

CN 5003 Quantitative Techniques in Management

Important 13 Mark questions

Unit I

1. Find the optimum solution to be following transportation problem in which the cells contain the transportation cost in rupees shown

	w_1	w_2	w_3	w_4	w_5	Available
F_1	7	6	4	5	9	40
F_2	8	5	6	7	8	30
F_3	6	8	9	6	5	20
F_4	5	7	7	8	6	10
Required	30	30	15	20	5	100 (Total)

2. Solve the following LP problem by simplex method:

$$\text{Maximize: } Z = 4x_1 + 10x_2$$

$$\text{Subject to: } 2x_1 + x_2 \leq 10$$

$$2x_1 + 5x_2 \leq 20$$

$$2x_1 + 3x_2 \leq 18$$

$$x_1, x_2 \geq 0.$$

- (i) Indicate that this problem has an alternate optimal basic feasible solution.
 (ii) Find that optimal solution.
 (iii) Hence show that this problem has multiple optimal solution.
3. Solve the following transportation problem and find the optimal solution supply and demand:

	Destination				Supply	
	D1	D2	D3	D4		
Origin	01	2	2	2	1	3
	02	10	8	5	4	7
	03	7	6	6	8	5
Demand		4	3	4	4	

4. Solve the following transportation problem and obtain optimum solution.

		To				Availability
		X	Y	Z	W	
From	A	3	3	5	4	15
	B	5	1	3	3	35
	C	6	4	4	3	12
	D	4	1	4	2	19
Demand		21	26	17	17	

5. Solve the simplex method:

$$\text{Maximize: } Z = 3x_1 + 4x_2 + 5x_3$$

$$\text{Subject to: } x_1 + 2x_2 + x_3 \leq 120$$

$$x_1 + 2x_2 + 2x_3 \leq 150$$

$$x_1 + 2x_2 \leq 90$$

$$x_1, x_2, x_3 \geq 0.$$

Unit II

- The expected times and variances for the activities of a PERT net work are given below. Determine the slack time for each event and the critical path. If the scheduled completion time is 32 months, find the probability of completion on schedule shown below

Activity :	1-2	1-3	2-4	2-5	3-4	3-6	4-5	4-6	5-7	6-7
Expected time (months) :	4	5	2	12	3	8	10	6	8	10
Variance :	8	3	1	5	2	4	4	2	1	8

- A simple engineering company has a machine whose purchase price is Rs. 80,000. The expected maintenance cost and resale price in deferent years are as given here.

Year	1	2	3	4	5	6	7
Maintenance cost (Rs.)	1,000	1,200	1,600	2,400	3,000	3,900	5,000
Resale value (Rs.)	75,000	72,000	70,000	65,000	58,000	50,000	45,000

After what time interval, in your opinion, should the machine be replaced? (16)

- Draw the network diagram for the activities given below.

Activity	Preceding Activity	Time Estimates (in weeks)		
		Optimistic	Most Likely	Pessimistic
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B, C	9	9	9
G	D	3	3.5	7
H	E, F, G	3	5	5

- Determine the critical path.
 - If a 30 weeks deadline is imposed, what is the probability that the project will be finished within the time limit.
 - If the project manager wants to be 99% sure that the project is completed on the scheduled date, how many weeks before that date should be start the project work. (Area of normal curve between $z=0.41$ is 0.1591 and the value of z which covers 49% of area is 2.33)
- Two persons X and Y work on a two-station assembly line. The distributions of activity times at their stations are shown below. Time in seconds Time frequency for X time frequency for Y.

10	4	2
20	7	3
30	10	6
40	15	8
50	35	12
60	18	9
70	8	7
80	3	3

- (i) Simulate operation of the line
- (ii) Assuming y must wait until X completes the first item before starting work, will he have to wait to process any of the other seven items? What is the average waiting time of items for Y. Use the following random numbers shown below?

For X: 83 70 02 12 59 46 54 03

For Y: 51 99 84 81 15 36 12 54

- (iii) Determine the inventory of items between the two stations.
 - (iv) What is the average production rate?
5. A firm considering replacement of a machine, whose cost price is Rs 12,200 and the scrap value, Rs 200. The running cost in rupees are found from experience to be as follows:

Year	1	2	3	4	5	6	7	8
Running cost in (₹)	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced?

Unit III

1. What is the importance of working capital management?
2. Describe the various methods used to make capital budgeting decisions.
3. Explain cash flow and stages of cash optimization with an example.
4. How will you use the present value method in finance management?
5. Explain the essentials of a successful budgetary control.

Unit IV

1. Briefly explain decision-making environments.
2. Explain the utility theory with an example.
3. Explain the Decision rules for taking decisions in conditions of certainty and uncertainty.
4. Construct 'Pay-off & regret Tables with neat examples.
5. The following matrix gives the pay-off of different strategies (alternatives) S_1, S_2, S_3 against conditions (events) N_1, N_2, N_3 and N_4 as below

	N_1 Rs.	N_2 Rs.	N_3 Rs.	N_4 Rs.
S_1	4,000	-100	6,000	18,000
S_2	20,000	5,000	400	0
S_3	20,000	15,000	-2,000	1,000

Indicate the decision taken under the following approach:

- (i) Pessimistic
- (ii) Optimistic
- (iii) Regret and
- (iv) Equal probability

Unit V

1. Reduce the following game by dominance and find the game value using below

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

2. From the following two persons zero sum game, find the value of the game:

		B		
		8	-3	7
A	6	-4	5	
	-2	2	-3	

3. Describe how you would determine the best decision using EMV criterion with a decision tree.
4. Describe Pricing Techniques and pricing Tools with example.
5. Explain the Applications of Game Theory in Engineering and Management.