Unit IV) | 1 | Introduction & Definition - Logistics role in the economy and in the firm, Concept - Components and requirements |
| | 1 | Evolution of World Class Management and implication for SCM |
| | 1 | Organization of Logistics functions, Integrating Logistics functions in SC. |
| | 1 | Performance Measurement of Logistics function |
| | 2 | Concept of Advances in logistics: Lean Logistics, Cross-Docking etc |
| (Unit V) | 2 | Transportation Fundamentals, Transportation Decisions, Facility Decision |
| | 2 | Critical review of modes of transportation |
| | 2 | Information technology and its importance & use in supply chain, Bullwhip concept |
| | 2 | SC Coordination and E-business in a supply chain |
| (Unit VI) | 6 | Postponement strategy in SC, 3PL practices, Relationship of ERP & SCM, Logistics Network Design, Transportation Performance Measures, Warehouse Performance Measures, Shipping Principles etc |
| **Total** | **40** | |

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# Semester –B

## IM 81701: MANAGEMENT INFORMATION SYSTEM

| Unit No. | No. of Lectures | Intended coverage of syllabus |
|---|---|---|
| Unit I | 2 | Characteristics and Importance of information, |
| | 2 | Search, Storage and Retrieval of Information, |
| | 1 | Information Feed back system |
| | 1 | Management Information System (MIS) Objectives & Cost Benefits of MIS, |
| | 1 | Management and System concept, Decision and MIS. |
| | 2 | Decision Environment Model. Functional Applications of MIS: |
| Unit II | 2 | Production Subsystem, Marketing Subsystem, Personnel Subsystem, Financial Subsystem. |
| | 2 | Planning, Design and Implementation of MIS |
| | 2 | Planning Techniques, Project Proposal, Reporting and Controlling, |
| | 2 | Information needs and sources, Conceptual Design, Detailed Design. |
| | 2 | Selection of Final Design. Organization for implementation and Training of Operational Personnel. Data Collection, Evaluation, Control and Maintenance of Information Systems. |
| | 2 | Computer Based Information System (CBIS): Role of C.B.I.S. in Management |
| Unit III | 1 | Hierarchy of C.B.I.S., M.I.S. and C.B.I.S. family. M.I.S. in total C.B.I.S. environment. Types of C.B.I.S. |
| | 2 | Transaction Processing System (TPS): Overview of T.P.S., Techniques of T.P.S. Processing Modes of TPS.<br>Decision Support System (DSS): Definition, Characteristic Evolution & Applications of D.S.S., Difference between DSS and M.I.S.<br>Office Automation System (OAS): Definition, Importance, Planning and Implementation of OAS, Computer based Office Communication System. |
| | 2 | Evolutionary stages of Enterprise Resource Planning(ERP), Need for ERP, |
| | 2 | Variety accommodation, Strategic and operational issues in ERP, |
| | 2 | Integrated and Business model of ERP, Zachmann enterprise architecture, |
| | 2 | MRP and MRP-II. |
| Unit IV | 2 | Introduction to Business Process Re-Engineering, |
| | 2 | ERP Implementation: Role of consultants, vendors and users, Guidelines and Procedure for ERP implementation, |
| | 2 | Strategic advantage through ERP, ERP Domain. |
| | 2 | Case studies |
| **Total** | **40** | |