MEPE3003 PRODUCTION AND OPERATION MANAGEMENT (3-0-0)

Course Objectives:

1. To impart fundamental knowledge of production and operations functions in manufacturing and service organizations.
2. To expose students to production planning, process design, facility layout, and scheduling.
3. To equip students with inventory and quality control techniques used in operations management.
4. To understand lean, ERP, forecasting, and optimization tools for process efficiency.

Module-I Introduction to Production & Operations Management(07 Hours)

Nature, scope and objectives of POM. Evolution of production systems (craft, mass, lean production). Interface with marketing, finance, HR, R&D, and supply chain. Characteristics of manufacturing vs service operations. Role of operations manager; decision types in operations. Trends: Industry 4.0, sustainability, AI in operations. Basics of Operations Research and its application in decision-making.

Module-II Production & Operation Systems (09 Hours)

Types of production systems: job shop, batch production, mass production, continuous flow. Characteristics, advantages, and limitations of each system. Automation in production: types, role of robotics and IoT. Overview of Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM). Facility location decisions: qualitative and quantitative models, break-even analysis. Capacity planning: definition, types (design, effective, actual), tools and capacity requirement planning (CRP).

Module-III Production & Operations Planning (09 Hours)

Plant layout types: product, process, cellular, fixed-position. Facility layout planning tools: block diagramming, relationship charts (REL), CRAFT. Production process planning: routing, sequencing, scheduling. Production Planning and Control (PPC): functions, phases (pre-planning, planning, control). Aggregate Production Planning (APP): objectives, strategies (chase, level, mixed). Master Production Schedule (MPS) and capacity utilization. Tools for resource allocation: linear programming (overview).

Module-IV Operations Management Processes (09 Hours)

Process selection strategies and process lifecycle. Work study:

Method study: process chart symbols, flow process charts. Time study: stopwatch method, standard time calculation.

Value engineering and value analysis: definition, procedure, benefits. Materials Requirement Planning (MRP I) and MRP II: logic and structure. TOC (Theory of Constraints) and Critical Chain Project Management (CCPM). Line balancing: objectives, heuristics, practical examples. Forecasting: types (qualitative vs quantitative), methods (moving average, exponential smoothing, regression models).

Module-V Controlling Production & Operations (09 Hours)

Inventory functions, types and classification. Inventory models: EOQ (Economic Order Quantity), reorder point, safety stock. Inventory management techniques: ABC, VED, FSN, JIT (Just-in-Time). Introduction to ERP systems and modules in production. Maintenance strategies: preventive, predictive, and breakdown maintenance. Statistical Quality Control (SQC): Control charts for variables ($\bar{X}$ and R), Control charts for attributes (p, np, c charts). Introduction to Total Quality Management (TQM), Six Sigma, and Kaizen. Principles of Lean Manufacturing and overview of SCM (Supply Chain Management).

Course Outcomes:

On successful completion of the course, students will be able to:

CO1: Describe the role and scope of operations management in manufacturing and service sectors.
CO2: Classify production systems and apply methods for facility and capacity planning.
CO3: Formulate production plans and layouts using planning techniques and decision tools.
CO4: Apply work study and forecasting techniques to improve productivity.
CO5: Use quality and inventory management tools for effective control and continuous improvement.

Textbooks:

1. Kanishka Bedi, Production and Operations Management, Oxford University Press.
2. Martand Telsang, Industrial Engineering and Production Management, S. Chand & Co.
3. Norman Gaither and G. Frazier, Operations Management, Thomson Learning.

Reference Books:

1. S.N. Chary, Production and Operations Management, Tata McGraw Hill.
2. B. Mahadevan, Operations Management – Theory and Practice, Pearson Education.
3. William Stevenson, Operations Management, McGraw Hill.