

SHRI G. S. INSTITUTE OF TECHNOLOGY AND SCIENCE
DEPARTMENT OF INDUSTRIAL AND PRODUCTION ENGINEERING
B.E./B. TECH IV Year

Semester - A
IP43013: OPERATIONS MANAGEMENT

| Unit No. | No. of Lecture Sessions | Topics to be Covered |
|-------------------|--------------------------------|--|
| (Unit I) | 1 | Introduction, Evolution of Operations Management |
| | 1 | Decision-Making, Objectives |
| | 1 | Systems Concept |
| | 1 | Types of Production Systems |
| (Unit II) | 1 | Plant Location: Factors, Reasons |
| | 1 | Rural & Urban Locations, Application of BEA |
| | 1 | Layout: Types, Quantitative Layout Analysis & Evaluation-1 |
| | 1 | Quantitative Layout Analysis & Evaluation-2 |
| | 1 | Line Balancing: Fundamentals |
| | 1 | Line Balancing Technique-1 |
| | 1 | Line Balancing Technique-2 |
| | 1 | PPC: Organization, Functions |
| | 1 | Forecasting: Methods-1 |
| 1 | Forecasting: Methods-2 | |
| (Unit III) | 1 | APP: Concept, Cost Parameters |
| | 1 | APP: Chase & Level Strategies-1 |
| | 1 | APP: Chase & Level Strategies-2 |
| | 1 | MPS: Concept, RCCP |
| | 1 | MRP: Concept, Benefits, Technique-1 |
| | 1 | MRP: Technique-2 |
| | 1 | Scheduling: Concept, Influencing Factors |
| | 1 | Job Shop Sequencing Techs.-1 |
| | 1 | Job Shop Sequencing Techs.-2 |
| (Unit IV) | 1 | Materials Mgmt: Objectives, Organization, & Functions |
| | 1 | Materials Mgmt: Integrated MM, JIT Production System |
| | 1 | Purchasing: Significance, Functions |
| | 1 | Purchasing: Methods |
| | 1 | Purchasing: Procedure |
| | 1 | Stores Mgmt: Functions & Location of Stores |
| | 1 | Inventory Mgmt: Reasons & Cost Parameters |
| | 1 | Inventory Mgmt: P-Q Systems |
| | 1 | Inventory Mgmt: Deterministic Models-1 |
| | 1 | Inventory Mgmt: Deterministic Models-2 |
| | 1 | Selective Inventory Systems |
| (Unit V) | 1 | Maintenance: Significance, Cost Factors |
| | 1 | Maintenance: Types of Maintenance |
| | 1 | Maintenance: Strategies |
| | 1 | Maintenance: Basics of TPM |
| | 1 | Individual and Group Replacement Policies-1 |
| | 1 | Individual and Group Replacement Policies-2 |
| TOTAL | 40 | |

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Semester - A

IP 43058: TOOL ENGINEERING & DESIGN OF CUTTING TOOLS

| Unit No. | No. of Lecture Sessions | Topics to be Covered |
|-------------------|--------------------------------|--|
| (Unit I) | 1 | Introduction of diff. types of tool mate. & tools |
| | 1 | Tool classification & tools |
| | 2 | Mate. Properties |
| | 1 | Tooling Applications |
| | 1 | General Design consideration |
| | 1 | Safety Aspects |
| (Unit II) | 2 | Design of single point cutting tool for strength |
| | 1 | Design of single point cutting tool for rigidity |
| | 2 | Design for optimum geometry , design strategies for H.S.S Carbide |
| | 2 | Design of Form Tool |
| | 1 | Design of drill & cutters |
| (Unit III) | 2 | Design of elements of press working tool dies & die set |
| | 2 | Blanking Operation concept of center of pressure, compound dies, progressive die, combination die, bending die, forming Die, |
| | 2 | Selection of press |
| | 1 | Design principle and practice for rolling |
| | 1 | Roll pass design |
| (Unit IV) | 1 | Economics of jigs & fixture |
| | 2 | Principle of location & clamping |
| | 2 | Design of various jig & fixture |
| | 1 | Drilling Jig & Milling Fixture |
| | 1 | Assembly Fixture , Welding fixture |
| (Unit V) | 2 | Dies and Mould Design for plastics |
| | 2 | Rubbers Parts |
| | 2 | Compression Moulding |
| | 2 | Transfer Moulding |
| | 2 | Blow Moulding |
| Total | 40 | |

