

IV B.Tech I Semester Supplementary Examinations, April/May 2005
OPERATIONS RESEARCH
(Electronics & Control Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions
 All Questions carry equal marks

1. Solve the following L.P.P. by using simplex method.

$$\text{Minimise } Z = 4x + 3y$$

Subject to

$$2x + y \geq 10$$

$$-3x + 2y \leq 6$$

$$x + y \geq 6; \quad x, y \geq 0$$

2. A firm manufacturing a single product has plant I, II, III. The three plants have produced 60, 35 and 40 units respectively during this month. The firm had made a commitment to sell 22 units to customer A, 45 units to customer B, 20 units to customer C, 18 units to customer D, and 30 units to customer E. Find the minimum possible transportation cost of shipping the manufactured product to five customers. The net per unit cost of transporting from the three plants to five customers is given in the table :

	A	B	C	D	E
I	4	1	3	4	4
II	2	3	2	2	3
III	3	5	2	4	4

3. Find the sequence that minimizes the total elapsed time required to complete the following tasks in the sequence M_1M_2 .

Job	1	2	3	4	5	6
Machine M_1	2	6	9	3	2	4
Machine M_2	10	8	10	7	9	12

Also find the total elapsed time and idle times of each machine

4. (a) Briefly explain the reasons for replacement.
 (b) The following table gives the running costs /year and resale price of equipment whose purchase price is Rs.8000.

Year	1	2	3	4	5	6	7	8
Running Cost(Rs.)	2500	2600	2800	3100	3500	3900	4400	5400
Resale Value(Rs.)	6500	5500	4700	4200	3800	3500	3500	3500

- i. At what year is replacement due?
 ii. If the resale value is zero, will there be any change in the replacement policy?

5. (a) Write a note on:
- Saddle point
 - value of the game
- (b) For the following matrix of pay-offs find saddle point. If there is no saddle point. Find the optimal strategies, their frequencies and value of the game.

		B	
		1	2
A	1	-2	3
	2	4	-1

6. Alpha company used two large machines in a processing operation. Each machine is running all the time, except when down for repairs. Given that a machine is running at time t , the probability that it fails between t and $t + dt$ is λdt with λ in terms of failure per hour. Any time a machine fails it is immediately assigned a repair crew (assume at least 2 are always available) for each machine the repair time is negative exponential with average $1/\mu$ hours.
- Find the steady-state probabilities P_0 , P_1 and P_2 .
 - What is the average down time of a machine.
 - Let $\lambda = \frac{1}{2}$ and down time costs Rs.200 per hour down. Also let it cost Rs.50 μ per hour to operate the repair service at the rate of μ . Find out the optimal service rate.
7. (a) Write a note on periodic review inventory system and Fixed order quantity system
- (b) A company consumes 200 items/month working 30 days in a month. The cost of the item is Rs.1000. For a lot of more than 50, the price is Rs.950. Find out the optimum purchase quantity if ordering cost is Rs.10,000 and handling charges are 1% of unit cost per month. If the discounted price is available for a lot of more than 75 items, find the optimum purchase quantity.
8. A man is engaged in buying and selling identical item. He operates from a warehouse that can hold 500 items. Each month he can sell any quantity that he chooses up to the stock at the beginning of the month. Each month he can buy as much as he wishes for delivery at the end of the month. So long as his stock does not exceed 500 items. For the next four months he has the following error free forecasts of the cost sales prices.

Month	i	1	2	3	4
Cost	C_i	27	24	26	28
Sales price	P_i	28	25	25	27

If he currently has a stock of 200 units, what quantity should he sell and buy next four months. Find the solution using dynamic programming.
