

Code No: NR310502

NR

Set No. 2

III B.Tech I Semester Examinations, November 2010

OPERATIONS RESEARCH

Common to Electronics And Computer Engineering, Computer Science And Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Shifttrans Transportation Company has four terminals A, B, C and D. At the start of first day of week, there are 8, 8, 6 and 3 vehicles available at terminals A, B, C and D respectively. During the previous night, 2, 12, 5 and 6 vehicles were loaded at plants P, Q, R and S respectively. The distances (in kms.) between the terminals and plants are given in the table. Based upon the foregoing information, what vehicles should be sent to which plants in order to minimize total distance? [16]

	P	Q	R	S
A	22	46	16	40
B	41	15	50	40
C	82	32	48	60
D	40	40	36	30

2. A Company is faced with the problem of assigning 4 machines to 6 different jobs (one machine to one job only). The profits are estimated as follows. Solve the problem to maximize the total profits. [16]

3	7	3	6	5	5
6	1	8	4	2	7
2	4	5	3	4	6
6	4	8	7	3	4

3. Use simplex method to

$$\text{Maximise } Z = 4x_1 + 5x_2 + 9x_3 + 11x_4$$

Subject to Constraints:

$$x_1 + x_2 + x_3 + x_4 \leq 15$$

$$7x_1 + 5x_2 + 3x_3 + 2x_4 \leq 120$$

$$3x_1 + 5x_2 + 10x_3 + 15x_4 \leq 100$$

$$x_1, x_2, x_3, x_4 \geq 0$$

[16]

4. (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.

[4+12]

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		B	
A	0	1	2
	1	-2	3
	2	4	-1

5. (a) What do you mean by forward and backward recursion in dynamic programming?
- (b) Suppose that a person want to select the shortest highway route between two cities. The network shown below provides the possible routes between the starting, city at node 1 and the destination city at node 7. The routes pass through intermediate cities designated by nodes 2 to 6. Solve the problem of finding the shortest route using dynamic programming. {As shown in the figure4b} [4+12]

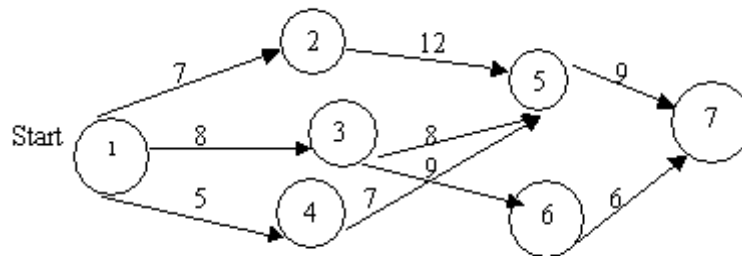


Figure 4b

6. Patients arrive at a clinic according to a poisson distribution at the rate of 30 patients per hour. The waiting room does not accommodate more than 14 patients. Examination time per patient is exponential with mean rate 20 per hour.
- (a) Find the effective arrival rate at the clinic.
- (b) What is the probability that an arriving patient will not wait?
- (c) What is the expected waiting time until a patient is discharged from the clinic. [16]
7. (a) The cost of a new machine is Rs.5000. The maintenance cost of nth year is given by $R_n = 500(n-1)$; $n=1,2$. Assuming that the money value will not change with time, after how many years will it be economical to replace the machine by new one.
- (b) A pipeline is due for repairs. It will cost Rs.10,000 and last for 3 years. Alternatively, a new pipeline can be laid at a cost of Rs.30,000 and lasts for 10 years. Assuming cost of capital to be 10% and ignoring salvage value, which alternative should be chosen. [8+8]
8. (a) A company uses annually 24,000 units of raw material which costs Rs.1.25 per unit. Placing each order costs Rs.22.50 and carrying cost is 5.4% per year of the average inventory. Find the economic lot size and the total inventory cost (including inventory cost). Should the company accept the offer made by the supplier of a discount of 5% on the cost price on a single order of 24,000 units.

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- (b) Consider an item on which incremental quantity discounts are available. The first 10 units costs Rs.100 each and additional unit costs Rs.95 each. Determine the optimal order quantity when $\lambda = 500$ units per year, $i = 0.20$, $A = \text{Rs. } 50$ per year per setup. [8+8]

FIRSTRANKER

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Set No. 4

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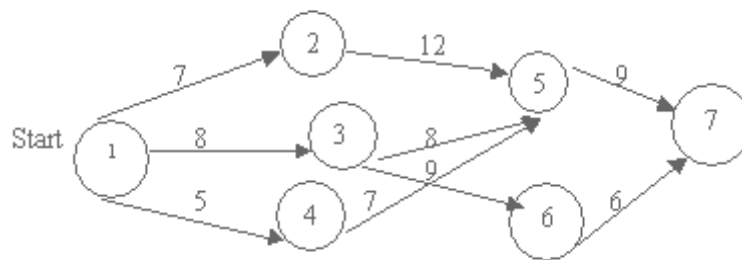


Figure 4b

3. A Company is faced with the problem of assigning 4 machines to 6 different jobs (one machine to one job only). The profits are estimated as follows. Solve the problem to maximize the total profits. [16]

3	7	3	6	5	5
6	1	8	4	2	7
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4. (a) The cost of a new machine is Rs.5000. The maintenance cost of n th year is given by $R_n = 500(n-1)$; $n=1,2$. Assuming that the money value will not change with time, after how many years will it be economical to replace the machine by new one.
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 i. Saddle point
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$$\begin{array}{ccc} & & B \\ & 0 & 1 \quad 2 \\ A & 1 & -2 \quad 3 \\ & 2 & 4 \quad -1 \end{array}$$

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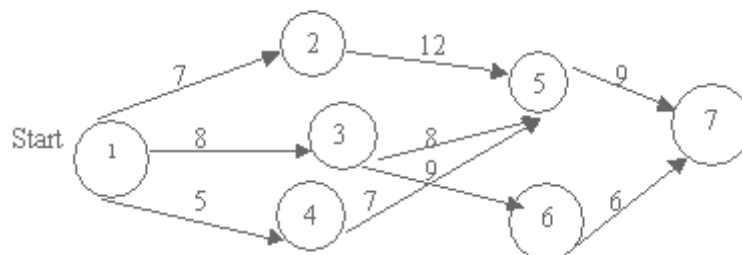


Figure 4b

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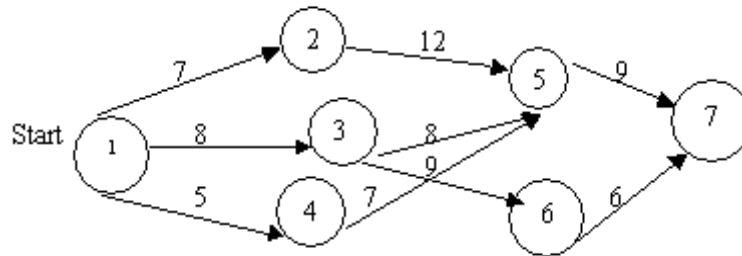


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