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Semester - A
IP 43065: ERGONOMICS

| Unit No. | No. of Lecture Sessions | Topics to be Covered |
|-------------------|--------------------------------|---|
| (Unit I) | 2 | Definition, History of Development |
| | 2 | Characteristics of Man Machine Systems |
| | 2 | Relative capabilities of Human beings and Machines |
| (Unit II) | 1 | Introduction to information theory |
| | 2 | Factors affecting information reception and processing |
| | 2 | Coding and Selection of sensory inputs |
| | 2 | Human Sensory Process: Vision, Hearing, Cutaneous |
| | 2 | Kinesthetics, and orientation senses |
| (Unit III) | 1 | Visual Display: Quantitative and qualitative types of visual display |
| | 1 | Visual indicators and warning signals |
| | 2 | pictorial and Graphic displays |
| | 1 | Alphanumeric Characteristics |
| | 1 | Symbolic Codes |
| | 2 | Auditory and Textual Display: General Principles |
| | 2 | Characteristics and Selection of Auditory and Textual display |
| (Unit IV) | 2 | Biomechanisms of motion |
| | 2 | Measurement of Physiological Functions |
| | 1 | Energy Expenditure in Physical Activities |
| | 1 | Compatibility, Tracking Operations, Design of Control |
| | 1 | Anthropometry: Anthropometrics Data and their uses |
| | 1 | Work Space Dimensions. Design of seats and seating Arrangement |
| | 1 | Location of components |
| | 1 | Design of work place. |
| (Unit V) | 2 | Introduction to Environmental stresses and their impacts on human work. |
| | 1 | Industrial Safety: Analysis of cost of accidents |
| | 1 | Hazards in various fields like Fire |
| | 1 | Electrical shocks |
| Total | 40 | |

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Semester – A

IP 43203: BUSINESS ANALYTICS – ELECTIVE II

| Unit No. | No. of Lecture Sessions | Topics to be Covered |
|-------------------|--|--|
| (Unit I) | 1 | Introductory and Evolutionary Concepts and Trends in Data Analytics |
| | 1 | Scope of Data Analytics (Descriptive, Diagnostic, Predictive and Prescriptive) |
| | 1 | Role and Scope of Data Science in Industry and Business Applications, Big Data Analytics – Conceptualization and Overview |
| | 1 | Data Classification, Variable Types, and Scale Classification |
| | 2 | Application Areas of Data Analytics (Operations Analytics, Marketing Analytics, Healthcare Analytics, Product Analytics, Supply Chain Analytics, and HR Analytics) along with Few Case Discussions |
| (Unit II) | 1 | Introduction to Data Mining Process, Multidimensional Data Analysis – Online Analytical Processing (OLAP) |
| | 1 | Association Analysis, and Cluster Analysis |
| | 1 | Data Mining Tools – XL Miner, Market Basket Analysis, Performance Matrix |
| | 1 | Data Organization (Sources), Data Reduction Techniques |
| | 1 | Dealing with Missing/Incomplete Dataset, Outliers, Data Partitioning |
| | 1 | Factor Analysis, Principal Component Analysis (PCA), Confusion Matrix |
| | 1 | K-Means Clustering, k-Nearest Neighbors (k-NN) Algorithm, Naïve Bias |
| (Unit III) | 1 | Data Visualization Tools/Techniques – Data Charts and Graphs, Scatter Plots, Box Plots, and Heat Maps |
| | 1 | Multidimensional Visualization, Measures of Location, Dispersion, and Shape |
| | 1 | Descriptive Statistics for Grouped and Categorical Data |
| | 1 | Statistical Inference, Review of z-, t-, and Chi-Square (χ^2) Tests |
| | 2 | ANOVA, Sampling, Hypothesis Testing |
| | 1 | Confidence Intervals for Mean and Variance, Goodness of Fit |
| | 2 | Numerical Exercises (Tutorials) and Problems specifying Special Cases |
| (Unit IV) | 2 | Time-series Models, Holt Walter Time-series Model with Seasonality, Numerical Exercises with Few Special Cases |
| | 1 | Types of Regression Models, Multicollinearity, Heteroscedasticity, Autocorrelation |
| | 2 | Multiple Regression Analysis, Multiple Regression Modeling with Dummy Variable and Categorical Variable |
| | 2 | Autoregressive Modeling, Logistic Regression, Curve Fitting |
| | 2 | Numerical Exercises (Tutorials) and Problems specifying Special Cases |
| (Unit V) | 1 | Optimality Testing, Model-building Tools (Modelling Characteristics, Excel Functions, Excel's 'Analysis ToolPak', etc.), Exploring Data and Spreadsheet Modelling |
| | 1 | Monte-Carlo Simulation, Simulation Models for Risk Analysis |
| | 1 | Network Optimization (Flow) Models |
| | 1 | Decision Trees – Problems with Few Special Cases |
| | 2 | Introductory Concepts to Machine Learning (ML), Classification and Regression Trees, Over Fitting, Pruning |
| | 1 | Basic Concepts about Artificial Neural Networks (ANN), ANN Software(s) |
| | 1 | Artificial Intelligence (AI) – Evolution and Overview, Role of AI in Data Sciences |
| 1 | Applicability of AI and ML in Real-Life Industry Scenarios with Few Case Discussions | |
| TOTAL | 40 | ***** |

