Course Name:		Manufacturing Resource Planning & Control	Course Code		O 307
Roll No.			**Marks**		60
Total No. of Questions		6	**Duration**		3 Hours
Total No. of printed pages		4	**Date**		05 /02/2024

Course Outcome Statements:
CO1: .Remember the basic concepts of production and operations management
CO2: Understand various resources required for a manufacturing organization
CO3: Apply the principles of matching available supply with market demand
CO4: Analyse sales and marketing plan to prepare Aggregate production Plan
CO5: Assess the feasibility of meeting the draft Master production Schedule

Instructions: -			Marks	BL	CO
Q. No 1 (All Questions are Compulsory)					
Q. No.		**Questions**			
Q. 1		Case/Case-let Study (500-800 words)			
		Demand Forecast in units and other operating parameters for a manufacturing organization are given below for a planning horizon of five consecutive months			

	Jan	Feb	March	April	May
Demand (nos.)	500	600	650	800	900
Working days	22	19	21	21	22

Cost & other data is as below

1. Materials $100.00 /unit
2. Inventory holding cost $10.00 /unit/month
3. Marginal cost of stock out $20.00 /unit/month
4. Marginal cost of subcontracting $100.00 /unit (its break up being $200 subcontracting cost less $100 material saving
5. Hiring and training cost $50.00 /worker
6. Layoff cost $100.00 /worker
7. Labour hours required 4/unit
8. Straight-line labour cost (first eight hours each day) $12.50 /hour
9. Overtime cost (1.5 times normal cost) $18.75 /hour
10. Beginning Inventory - 200units at the start of planning period.
11. Safety Stock Required 0% of month demand

Prepare Aggregate Production Plan to meet the demand during planning period by making suitable assumptions, if needed, and stating them clearly

	a.	By using chase strategy through hiring and firing workmen. **Analyse** the cost of this strategy considering first month requirement of workers as the starting number of workers.	6	Level 4	CO 4
	b.	By following level strategy with constant workforce of 10 numbers, will it be able to meet demand? **Determine** the stock out cost and total cost in this case? If it wants to meet monthly demand through subcontracting the shortfall **estimate** the total cost?	6	Level 5	CO 5
Q. 2		Answer **Any one** from the following.			
	a.	The data for the sales forecast and actual customer orders for a planning horizon of 10 weeks is given in the table. Production Lot size is 50 numbers. There is no requirement of maintaining any safety stock <table><tr><td></td><td colspan="3">Frozen Zone (DTF)</td><td colspan="5">Slushy Zone (PTF)</td><td colspan="2">Liquid Zone</td></tr><tr><td>Period</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>Forecast</td><td>20</td><td>22</td><td>21</td><td>25</td><td>24</td><td>23</td><td>21</td><td>21</td><td>25</td><td>25</td></tr><tr><td>Customer orders</td><td>19</td><td>17</td><td>15</td><td>11</td><td>9</td><td>5</td><td>2</td><td>1</td><td>0</td><td>0</td></tr></table> • For each period – i. **Determine** Projected Available Balance (PAB) & Master production Schedule (MPS) ii. **Estimate** Available To Promise (ATP)	6	Level 5	CO 5
	b.	A company produces two products, product 1 and 2. Both the products require some machining operations and then some assembly operations. Each unit of Product 1 requires 1 hour of machining and 1 hour of assembly time. Each unit of product 2 requires twice as much machining time as a unit of product 1. However both the products require the same amount of assembly time for each unit. The current capacity of machine shop is 25000 hours and that of assembly shop is 15000 hours. The forecasted quantities are given below. 		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	 |---|---|---|---|---|---|---| 	Product 1 forecast in units	10,000	12,000	14,500	17,500	21,000	25,000	 	Product 2 forecast in units	5,000	6,500	8,500	11,000	14,500	18,500	 Comment on the capacity requirement for machine shop as well as for assembly shop. As a planning manager what will be your recommendation to top management to meet the forecasted demand?	6	Level 5	CO 5

Q. 3		Answer **Any one** from the following.			
	a.	The demand data compiled for first six months of the year is given in the table below. Use exponential smoothing with smoothing co-efficient α = 0.5 to **Analyse** the given data & discover demand forecast for July (Period 7). Assume that the actual demand for January is same as that of forecast.	**6**	**Level 4**	**CO 4**

Period	Month	Demand
1	January	37
2	February	40
3	March	41
4	April	37
5	May	45
6	June	50

	b.	The activities / operations carried out on the assembly line of a toy manufacturing company are given below.	**6**	**Level 4**	**CO 4**

Activity No.	Description	Cycle time (minutes)	Precedence Activity
1	Inspection and flash removal of plastic moulded part 1	1.48	Nil
2	Inspection and flash removal of plastic moulded part 2.	1.70	1
3	Assembly of part 1 and part 2.	0.98	2
4	Insertion of screw 1.	0.48	3
5	Insertion of screw 2.	0.50	4
6	Insertion of screw 3.	0.48	5
7	Cleaning.	1.00	6
8	Labelling.	0.65	7
9	Inspection.	0.75	8
10	Packing	0.90	9

Demand of the toy per day is 240 nos. And the assembly line works in one shift per day. Working time per shift is 420 minutes.

Analyse the given data and balance the assembly line and find efficiency of the line.

Q. 4		Answer **Any two** from the following	.		
	a.	Identify suitable approach of Master Production Schedule change for different types of production Systems viz. Manufacture to Stock,(MTS) Manufacture To Order (MTO) and Assemble to Order (ATO)	**6**	**Level 3**	**CO 3**

	b.	Apply Finite Scheduling in a suitable industry and explain why industries use this approach. By Applying infinite scheduling Identify the type of software that will be used in this type of approach. Explain with reasons the characteristic features of the businesses that have to use this approach.	6	Level 3	CO 3
	c.	"Capacity Requirement Planning (CRP) and Rough-Cut Capacity Planning (RCCP) are both crucial components of a capacity planning exercise in manufacturing" Apply different strategies for altering the capacity to justify the above statement.	6	Level 3	CO 3
Q. 5		Answer **Any two** from the following			
	a.	"MPS is a single level planning whereas MRP is a multilevel Planning" In light of this statement **Explain** the similar & differentiating features of MPS & MRP	6	Level 2	CO 2
	b.	When we state that "MRP II was developed as the second generation of MRP", **illustrate** additional features/refinements provided in this higher-level software.	6	Level 2	CO 2
	c.	What is the major design consideration in the product layout which has culminated in assembly lines? What are the merits and demerits of assembly lines? Based on behavioural sciences, what are the current trends in assembly line design? What is a mixed-model assembly line?	6	Level 2	CO 2
Q. 6		Answer **Any two** from the following.			
	a.	What is the critical factor in process layout model? For estimating the flows between different work centres there are different modelling tools / techniques available. Name and explain them briefly.	6	Level 1	CO 1
	b.	After advent of ERP, MRP II does not exist as an independent software. However MRP is still available in today's market. Define the techno commercial aspects/features of MRP & ERP systems to explain this phenomenon	6	Level 1	CO 1
	c.	i. What are "Best Practices" in the systems offered by global ERP vendors? ii. Why do they insist on not customising them but to be implemented on "as is" basis? iii. How deployment methods of ERP have evolved and what issues need to be considered during implementation of ERP system	6	Level 1	CO 1