



CBCS SCHEME

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21ME61

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Production and Operations Management

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define Productivity. Explain the factors affecting the productivity. (08 Marks)
- b. Explain the steps involved in decision making process. (09 Marks)
- c. Explain a decision tree. (03 Marks)

OR

- 2 a. A glass factory specializing in crystal is experiencing a substantial backlog, and the firm's management is considering three courses of action :
 - i) arrange for subcontracting
 - ii) Begin overtime production or
 - iii) Construct new facilities. The correct choice depends largely upon future demand, which may be low, medium or high. By consensus, management ranks the respective probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals the effect upon profits that is shown in Table 1.

Table 1, Q. 2(a) [Profit in Rs. thousands]

	Profit (Rs.000) If Demand is		
	Low (P = 0.10)	Medium (P= 0.50)	High (P= 0.40)
A – Arrange subcontracting	10	50	50
B – Begin overtime	- 20	60	100
C = Construct facilities	-150	20	200

- i) State which course of action would be taken under a criterion of
 - 1) Maximax
 - 2) Maximin
 - 3) Maximum probability
 - 4) Maximum expected value
- ii) Show this decision situation schematically in the form of a decision tree. (10 Marks)

- b. Explain the important differences between goods production and service operations. (10 Marks)

Module-2

- 3 a. Explain the steps in the forecasting process. (06 Marks)
- b. Write a short note on concurrent Engineering. (05 Marks)
- c. Explain various sources of idea generation in product design and development. (09 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 4 a. The general manager of a building materials production plant feels that the demand for plasterboard shipments may be related to the number of construction permits issued in the country during the previous quarter. The manager has collected the data as shown in Table 2

Table 2, Q. 4(a)

Construction permits	15	9	40	20	25	25	15	35
Plaster board Shipments	6	4	16	6	13	9	10	16

- i) Develop a linear regression equation.
 ii) Determine a point estimate for plasterboard shipments when the number of construction permits is 30. Also, compute correlation coefficient. (10 Marks)
- b. Write a short note on controlling the forecast. (05 Marks)
- c. Explain the role of Computer Aided Design (CAD) in designing the products. (05 Marks)

Module-3

- 5 a. Mention the steps involved in the general procedure for making location decisions. (04 Marks)
- b. Explain the factors that determine effective capacity. (10 Marks)
- c. With sketches explain i) A product layout ii) A process layout. (06 Marks)

OR

- 6 a. Explain Design Capacity and System Capacity. Silver valley smelting is considering the expansion of a production process by adding more 1 – ton – capacity curing furnaces. Each batch (1 ton) of ore must undergo 30 minutes of furnace time, including load and unload operations. However, the furnace is used only 80% of the time due to power restrictions in other parts of the system. The required output for the new layout is to be 16 tons per shift. Each shift is of eight hours. Plant (system) efficiency is estimated at 50% of system capacity.
- i) Determine the number of furnaces required (10 Marks)
- ii) Estimate the percentage of time the furnaces will be idle.
- b. Explain Break even Analysis with a neat sketch. For an existing product that sells for Rs. 650 per unit, Fixed costs is Rs. 82000 and variable cost is Rs. 240 per unit.
- i) What is the BEP? (10 Marks)
- ii) What volume is needed to generate a profit of Rs. 10250?

Module-4

- 7 a. List and explain the pure strategies used in the aggregate planning for meeting uneven demand. (07 Marks)
- b. Write a short note on “ Disaggregating the Aggregate Plan”. (05 Marks)

- c. Given the accompanying supply, demand and inventory data (Table 3 and Table 4) for a firm that has a constant workforce and wishes to meet all demand with no back orders, allocate production capacity to satisfy demand at minimum cost.

Table 3, Q. 7(c), Supply, (units)

Period	Regular time	Overtime	Subcontract
1	60	18	1000
2	50	15	1000
3	60	18	1000
4	65	20	1000

Table 4, Q. 7 (c) Demand

Period	Units
1	100
2	50
3	70
4	80

(08 Marks)

- i) Initial Inventory = 20
ii) Final inventory = 25

Regular time cost per unit = Rs. 100, out of which 50% of cost is labour.

Overtime cost per unit = Rs. 125.

Subcontract cost per unit = Rs. 130

Inventory carrying cost = Rs. 2 per unit – period

Use the transportation linear programming approach to develop an aggregate plan based on the 4 periods.