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Semester – A

IP 43282: PROJECT MANAGEMENT – ELECTIVE II

| UnitNo. | No. of Lecture Sessions | Topics to be Covered |
|------------------|--|--|
| (UnitI) | 2 | Introduction to projects. Characteristics and types of projects |
| | 2 | Gaining importance, Project selection, |
| | 2 | Technical feasibility and technology selection |
| | 2 | Market feasibility. Social Cost Benefit Analysis, project manager's skills and functions |
| (UnitII) | 2 | Analysis, construction of networks, CPM, |
| | 2 | Various types of floats and their application, PERT and its applications. |
| | 2 | Time cost relationship, crashing for optimum cost and optimum time |
| | 2 | . Resource leveling. Earned Value Analysis |
| (UnitIII) | 2 | Time value of money, DCF and Non DCF Methods for Evaluating Projects. |
| | 2 | Types of risk, techniques of risk evaluation and its mitigation |
| | 2 | Sensitivity analysis, Hiller's model |
| | 2 | scenario analysis, simulation with numerical aspects |
| (UnitIV) | 2 | Concept, Nature, Scope |
| | 2 | Objective of Financial Management |
| | 1 | Finance Functions, Sources of Finance. |
| | 1 | Liquidity, Activity |
| | 1 | Profitability and Leverage Ratios |
| | 1 | Interpretation of ratios |
| (UnitV) | 1 | Cost of Capital, Cost of Debt |
| | 2 | Preference shares, Equity Shares, |
| | 2 | Weighted Average Cost of Capital |
| | 1 | Working Capital: Concept |
| | 1 | Need and Determinants. Computing working capita |
| TOTAL | 40 | ***** |

