SEMESTER S3

OPERATIONS MANAGEMENT

Course Code	**PBIET304**	**CIE Marks**	60
Teaching Hours/Week (L: T:P: R)	3:0:0:1	**ESE Marks**	40
Credits	4	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. To equip students with a thorough understanding of operations management, enabling them to apply demand forecasting, inventory control, aggregate planning and modern production systems effectively.
2. To familiarise mathematical models and strategic methodologies for optimizing operational processes, enhance efficiency, and make informed decisions within organizational contexts.

SYLLABUS

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Module No.	Syllabus Description	Contact Hours
1	**Introduction to Operation Management:** Role of Operations in an Organisation, Historical Evolution and perspectives, Operations strategies and productivity in organisations. **Demand Forecasting**: Forecasting methods: causal and time series models, moving average, exponential smoothing methods. Trend, cycle, and seasonality components, Winter's complete model. Analysis of forecast error, comparison of forecasting methods based on errors. **Facility Location and Layout**: Factors influencing location planning, Factor rating and center of gravity methods of location selection. Types facility of layouts, comparison of layouts. Systematic Layout Planning (SLP), software packages for SLP.	11

2	**Inventory Models:** Objectives, Types of Inventories, EOQ and EBQ models for uniform and variable demand with and without shortages. Quantity discount models, Probabilistic inventory models, Inventory systems under risk, service levels, safety stock. **Selective Inventory Control:** ABC Analysis, XYZ Analysis, VED Analysis.	**11**
3	**Aggregate Planning**: Definition, value of decision rules, Pure and Mixed strategies, Mathematical Models for Aggregate planning – Transportation Method, Linear programming Formulation, Linear Decision Rules. **Master production schedule:** Bill of Material (BOM), structuring BOM,, MRP -Lot sizing methods – Implementation issues, MRP – II, Introduction to ERP.	**11**
4	**Job Shop Production:** Activity planning, scheduling, shop loading, sequencing. Priority rules for dispatching jobs. **Modern Production Systems**: Introduction to Business Process Re-engineering, Lean Manufacturing, Kaizen, Toyota Production System, World Class Manufacturing Concepts. Kanban - Push vs Pull systems, Just-in-time systems.	**11**

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Suggestion on Project Topics

- **Forecasting Model Implementation**
  – Students choose a product or service and apply different forecasting methods (e.g., causal models, time series models, moving average, exponential smoothing) to predict future demand.
- **Location Planning Analysis**
  – Students analyse factors influencing facility location decisions for a given company and apply factor rating and center of gravity methods to determine the optimal location.
- **Layout Design**
  – Students design different types of facility layouts (e.g., process layout, product layout) for a specific business scenario and compare their efficiencies.

- **EOQ/ EBQ Model Development**
  – Students develop advanced EOQ and EBQ models that account for real-world complexities such as variable demand, lead times, and shortages. They implement these models using programming languages like Python or MATLAB.
- **Optimization of Inventory Costs with Quantity Discounts**
  – Students create an optimization algorithm that determines the optimal order quantity considering quantity discounts and other cost factors. They use software like Excel Solver, Python, or MATLAB.
- **MPS Optimization for a Manufacturing Firm**
  – Students design an optimized Master Production Schedule (MPS) for a manufacturing firm using Linear Decision Rules and other relevant methodologies. They implement the optimization in software tools like Excel, Python, or MATLAB.
- **BOM Structuring and MRP System Development**
  – Students develop a comprehensive Bill of Material (BOM) for a complex product and implement a Material Requirements Planning (MRP) system using software tools like MS Project or specialized MRP software.
- **Case Study on Real-World ERP Implementation**
  – Students conduct a detailed case study on a real-world ERP implementation in a large enterprise, analysing the challenges, solutions, and outcomes.
- **Business Process Re-engineering (BPR) Case Study**
  – Students conduct a case study on Business Process Re-engineering (BPR) in a real or hypothetical company. They identify processes for re-engineering, propose improvements, and evaluate potential impacts.
- **Lean Manufacturing Implementation**
  – Students develop a Lean Manufacturing implementation plan for a manufacturing facility. They apply lean principles such as value stream mapping, 5S, and waste reduction techniques.

