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## Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025 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. What is Operations Management? Identify the three major functional areas of business organizations and describe how they are interrelated. (10 Marks)
- b. A firm manufactures two products A and B on which the profits earned per unit are Rs.3 and Rs.4 respectively. Each product is processed on two machines  $M_1$  and  $M_2$ . Product A requires one minute of processing time on  $M_1$  and two minutes on  $M_2$ . Product B requires one minute each on machine  $M_1$  and  $M_2$ . Machine  $M_1$  is available for not more than 7 hours 30 minutes per day, while machine  $M_2$  is available for 10 hours per day. Find the number of units of products A and B to be manufactured to get maximum profit. Solve graphically. (10 Marks)

**OR**

- 2 a. What is productivity? List the various measures of productivity. (04 Marks)
- b. What is decision making? Describe the steps in decision making. (10 Marks)
- c. A firm of compiling the monthly of productivity report for its Board of Directors. From the following data, compute :
  - i) Labour productivity
  - ii) Machine productivity
  - iii) Multit-factor productivity of rupees spent on labour, machine, materials and energy. The average labour rate is Rs. 15/hour, and the average machine usage rate is Rs.10/hour.

Units produced = 1,00,000  
 Labour hours = 10,000  
 Machine hours = 5,000  
 Cost of materials = Rs. 35,000  
 Cost of energy = Rs.15,000. (06 Marks)

### Module-2

- 3 a. What is demand forecasting? What are the reasons for an organization to carry out demand forecasting? Give a broader classification of forecasting methods. (08 Marks)
- b. The manager of a 'building construction materials' company has collected the demand data for a specific material (in tons) for the past eight periods. The demand for this material is based on the number of construction permits approved by the local authority.

Construction permits	15	9	40	20	25	25	15	35
Demand (tons)	6	4	16	6	13	9	10	16

- i) Plot a graph of number of instruction permits vs demand and check for a linear relationship.
- ii) Develop a regression model and forecast the demand when the number of construction permits given is 30 ; 45 ; 50. (12 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. Explain with suitable examples, the approaches used for qualitative forecasting. (08 Marks)
- b. The manager of a large manufacturer of industrial pumps must choose between two alternative forecasting techniques. Both techniques have been used to prepare forecasts for a six months period. Using MAD and MAPD as criteria, which technique has the better performance record? Compute also the tracking signal for both the forecasting techniques and offer your comments.

Month	Demand (units)	Forecast (units)	
		Technique – 1	Technique – 2
1	492	488	492
2	470	484	482
3	485	480	478
4	493	490	488
5	498	497	492
6	492	493	493

(12 Marks)

**Module-3**

- 5 a. Explain the following terms with example :
- Design capacity
  - System capacity. (04 Marks)
- b. Describe the factors that determine effective capacity. (06 Marks)
- c. An auto component manufacturer has plan of buying hydraulic forging machines that can produce 170,000 good parts/year. These machines will be a part of a product line. The system efficiency of the product line is 85%.
- What is the required system capacity?
  - Assume that it takes 100 seconds to forge each part and the plant operates 2000 hours/year. If the machines will be utilized only 60% of the time and are 90% efficient, what is the actual output of machines/hour?
  - How many forging machines would be required? (10 Marks)

OR

- 6 a. With neat sketches, explain :
- Product layout
  - Fixed position layout. (06 Marks)
- b. List the factors affecting location decisions. (04 Marks)
- c. Potential locations A, B and C have the cost structure shown in the table for a product expected to sell at Rs. 130.

Potential location	Fixed cost per year Rs.	Variable cost/unit Rs.
A	150,000	75
B	200,000	50
C	400,000	25

- Find the most economic location for an expected volume of output of 6000 units/year
- What is the expected profit, if the selected site is used?
- For what output range each location is suitable? (10 Marks)

**Module-4**

- 7 a. With suitable sketches, explain :  
 i) Level production strategy  
 ii) Chase strategy of aggregate planning. (06 Marks)
- b. A company would like to prepare an aggregate plan for the next four periods. Given the following information, set up the problem in a transportation table and solve for the minimum cost plan.

Regular time cost	= Rs.20/unit
Overtime cost	= Rs.25/unit
Subcontracting cost	= Rs.28/unit
Inventory carrying cost	= Rs.3/unit/period
Beginning inventory	= 300 units.

Period	Expected demand	Regular time capacity	Overtime capacity	Subcontract capacity
1	900	1000	100	500
2	1500	1200	150	500
3	1600	1300	200	500
4	3000	1300	200	500

(14 Marks)

**OR**

- 8 a. Explain the master scheduling process (the inputs and outputs). (08 Marks)
- b. The following information is available regarding a product :

Capacity, units/month	Cost, Rs./unit
RT = 50	RT = 20
OT = 10	OT = 26
Inventory carrying/month = 3 , SC = Rs 29.	

Develop an economic production plan for the following demand :

Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand units	10	12	15	40	130	200	100	40	30	20	40	10

(12 Marks)

**Module-5**

- 9 a. With a neat block (flow) diagram, explain the inputs and outputs of a Material Requirement Planning (MRP). (06 Marks)
- b. Use the information given in the Fig.Q9(b) (product structure tree) and determine the quantities of B, C, D, E and F needed to assemble one X. Taking into account the on-hand inventory of various components given below determine the quantity of these components required to assemble 10 Xs.

On hand inventory :

Component	On-hand, units
B	4
C	10
D	8
E	60

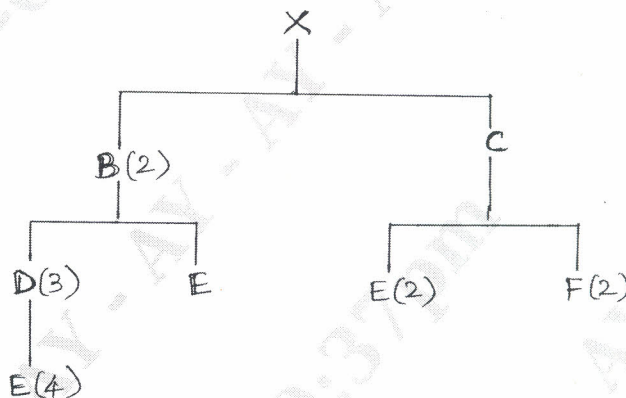


Fig.Q9(b)

(08 Marks)

- c. Complete the following MRP matrix for an item X. Determine when orders should be released? What is the on-hand inventory at the end of the last period?

Item : X Lot size : minimum 50 units	← Period →							
	1	2	3	4	5	6	7	8
Gross requirements	25	30	56	25	100	40	30	20
Scheduled receipts		50						
Projected on-hand	30							
Net requirements								
Planned order receipts								
Planned order releases								

(06 Marks)

**OR**

- 10 a. What is purchasing? Explain in brief the factors to be considered while selecting a supplier (or vendor) (10 Marks)
- b. Explain why Supply Chain Management has become an import aspect for most organizations. (10 Marks)

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