Sardar Patel University, Balaghat (M.P.)

Curriculum

For

M.Tech.

Industrial Management & Engineering

From Session: 2024-25

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)
School of Engineering and Technology
Syllabus
Subject Name: Product Design and Lifecycle Management, Subject Code : MIM021
Course: M.Tech. Branch: Industrial Management & Engineering Semester: II
Academic Session: 2024-25

Course Objectives

1. Provide students with a comprehensive understanding of the product development process, from concept to market launch.
2. Equip students with the principles of effective product design, including usability, aesthetics, and functionality, to create user-centered products.
3. Teach students how to analyze a product's lifecycle, including stages such as development, introduction, growth, maturity, and decline, to inform strategic decisions.

Course Contents

Unit 1
Product Design : Product specifications, concept development, configuration design involving synthesis, analysis and optimization, Detailed design, Presentation of design, Oral and Visual presentations, various types of models used in product design, Design through creative routes, Adaptive and variant design, Concurrent Engineering theory.

Unit 2
Product Lifecycle Management definitions, Product data management, Evolution of PLM, Pre-requisites for PLM, PLM benefits, PLM implementation methods, Product Lifecycle Engineering: Design for X, Components of DFX.

Unit 3
Design for manufacturing and Design for assembly, Role of Aesthetics and Ergonomics in design, Robust Design using Taguchi methods, Reliability based design, Modular versus integral design, Design for environment (DFE), Life cycle assessment (LCA), Steps of LCA, Determining system boundaries, Life Cycle Inventory compilation, Common LCA methods and their impact categories, Applying DFE through LCA, Case studies.

Unit 4
Value analysis: scope, techniques and job plan, Standardization, Renard series, Simplification versus Variety in products, Patents, copyright and Intellectual Property Rights.

Unit 5
Marketing Management: Philosophies of Marketing, Market and Product strategies, BCG matrix, Portfolio management, New Product development strategy. Marketing channels, Pricing

strategies and Promotional strategies, Consumer behavior, Sales Management, Planning of sales, Sales skills, evaluation and promotion, Advertising methods, preparation of advertising briefs.

Reference Books :

- ❖ John Stark; Product Life Cycle Management: Paradigm for 21st Century; Springer-Verlag.
- ❖ Grieves Michael, Product Life Cycle Management, McGraw Hill.
- ❖ Chitale A. K. and Gupta R. C.; Product Design and Manufacturing, PHI.
- ❖ Gupta V., Lal G.K. and Reddy; Fundamentals of Design and manufacturing; Narosa Publishing.
- ❖ James Garrat; Design & Technology; Cambridge University Press
- ❖ Dieter; Engineering Design Marketing Management; PHI.
- ❖ Kolter, Philip; Marketing Management; PHI.
- ❖ Stanton; Principles of Marketing, Prentice Hall.
- ❖ Product Life Cycle Engineering and Management, CEP Lecture notes, Prof B Ravi, IIT Bombay

Course Outcomes

1. Students will be able to apply a structured approach to product development, from initial concept through to market introduction.
2. Students will demonstrate the ability to design products that prioritize user needs and preferences, employing usability and ergonomics principles.
3. Students will analyze and evaluate products across their lifecycle stages, identifying key factors that influence performance and sustainability.
4. Students will implement sustainable design principles, assessing environmental impacts and integrating eco-friendly materials and processes.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject Name: Reliability Engineering & Quality Management, Subject Code :
MIM022

Course: M.Tech. Branch: Industrial Management & Engineering Semester: II

Academic Session: 2024-25

Course Objectives

1. Equip students with knowledge of quality management frameworks, methodologies, and tools to enhance product and service quality.
2. Teach students to apply statistical methods to analyze reliability data and make informed decisions regarding product performance and maintenance.
3. Familiarize students with various reliability testing methods and techniques to assess and validate product performance over time.

Course Contents

Unit 1
Reliability: Distributions encountered in controlling Reliability, mean time to failure, Exponential failure density, MTTF, Weibull, Failure density, Measurement and Tests, Maintenance and Reliability, Life testing.

Unit 2
Quality Control: Definitions, Place of quality control in industries, Taguchi loss function and robust design, Quality control organization. Difference between inspection and quality control. Applications of quality control in industries. Economics of Quality systems. Quality Assurance.