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Course Assessment Method
(CIE: 60 marks, ESE: 40 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Project	Internal Ex-1	Internal Ex-2	Total
5	30	12.5	12.5	60

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 2 marks **(8x2 =16 marks)**	2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 2 sub divisions. Each question carries 6 marks. **(4x6 = 24 marks)**	**40**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Understand the role and evolution of operations management and apply its strategic impact on organizational productivity.	**K3**
CO2	Apply different inventory models and effectively manage inventory to optimize stock levels and reduce risks	**K3**
CO3	Proficient in developing aggregate plans and applying advanced planning systems for efficient operations.	**K3**
CO4	Effectively plan and schedule job shop production activities and apply modern production system principles to enhance operational efficiency.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

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CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	2	-	1	-	2	2	-	2
CO2	3	3	2	2	2	-	-	-	2	2	2	2
CO3	3	3	3	2	2	-	-	-	2	2	2	2
CO4	3	3	3	2	2	-	-	-	3	2	2	2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Operations Management: Processes and Supply Chains	Lee J. Krajewski, Manoj Malhotra	Pearson Education	14th Edition, 2024
2	Operations Management	William J. Stevenson	McGraw-Hill Education	14th Edition, 2020
3	Production and Operations Management	R. Paneerselvam	PHI Learning	3rd Edition, 2012

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Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Introduction to Operations and Supply Chain Management	Cecil B. Bozarth, Robert B. Handfield	Pearson	5th Edition, 2019
2	Operations Management: Sustainability and Supply Chain Management	Jay Heizer, Barry Render, Chuck Munson	Pearson	14th Edition, 2022
3	Operations Management: Processes and Value Chains	Lee J. Krajewski, Larry P. Ritzman, Manoj K. Malhotra	Pearson	10th Edition, 2012
4	Production and Operations Management	S. N. Chary	McGraw-Hill	6th Edition, 2019
5	Operations Management: Theory and Practice	B. Mahadevan	Pearson India	3rd Edition, 2015

Video Links (NPTEL, SWAYAM…)	
Sl No	**Link ID**
1	https://archive.nptel.ac.in/courses/112/107/112107238/

PBL Course Elements

L: Lecture (3 Hrs.)	**R: Project (1 Hr.), 2 Faculty Members**		
	Tutorial	**Practical**	**Presentation**
Lecture delivery	Project identification	Simulation/ Laboratory Work/ Workshops	Presentation (Progress and Final Presentations)
Group discussion	Project Analysis	Data Collection	Evaluation
Question answer Sessions/ Brainstorming Sessions	Analytical thinking and self-learning	Testing	Project Milestone Reviews, Feedback, Project reformation (If required)
Guest Speakers (Industry Experts)	Case Study/ Field Survey Report	Prototyping	Poster Presentation/ Video Presentation: Students present their results in a 2 to 5 minutes video

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Assessment and Evaluation for Project Activity

Sl. No	**Evaluation for**	**Allotted Marks**
1	Project Planning and Proposal	5
2	Contribution in Progress Presentations and Question Answer Sessions	4
3	Involvement in the project work and Team Work	3
4	Execution and Implementation	10
5	Final Presentations	5
6	Project Quality, Innovation and Creativity	3
Total		**30**

1. **Project Planning and Proposal (5 Marks)**
    - Clarity and feasibility of the project plan
    - Research and background understanding
    - Defined objectives and methodology

2. **Contribution in Progress Presentation and Question Answer Sessions (4 Marks)**
    - Individual contribution to the presentation
    - Effectiveness in answering questions and handling feedback

3. **Involvement in the Project Work and Team Work (3 Marks)**
    - Active participation and individual contribution
    - Teamwork and collaboration

4. **Execution and Implementation (10 Marks)**
    - Adherence to the project timeline and milestones
    - Application of theoretical knowledge and problem-solving
    - Final Result

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5. **Final Presentation (5 Marks)**
    - Quality and clarity of the overall presentation
    - Individual contribution to the presentation
    - Effectiveness in answering questions

6. **Project Quality, Innovation, and Creativity (3 Marks)**
    - Overall quality and technical excellence of the project
    - Innovation and originality in the project
    - Creativity in solutions and approaches