

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0422

Roll No.

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B. Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION
2010-11

OPERATIONS RESEARCH*Time : 3 Hours**Total Marks : 100***Note : Attempt all questions.**1. Attempt any two of the following : (10×2=20)

(a) Solve the following LP problem using Simplex method :

$$\text{Max. } Z = 5X_1 + 7X_2$$

subject to :

$$2X_1 + 3X_2 \leq 13$$

$$3X_1 + 2X_2 \leq 12$$

$$X_1, X_2 \geq 0.$$

(b) Write the dual to the following primal LP problem :

$$\text{Maximize } Z = 20X_1 + 15X_2 + 18X_3 + 10X_4$$

subject to :

$$4X_1 - 3X_2 + 10X_3 + 4X_4 \leq 60$$

$$X_1 + X_2 + X_3 = 27$$

$$-X_2 + 4X_3 + 7X_4 \geq 35$$

and X_4 unrestricted in sign.

(c) Explain the mechanism and managerial significance of post-optimality analysis of a linear programming solution.

2. Attempt any two of the following : (10×2=20)

- (a) Find the optimal solution of the following transportation problem, using Vogel's Approximation Method to get the basic feasible solution :

	R ₁	R ₂	R ₃	R ₄	
G ₁	20	22	24	22	50
G ₂	17	19	18	19	50
G ₃	16	15	19	20	Avg. Amount
	70	20	20	30	

- (b) A director in a Management Institute has the problem of assigning courses to teachers with a view to maximizing educational quality in his Institute. Relative ratings (100 = best rating) regarding the ability of each instructor to teach each of the four courses is given below. How should he assign his staff to the courses to realise his objects ?

	Course 1	Course 2	Course 3	Course 4
Prog 1	60	40	60	70
Prog 2	20	60	50	70
Prog 3	20	30	40	60
Prog 4	30	10	20	40

- (c) Discuss the characteristics of a Dynamic Programming problem with the help of a suitable example.
3. Attempt any two of the following : (10×2=20)

- (a) What techniques are used to solve decision-making problems under uncertainty ? Which technique results in an optimistic decision ? Which technique results in a pessimistic decision ?

- (b) Explain the overall purpose of utility theory. How is a utility curve used in selecting the best decision for a particular problem ?
- (c) Two companies A and B are competing for the same product. Their different strategies are given in the following pay-off matrix :

		B		
		3	-4	2
A	1	1	-3	-7
	-2	-2	4	7

Find the saddle point, in case the saddle point is missing, formulate the problem as a LP problem so that the mixed strategies may be obtained acceptable to both players.

4. Attempt any two of the following : (10×2=20)
- (a) A newspaper boy purchases paper for Rs. 1.60 each and sells them for Rs. 2.00 each. He cannot return the unsold newspaper. Daily demand has the following distribution :
- | | | | | | | | | |
|------------------------|---|-----|-----|-----|-----|-----|------|------|
| No. of Customer | : | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| Probability | : | 0.1 | 0.2 | 0.3 | 0.2 | 0.1 | 0.05 | 0.05 |
- If each day's demand is independent of the previous day, how many newspaper should he order each day ?
- (b) Explain the basis of selective inventory control and state the different selection techniques adopted in Inventory Control System. Give a brief note on each.
- (c) XYZ Company wants to provide 95 percent service level to its customers using the past history of demand, the following data is available :
- Daily demand follows normal distribution with an average daily demand of 20 units and the standard deviation of

5 units. The lead time for procurement is 4 days. The cost of placing an order is Rs. 10 and its inventory carrying cost is Re. 1 per unit per year. There are no stockout costs and unfilled order are supplied after the items are received. What should be the inventory policy for the company ? For 95% service level, point S will be 1.645 standard deviation away from the mean.

5. Attempt any two of the following : (10×2=20)
- (a) What is a queuing problem ? Explain some of the basic characteristics of a queuing system. What are some of the important assumption in Queuing Models ?
 - (b) State two major reasons for using simulation. Explain the basic steps of Monte Carlo simulation.
 - (c) Write a note on simulation languages. Give few examples of softwares used for computer simulation.