Unit 3
Statistical process control: Sample size and frequency of sampling and control, Design and application of control charts for variable and attribute, Process capability studies, six sigma concepts and implementation

Unit 4
Acceptance Sampling: Single sampling plans. Double sampling and sequential sampling plans. Rectifying inspection for lots. Sampling plans for continuous production. Selection of sampling plans for different situations. Economics of acceptance sampling.

Unit 5
T.Q.M.: Evolution of total quality management. Historical perspective. Elements of TQM: elimination of waste and problem exposure. Total quality control systems. Demings wheel, Deming 14 points-pros and cons in industrial engineering context, Philip Crosby philosophy, Juran Philosophy, Ishikawa Diagram. Quality function development, quality circles & ISO

9000. Application of TQM to service type organizations. Various Quality Awards. Costs benefit analysis. Life cycle costing.

Reference Books :

- ❖ Kapur K.C. and Lamberson; Reliability in Engg. Design; Wiley Eastern.
- ❖ Dhillon; Reliability; Wiley Eastern
- ❖ O' Connor Patrick DT; Practical Reliability Engg; Wiley.
- ❖ Mann Prem S; Statistics; Wiley
- ❖ Bedi Kanishka; Quality Management; Oxford University press
- ❖ Grant E.L. and Leave Worth; Statistical Quality Control; TMH.
- ❖ Juran and Gray, Quality Planning Control, TMH

Course Outcomes

1. Students will be able to apply fundamental concepts of reliability engineering to analyze and improve the reliability of products and systems.
2. Students will demonstrate knowledge of quality management principles and frameworks, effectively utilizing them to enhance organizational performance.
3. Students will proficiently use statistical methods to analyze reliability data, interpret results, and inform decision-making.
4. Students will design and implement reliability testing protocols to evaluate product performance and longevity.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology
Syllabus
Subject Name: Supply Chain Management, Subject Code : MIM023

Course: M.Tech. Branch: Industrial Management & Engineering Semester: II

Academic Session: 2024-25

Course Objectives

1. Equip students with the skills to design effective supply chain networks that optimize efficiency, cost, and service levels.
2. Teach students techniques for managing inventory effectively, including forecasting, replenishment, and inventory control strategies.
3. Familiarize students with logistics principles, transportation modes, and distribution strategies that impact supply chain performance.
4. Instill knowledge of strategies for developing and maintaining strong relationships with suppliers to enhance collaboration and reliability.

Course Contents

Unit 1

Introduction to SCM: Understanding supply chain, supply chain drivers and obstacles, inbound and outbound supply chain network, Performance Measures and supply chain performance, Decisions in the Supply Chain, Models for Supply Chain Decision-Making.

Unit 2

Supply Chain Inventory Management, demand forecasting in supply chain, aggregate planning in supply chain; planning supply and demand; managing predictable variability in supply, transport and demand, Economic Order Quantity Models, Reorder Point Models, Multi-echelon Inventory Systems, Inventory Optimization, JIT in SCM.

Unit 3

Mathematical Foundations of Supply Chain Solutions; Use of Stochastic Models and combinatorial Optimization in Supply Chain, Planning, Supply Chain Facilities Layout, Capacity Planning, Dynamic Routing and Scheduling, managing economies of supply chain; managing uncertainties in a supply chain; determining optimal levels of product availability.

Unit 4

Logistics Management: Definition, Logistics role in the economy and in the firm, Components and requirements, Organization of Logistics functions, Integrating Logistics functions in overall organization structure, Measurement of performance of Logistics function and functionaries, Supply Management and Logistics - Integrated Logistics Planning; Evolution of World Class Management and implication for supply Management, Business Logistics Concept; Customers

Satisfaction, Customers Value Creation, Customer Relationship Management, Cost and relationship, Lean logistics.