OR

- 8 a. What do you mean by Master Scheduling? Explain the inputs and outputs of Master Scheduling. (08 Marks)
- b. Explain the concept of time fences in MPs (Master Production Schedule) with a block diagram. (06 Marks)
- c. Find the ATP (Available – to – Promise) inventory values for the master schedule shown in Table 5.

Table 5, Q.8(c), Master Schedule

Period	Planning time Fence 6					
	1	2	3	4	5	6
Forecast	10	10	10	10	20	20
Customer Orders (booked)	13	5	3	1		

(06 Marks)

Module-5

- 9 a. Define (i) MRP (ii) CRP (iii) ERP. Also list the essential inputs and outputs in an MRP System? (10 Marks)
- b. List the benefits and requirements of MRP. (04 Marks)
- c. The product structure tree for X is as shown in figure Q.9(c), with the number of units required shown in brackets. What quantities of E, J and K are required to complete 500 units of X?

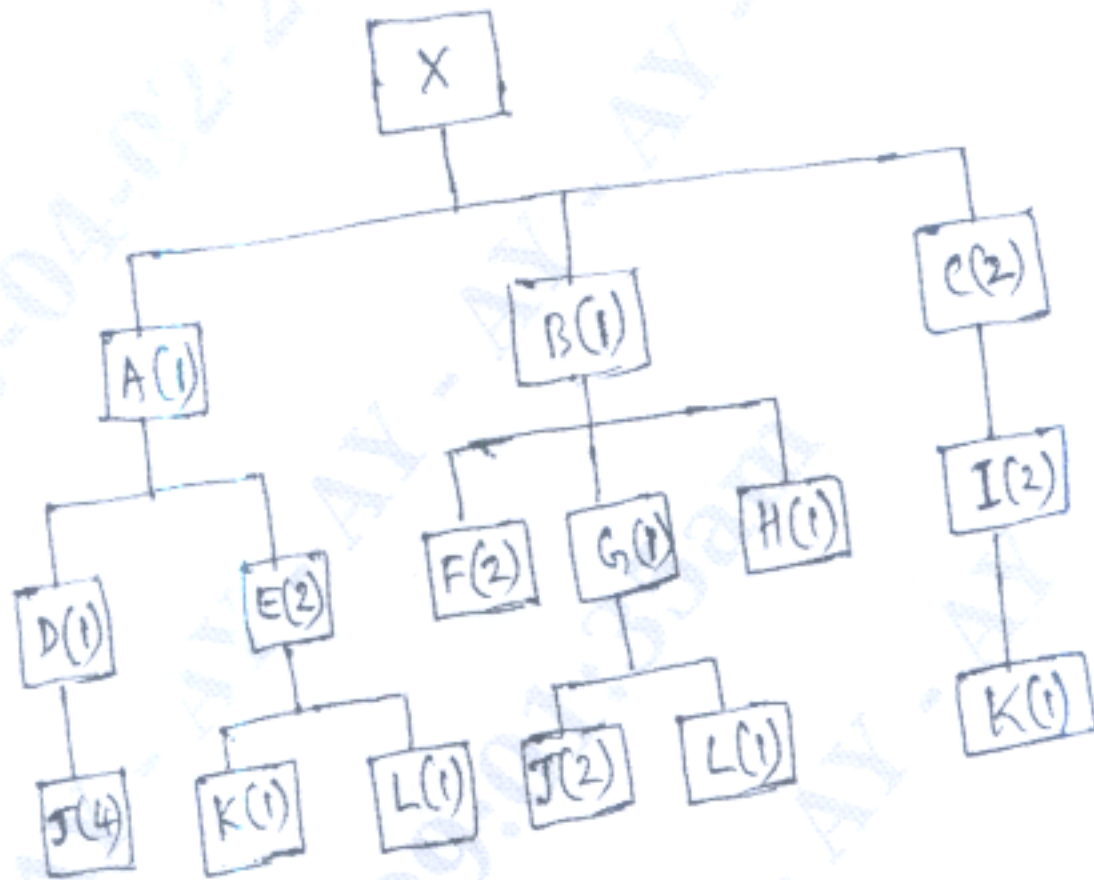


Fig. Q 9 (c) Product Structure tree for X

(06 Marks)

OR

- 10 a. Explain the procurement process with a block diagram. (10 Marks)
- b. Explain the stages in vendor development with a block diagram. (10 Marks)
