

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1. A television company has three major departments for manufacturing of its models supreme and deluxe. Monthly capacities are given as follows

Department	Per Unit Time Requirements (Hrs)		Hours Available Per Month
	Model Supreme	Model Deluxe	
I	4.0	2.0	1,600
II	2.5	1.0	1,200
III	4.5	1.5	1,600

The marginal profit of model supreme is Rs. 400 each and that of model deluxe is Rs. 100 each. Assuming that the company can sell any quantity of either products due to favorable market conditions; Determine the optimum output for both the models, the highest possible profit for this month and slack time in the three departments.

2. A company has 3 factories and 3 ware houses with the following shipping cost and other information

Ware house	factories			Sales price	Ware house capacity
	F ₁	F ₂	F ₃		
W ₁	3	9	5	34	80
W ₂	1	7	4	32	120
W ₃	5	8	3	31	150
R/M cost	15	18	14		
Labor cost	10	9	12		
Factory capacity	150	100	130		

Due to prior commitment F₁ must supply 50 units to W₂ and for every unit sent to W₁ an octroi of Rs. 2/- per unit is imposed, also at F₃ left out inventory costs Rs. 1/- per unit left out.

Find the optimal solution for the company so as to make maximum profits or minimum cost/loss.

3. A company has four territories and four salesmen for assignment. The territories are not equally rich in their sales potential. It is estimated that a typical salesman operating in each territory would bring the following annual sales.

Territory	I	II	III	IV
Annual sales(rs)	60000	50000	40000	30000

The four salesmen are also considered to differ in ability, it is estimated that working under same condition their yearly sales could be proportionately as follows

Sales man	A	B	C	D
proportion	0.7	0.5	0.5	0.4

If criteria is to maximize expected sales, the intuitive answer is to assign the best salesman to the richest territory and next best to second richest and so on. Verify this answer by assignment technique.

- 4.a) Explain 'No passing rule' with reference to sequencing problems.
 b) Use the graphical method to find the minimum elapsed time sequence of 2 works and 5 machines when we are given the following information.

Work 1	Sequence	A	B	C	D	E
	Time(Hours)	2	3	4	6	2
Work 2	Sequence	C	A	D	E	B
	Time(Hours)	4	5	3	2	6

5. Find the shortest path from city 11 to city 51 along the various cities lying between 11 and 51. The lengths of paths are as shown below.

From	To	Corresponding distance in km
11	21, 22, 23	7, 6, 3
21	31, 32	3, 4
22	31, 32, 33	6, 7, 7
23	32, 33	9, 4
31	41, 42	7, 8
32	41, 42, 43	6, 7, 3
33	42, 43	4, 4
41, 42, 43	51	3, 9, 8

- 6.a) Distinguish the following
 i) Zero-sum game Vs. non-zero-sum game
 ii) Fair game Vs. unfair game.
 b) A and B play a game in which each has three coins a 5P, a 10P and 20P. Each selects a coin without the knowledge of the others choice. If the sum of the coins is an odd amount, A wins B's coins. If the sum is even B wins A's coins. Find the best strategy for each player and the value of the game
- 7.a) Explain machine life cycle, with reference to costs and describe the types of failures that can occur at each stage.
 b) What are the costs involved in failure and replacement analysis of equipment. Explain.
- 8.a) What are the functions and advantages of inventory?
 b) A manufacturer has to supply his customer 30,000 units of product/year. Demand is known and fixed. There is no storage space and shipping is daily. The penalty for failure to supply is Rs 0.20 per unit per month. Inventory holding cost is Rs 0.1 per month and set up cost is Rs 350/- per production run. Find optimum lot size for the manufacturer.