Unit 5

Transportation, Network Design and Information Technology: Transportation Fundamentals

Transportation Decisions, facility Decision; Network design in a supply chain; Information technology and its use in supply chain, Coordination and E-business in a supply chain; financial

Evaluation in a supply chain, Relation to ERP, E-procurement, E-Logistics, Internet Auctions, E-markets, Electronic business process optimization

Reference Books:

- ❖ Hopp WJ, Spearman, Irwin; Factory Physics: Foundations of Manufacturing; TMH
- ❖ Viswanadham N and Kluwer; Analysis of Manufacturing Enterprises; Academic Pub
- ❖ Sridhar Tayur, Ganeshan; Quantitative Models for SCM; Academic Publishers
- ❖ Walker William T; Supply Chain Architecture; CRC press
- ❖ Handfield RB and Nochols; Introduction to SCM; PHI
- ❖ Chopra Sunil and Meindel P; SCM: Strategy, Planning, and Operation; PHI
- ❖ Shapiro JF, Duxbury; Modeling the Supply Chain; Thomson Learning,
- ❖ Levi DS, Kaminsky, Levi; Designing and Managing the Supply Chain…; TMH
- ❖ Chitale AK and Gupta RC; Materials Management; PHI
- ❖ Ronald H. Bolau "Business Logistics Management",
- ❖ Bowersox D.J.ClossD.J. & Helferich O.K "Logistical Management".
- ❖ Lambert D.M.& Stock J.R "Strategic Logistics Management".

Course Outcomes

1. Students will be able to apply fundamental concepts of supply chain management to analyze and improve supply chain operations.
2. Students will demonstrate the ability to design effective supply chain networks that balance cost, efficiency, and service quality.
3. Students will effectively manage inventory levels through the application of forecasting techniques and inventory control methods.
4. Students will analyze logistics and transportation strategies, assessing their impact on overall supply chain performance.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject Name: Industrial Organization and Management, Subject Code : MIM024

Course: M.Tech. Branch: Industrial Management & Engineering Semester: II

Academic Session: 2024-25

Course Objectives

1. Provide students with a comprehensive understanding of different industrial structures and market types, including perfect competition, monopoly, and oligopoly.
2. Equip students with the skills to analyze market dynamics, including demand, supply, and pricing strategies within various industries.
3. Teach students the principles of strategic management and their application in organizational settings to achieve competitive advantage.
4. Familiarize students with the role of government regulation and policy in shaping industrial practices and competition.

Course Contents

Unit 1

Introduction: Definitions of management, administration and organization, management functions- planning, organizing, leading and controlling, organization performance, management skills, Mintzberg's three role-category of informational, interpersonal/ HRM and decisional, ten roles of manager, managing in crisis, historical evolution of management thinking: classical, humanistic, modern perspectives and jungle of theories, scientific, bureaucratic, administrative, human resources, behavior, system and contingency theories, learning organization, corporate/ organization cultures, symbols, stories, heroes, slogans and ceremonies, Informal organizations, ethics and social responsibilities.

Unit 2

Planning: Definition, why planning is necessary and difficult, mission, vision, goals, objectives, strategies, plans and schedules, three levels hierarchy of planning and goals, contingency plans, management by objectives (MBO), BCG matrix, SWOT analysis, Porters five factor competency, Organization:-Definition, dimensions of organizations- size/specialization, behavior formalization and authority centralization, departmentalization, span and line of control, responsibility, authority (to use resources) and accountability, line, staff, matrix and virtual network organization, Mintzberg's organization typology with techno-structure and support staff, horizontal coordination by task force and project teams, informal groups, Business Process Reengineering, effect of environment (stable, unstable), strategy (stable/cost-leadership/efficiency, flexible/differentiation/innovative) and Technology (job-shop, batch, mass, lean, TQM, e-business) on structure.

Unit 3

Leading and decision making: types of decision- structured (programmed) and unstructured, decision under risk, uncertainty and ambiguity, models like rational/normative/classical, bounded-rationality/satisficing/administrative and political, six rational decision making steps, personal differences/styles- directive, analytical, conceptual and behavioral, Vroom-Jago's five leader/ group participation styles of decide, consult-individual/ group, facilitate, delegate and the model to decide the styles, new speedy decision processes of brainstorming, learning by failures at early, debate and five W's, management in crisis/ turbulence and change management.

Unit 4

Controlling: mutual relation in plan and control, control loop, administrative and financial controls, budgets, types of Ownership, Individual, Partnership: - Joint stock company, Public Ltd and Pvt. Ltd companies, cooperative organization, cooperative Societies, public sector organization, comparative evaluation of different forms of Business ownership.

