

(3 Hours)

[Total Marks : 100]

Semester: VII

- Question No.1 is compulsory.
- Attempt any four questions from remaining six questions.
- Assume suitable data wherever necessary.
- Figures to the right indicate marks

Q.1 Solve any **four** of the following:- (20)

- Master Production Schedule
- Kanban
- MRP II
- Capacity Planning
- Shop Floor Control
- Framework of MPC System with function of each Module

Q.2 A) Seven jobs, each of which has to through the machines M_1 and M_2 in the order M_2M_1 , have the following processing times in hours: (10)

Job	A	B	C	D	E	F	G
Machine M_1	3	12	15	6	10	11	9
Machine M_2	8	10	10	6	12	1	3

- Determine the optimal sequence that will minimize the total elapsed time. Also find the idle time of each machine.
- If the order is reversed to M_1M_2 , what difference will it make to the calculated results and idle times

B) Find the optimal assignment (Effectiveness matrix in man-hours needed): (10)

Worker	Job			
	A	B	C	D
1.	5	3	2	8
2.	7	9	2	6
3.	6	4	5	7
4.	5	7	7	8

Q.3 A) Solve the following problem by Simplex Method: (10)

$$Z_{\max} = 2x_1 + 3x_2$$

$$\text{Subject to: } x_1 + x_2 \leq 10; \quad 2x_1 + 3x_2 \leq 5; \quad x_1, x_2 \geq 0$$

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B) A firm manufactures three products A, B and C. Time to manufacture product A is twice that for B and thrice that for C and they are to be produced in the ratio 3 : 4 : 5. The relevant data is given in the following table:

Raw Material	Requirement per unit of product (kg)			Total Availability (kg)
	A	B	C	
P	6	5	9	5,000
Q	4	7	8	6,000

If the entire labour is engaged in manufacturing product A, 1,600 units of this product can be produced. There is demand for atleast 300, 250 and 200 units of product A, B and C and the profit earned per unit is Rs. 50, Rs. 40 and Rs. 70 respectively. Formulate the problem as Linear Programming problem.

- Q.4 A) The demand for an item is Rs. 18,000 per year. Production rate is 3000 units/month. The carrying cost is Rs. 0.15/unit/month and the setup cost is Rs. 500 per setup. The shortage cost is Rs. 20.00 per unit per year. Find the following parameters:
- Economic Batch Quantity
 - Maximum Inventory
 - Maximum Stock-out
 - Cycle Time
 - Inventory Period
 - Shortage Period

B) Estimate the sales forecast for the year 2000, using exponential smoothing forecaster. Take $\alpha = 0.5$ and the forecast for the year 1995 as 160×10^5 units. Compare the forecast with least square method.

Year	1995	1996	1997	1998	1999
Sales Rs. ($\times 10^5$)	180	168	159	170	188

- Q.5 A) The activities involved in a small project are given below along with relevant information. Construct the network diagram and find the critical path and floats for each activity.

Activity	1-2	1-3	2-3	2-4	3-4	4-5
Duration	20	25	10	12	6	10

B) The time estimate (in weeks) for the activities of a P.E.R.T. network are given below:

Activity	Optimistic Time	Most Likely Time	Pessimistic Time
	t_o	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

- i. Draw the network diagram and identify all the paths
- ii. Determine the expected project length
- iii. Calculate the standard deviation and variance of the project in Tabular form.

Q.6 A) Complete the MRP plan for the component shown below. Use lot size = 60 and (10)
lead time of 1 weeks and safety stock = 10:

Component	1	2	3	4	5	6	7	8
Gross requirements			60		140	30	130	
Scheduled receipts	50		50				50	
On hand at the end of period	20							
Planned Order Release								

If the lot size is changed to 80 units, redraw the MRP plan and recalculate the table.

B) Explain the following: (10)

- i. Purchasing and EDI in MPC
- ii. CRP with flow diagram

Q.7 A) A company has three factories X, Y, Z. It supplies good to four warehouses W1, W2, W3, and W4. The production capacities of the factories and demand of the warehouses are shown in the table. Determine the optimal solution of the problem. (10)

		Warehouse				Production Capacity
		W1	W2	W3	W4	
Factory	X	19	30	50	12	7
	Y	70	30	40	60	10
	Z	40	10	60	20	18
Demand		5	8	7	15	

B) Discuss the advantages and limitations of Simulation. (05)

C) Explain Lean and Agile Manufacturing in detail. (05)