



**M.E / M.TECH/MCA DEGREE EXAMINATIONS: NOV/ DEC 2024**

(Regulation 2024)

First Semester

**INDUSTRIAL ENGINEERING**

24ILT504: Production Planning and Control

**COURSE OUTCOMES**

- CO1:** Infer the origins of production planning and classify various types of production.
- CO2:** Appraise the forecasting tools and importance of aggregate planning in production.
- CO3:** Analyze process strategies in industries and surface tools and concepts involved.
- CO4:** Analyze the importance and inventory systems and their positions in supply chains.
- CO5:** Appraise the models of inventory control and infer the recent trends in practice.

**Time: Three Hours**

**Maximum Marks: 100**

**PART A (4\*20 = 80 Marks)**

- |       |                                                                                                                                                   |   |     |                   |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|---|-----|-------------------|
| 1. a) | Briefly explain any four main objectives of production planning and control.                                                                      | 4 | CO1 | [K <sub>1</sub> ] |
| b)    | Explain two stages in production planning with an example for each.                                                                               | 4 | CO1 | [K <sub>2</sub> ] |
|       | Scenario: A furniture manufacturing company                                                                                                       |   |     |                   |
| c)    | Identify four differences between job and batch production with reference to furniture making.                                                    | 4 | CO1 | [K <sub>2</sub> ] |
| d)    | State two advantages and two disadvantages of mass production in furniture manufacturing.                                                         | 4 | CO1 | [K <sub>2</sub> ] |
| e)    | List four changes in production planning needed when moving from batch to mass production.                                                        | 4 | CO1 | [K <sub>2</sub> ] |
| 2. a) | Calculate the break-even point when Fixed Cost = Rs.50,000, Selling Price = Rs.100, and Variable Cost = Rs.60 per unit.                           | 4 | CO2 | [K <sub>3</sub> ] |
| b)    | List four factors to consider in make vs buy decisions with one example each.                                                                     | 4 | CO2 | [K <sub>1</sub> ] |
| c)    | A production line operates for 8 hours (480 minutes) per shift with the following data: Standard cycle time = 2 minutes per unit, Total idle time | 4 | CO  | [K <sub>3</sub> ] |

during shift = 60 minutes, Line has 5 workstations, Target production = 200 units per shift. Calculate: a) Actual production time available b) Line efficiency

- d) A CNC machine in a manufacturing facility has the following data for last week: Available time = 40 hours (8 hours  $\times$  5 days), Planned maintenance = 4 hours, Breakdown time = 2 hours, Setup time = 1 hour, Actual production time = 33 hours. Calculate the machine utilization ratio and interpret the result. 4 CO2 [K<sub>3</sub>]
- e) Enumerate the steps in aggregate planning process. 4 CO3 [K<sub>1</sub>]
3. a) Describe two process strategies with one example each. 4 CO3 [K<sub>2</sub>]
- b) A machining process operates on a single shift basis with the following data: Shift duration = 8 hours (480 minutes), Downtime for lunch break = 30 minutes, Machine breakdowns = 45 minutes, Standard cycle time per part = 5 minutes, Actual parts produced = 65 units. Calculate the process efficiency and interpret the result. 4 CO3 [K<sub>3</sub>]
- c) Match four given products with their suitable process types and substantiate. 4 CO3 [K<sub>L</sub>]  
Custom furniture, Automobiles, Restaurant meals, Steel
- d) Enumerate and briefly explain factors affecting process design. 4 CO3 [K<sub>1</sub>]
- e) Identify two advantages and two limitations of automation in process design. 4 CO3 [K<sub>2</sub>]
4. a) A company has the following inventory data: Annual demand (D) = 1,000 units, Ordering cost (S) = Rs. 100 per order, Unit cost (C) = Rs. 50 per unit, Holding cost (H) = 20% of unit cost per year, Order quantity (Q) = 200 units. Calculate the total inventory cost using given ordering and holding cost. 5 CO4 [K<sub>3</sub>]
- b) Identify four inventory positions in a manufacturing supply chain. 5 CO4 [K<sub>1</sub>]
- c) List two types of inventories with two examples each. 5 CO4 [K<sub>2</sub>]
- d) A retail store has the following data for the past year: Annual Sales Revenue = Rs. 2,400,000, Beginning Inventory = Rs. 300,000, Ending Inventory = Rs. 500,000. Calculate: Average Inventory, Inventory Turnover Ratio, Days Inventory Outstanding (DIO). 5 CO4 [K<sub>3</sub>]

**Answer any ONE Question**  
**PART B (1\*20 = 20 Marks)**

5. a) a) Compare fixed order quantity and fixed time period systems. 4 CO5 [K<sub>4</sub>]
- b) b) ABC Manufacturing uses component X which has the following cost structure: Annual demand (D) = 1000 units Ordering cost (S) = \$100 per order Holding cost (H) = 20% of unit cost per year  
The supplier offers the following quantity discounts:
- Price = \$50/unit for orders < 200 units
  - Price = \$48/unit for orders 200-499 units
  - Price = \$45/unit for orders ≥ 500 units
- Calculate the EOQ for each price level.
- c) c) A hospital pharmacy maintains 10 critical drugs with their annual consumption value as follows:  
Drug: Annual Value: Drug A: Rs. 80,000, Drug B: Rs. 15,000, Drug C: Rs. 150,000, Drug D: Rs. 10,000, Drug E: Rs. 120,000, Drug F: Rs. 8,000, Drug G: Rs. 25,000, Drug H: Rs. 4,000, Drug I: Rs. 3,000, Drug J: Rs. 85,000  
Design an ABC classification system to prioritize inventory control, showing: a) The ranking of items by annual value b) Cumulative percentage calculations c) ABC classification using the criteria: A items: Top 70% of value, B items: Next 20% of value, C items: Remaining 10% of value d) One key control measure for each category. 4 CO5 [K<sub>6</sub>]
- d) d) How do modern ERP systems support inventory control? 4 CO5 [K<sub>2</sub>]
- e) e) Analyze the implementation requirements for pull systems. 4 CO5 [K<sub>4</sub>]
- OR**
6. a) Evaluate strategies for inventory control under demand uncertainty. 5 CO5 [K<sub>5</sub>]
- b) A manufacturing company uses component X with the following data: 5 CO5 [K<sub>6</sub>]  
Average daily demand = 25 units, Lead time = 5 days, Service level = 95% (Z = 1.645), Standard deviation of daily demand = 4 units, Unit cost = Rs. 100, Design a reorder point system by:
- a) Calculating the reorder level with safety stock
- b) Explaining what action should be taken when inventory reaches this level

- c) Calculating the safety stock cost at Rs. 20 holding cost per unit per year
- |    |                                                             |   |     |                   |
|----|-------------------------------------------------------------|---|-----|-------------------|
| c) | Analyze recent trends in automated inventory management.    | 5 | CO5 | [K <sub>4</sub> ] |
| d) | How do scheduling decisions impact supply chain efficiency? | 5 | CO5 | [K <sub>2</sub> ] |

\*\*\*\*\*