Unit 5:

System Concepts: Types, definition & characteristics; supra & subsystems, key component; boundary & interface complexity; feedback (pull) & feed forward (push) controls, open flexible-adaptive system, computer as closed system, law of requisite variety; system coupling, stresses and entropy; functional & cross functional system; Steven Alter's nine element work system model and its comparison with IPO (input-processing-output) model, structure and performance of work systems leading to customer delight.

Reference Books:

- ❖ Daft R; The new era of management; Cengage.
- ❖ Bhat Anil, Arya kumar; Management: Principles, Processes Practices; Oxford higher edu.
- ❖ Robbins S P; Organization theory; PHI
- ❖ Robbins S P, Judge TA; Organizational Behavior; PHI
- ❖ Agrawal RD; Principles of Organization.
- ❖ Davis & Olson; Management Information System; TMH.
- ❖ Steven Alter; Information systems, Pearson, www.stevenalter.com

Course Outcomes

1. Students will be able to analyze different industrial structures and their implications for competition, pricing, and consumer behavior.
2. Students will demonstrate the ability to apply strategic management principles to make informed decisions that enhance competitive advantage.
3. Students will understand the impact of government regulations and policies on industry practices and competitive dynamics.
4. Students will assess operational processes and identify opportunities for improvement to enhance productivity and efficiency within organizations.

SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Subject Name: Management Information System, ERP & CRM, Subject Code : MIM025

Course: M.Tech. Branch: Industrial Management & Engineering Semester: II

Academic Session: 2024-25

Course Objectives

1. Provide students with a comprehensive understanding of the role of management information systems in supporting organizational decision-making and operations.
2. Equip students with knowledge of ERP systems, including their components, functionalities, and the benefits they bring to organizations.
3. Teach students the principles of customer relationship management and how CRM systems can enhance customer satisfaction and loyalty.
4. Instill skills in managing and analyzing data effectively to support business processes and inform strategic decisions.

Course Contents

UNIT 1

Management Information System (MIS) definition, Objectives and benefits, MIS as strategic tool, obstacles and challenges for MIS, functional and cross functional systems, hierarchical view of CBIS, structured and unstructured decision, Operation and mgt support, Decision process and MIS, info system components and activities, Value chain and MIS support.

UNIT 2

System concepts: types, definition, characteristics, feedback (Pull) and feed-forward (Push) control, system stress and entropy, computer as closed system, law of requisite variety, open and flexible (Adaptive) systems, work system model and comparison with input-process-output model, five views of work system: structure, performance, infrastructure, context and risk and their effect on product performance.

UNIT 3

Info concepts: define data, info, knowledge, intelligence and wisdom. Information characteristics and attributes, info measurement and probability, characteristics of human as info processor.

UNIT 4

Planning and control Concepts: terminologies, difficulties in planning, system analysis and development plan-purpose and participants, info planning, (SDLC) system development life cycle for in-house and licensed sw, system investigation, analysis of needs, design and

implementation phases, training of Operational personnel, evaluation, Control and Maintenance of Information Systems.

UNIT 5

E-business components and interrelationship, Evolution of Enterprise Resource Planning (ERP) from MRP, Supply chain management (SCM) and Customer relationship management (CRM), Integrated data model, strategic and operational issues in ERP, Business Process Re-Engineering (BPR), significance and functions of BPR, information technology and computer NW support to MIS.

UNIT 6

ERP Implementation, role of consultants, vendors and users, customization, methodology of ERP implementation and guidelines for ERP implementation, ERP modules.

Reference Books:

- ❖ Davis and Olson, MIS, TMH
- ❖ James O' Brian, MIS, TMH
- ❖ Oz, MIS, Cengage
- ❖ Business Process Re-Engineering, Jayaraman, TMH.
- ❖ ERP by V.K. Garg, PHI
- ❖ ERP by Alex Leon.
- ❖ ERP, Monk, Cengage (Thomson)
- ❖ Manuals of SAPP, MFG-pro

Course Outcomes

1. Students will demonstrate an understanding of ERP systems, including their components, functionalities, and the implementation process within organizations.
2. Students will effectively evaluate and implement CRM strategies that enhance customer relationships and drive customer loyalty.
3. Students will analyze and interpret data to inform business decisions, utilizing tools and techniques relevant to MIS, ERP, and CRM systems.
4. Students will assess the integration of MIS, ERP, and CRM systems to optimize workflows and improve information flow across various organizational functions.