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Semester – B

IP 43614: PRODUCT MANAGEMENT – ELECTIVE IV

| UnitNo. | No. Of Lecture | TOPICS TO BE COVERED |
|------------------|-----------------------|---|
| (UnitI) | 1 | Definition of product design. Design by evolution and design by innovation. |
| | 1 | Essential factors of product design. |
| | 1 | Production consumption cycle. |
| | 2 | Morphology of design (seven phases) |
| | 2 | Asimov's model of Product Design (25 steps) |
| | 1 | Product Analysis and product characteristics. |
| (UnitII) | 2 | General guidelines for design for manufacture (Metal forming, casting, machining and welding process) |
| | 1 | Design for environment, concept of robust design, modular and integral design. |
| | 1 | Role of Aesthetics in product design. |
| (UnitIII) | 1 | Introduction to value Engineering its historical perspective Nature and measurement of value. |
| | 1 | Value analysis job plan, creativity: Creative process, blocks and factors conducive to creativity. |
| | 1 | Creative techniques : Brain storming, Gordon, Check listing system etc. |
| | 1 | Variety reduction : Introduction and benefits (Simplification, specialization and variety reduction) |
| | 1 | Techniques of variety reduction |
| | 1 | Standardization and Ray nard's series |
| | 2 | Introduction IPR. |
| (UnitIV) | 1 | Introduction to marketing: What is marketing, core concepts, needs wants and demands. Concept of product, exchange and transactions |
| | 2 | Marketing system and environment Various types of environments. |
| | 3 | Difference between marketing and sales concept of customer value and satisfaction. Customer retention. |
| | 2 | Marketing philosophies: Sales, production, marketing and societal marketing.Examples. |
| | 7 | Segmenting, targeting and positioning the product. |
| | 1 | Developing a positioning strategy: Perceptual Map. |
| | 1 | BCG Matrix and managing the marketing mix (Portfolio). |
| | 2 | New product development strategy. |
| (UnitV) | 1 | Marketing channels, functions and flows. Distribution of consumer v/s Industrial products. |
| | 1 | Channel Design decisions. |
| | 1 | Selecting, motivating and evaluating channel members. |
| | 2 | Consumer behavior model. Factors influencing buying behavior. |
| | 2 | Sales management. |
| | 1 | Pricing strategies. |
| | 1 | Advertising decisions. |
| Total | 40 | |

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Semester – B

IP 43612: SIX SIGMA – ELECTIVE V

| Unit No. | No. of Lecture Sessions | Topics to be Covered |
|------------------|--------------------------------|---|
| (UnitI) | 1 | Introductory Concepts, Mapping the current Process |
| | 1 | DMAIC Process of Six Sigma |
| | 2 | Probability and statistics, Principles of six Sigma |
| | 1 | Testing of Hypotheses |
| | 2 | Process Capability, Sigma Level |
| (UnitII) | 1 | Non-Parametric test calculation |
| | 1 | Design of Experiments |
| | 1 | Evolutionary Operations Methodology |
| | 1 | Fractional, full and orthogonal Experiments |
| | 1 | Regression Model Building |
| | 2 | Optimizing the process – Response Surface Method and Response Surface Designs |
| | 1 | Taguchi Method Introduction |
| | 1 | Taguchi method for Robust Designs |
| (UnitIII) | 1 | Value Stream Mapping |
| | 1 | Tools and Techniques for Process Improvement |
| | 1 | DFSS, DMADV Approach |
| | 1 | Six Sigma Project Selection |
| | 1 | Statistical Process Control |
| | 1 | Control of six sigma |
| (UnitIV) | 2 | Execution of Six Sigma Implementation |
| | 1 | Design for Six Sigma |
| | 2 | Principles for Six Sigma Execution |
| | 2 | Detailed Procedure for six sigma implementation |
| | 2 | Reliability Prediction in DFSS |
| | 1 | Simulation in DFSS, Process Simulation |
| | 1 | Design Verification for Six sigma Process |
| | 1 | The DFSS Toolkit |
| (UnitV) | 1 | Lean and Six sigma |
| | 1 | Kano Model |
| | 1 | FMEA |
| | 1 | Leadership in six sigma |
| | 2 | Future scope of six sigma |
| Overall | 40 | ***** |

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Semester – B

IP 43616: SUPPLY CHAIN MANAGEMENT – ELECTIVE V

| Unit No. | No. of Lecture Sessions | Topics to be Covered |
|------------------------------------|--------------------------------|--|
| (Unit I) | 2 | Understanding supply chain, SC in India, Logistics & SC, Value Chain |
| | 1 | SC performance; Performance Measures, |
| | 1 | 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 |
| | 1 | Inventory Optimization in SC. |
| (UNIT III) | 1 | Use of Stochastic Models |
| | 1 | SC Facilities Layout |
| | 2 | Capacity Planning along SC |
| | 1 | Managing uncertainty in a supply chain |
| | 2 | Optimal levels of product availability |
| (Unit IV) | 2 | 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 |
| | 2 | 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 |
| ADDITIONAL: Advances in SCM | 4 | Postponement strategy in SC, 3PL practices, Relationship of ERP & SCM, Logistics Network Design, Transportation Performance Measures, Warehouse Performance Measures, Shipping Principles etc. |
| Total | 40 | ***** |