

**III B.Tech II Semester Supplementary Examinations,  
November/December 2005  
OPERATIONS RESEARCH  
(Computer Science & Systems Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions  
All Questions carry equal marks**

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1. (a) Briefly discuss the following:

- i. Iconic models
- ii. Analogue models

- (b) Solve the following LP Problem.

$$\text{Maximize } Z = 5X_1 + 2X_2$$

Subject to

$$2X_1 + 7X_2 \leq 100$$

$$3X_1 + 8X_2 \leq 135$$

$$\text{and } X_1, X_2 \geq 0$$

[4+12]

2. Solve the transportation problem for minimizing transportation cost.

[16]

Plant	To				Supply
	1	2	3	4	
A	10	7	5	3	150
B	9	12	10	2	90
C	12	6	8	5	240
Demand	170	80	200	85	

3. (a) What are the conditions to be satisfied in order to convert a 3 machine sequencing problem into a 2 machine sequencing problem?
- (b) State Johnson's algorithm for sequencing of jobs in machines.
- (c) Find the optimal sequence, the minimum total elapsed time and the idle Time of the where the processing is in the order G F H.

[3+3+10]

Job	1	2	3	4	5	6
Machine						
G	12	8	7	11	10	5
H	7	10	9	6	10	4
F	3	4	2	5	5	4

4. A machine has been purchased at a cost of Rs.1,60,000. The value of the machine is depreciated in the first three years by Rs.20,000 each year and Rs.16,000 per year thereafter. Its maintenance and operating costs for the first three years are Rs.16,000 ,Rs.18,000 and Rs.20,000 in that order and increase by Rs.4000 every year. Assuming an interest rate of 10%,find the economic life of the machine. [16]
5. (a) For the following pay-off matrix, determine the best strategies and the value of the game

		Y		
		j	k	l
X	p	60	50	40
	q	70	70	40
	r	80	60	75

- (b) Briefly explain the limitations of game theory. [10+6]
6. (a) Write some important applications of queuing theory.
- (b) A P.C. repairperson finds that the time spent on jobs has an exponential distribution with mean 30 minutes. If the sets are repaired in the order in which they come in, and if the arrival of sets is approximately poisson with an average of 10 per 8 hour day, what is the repairperson's expected idle time each day ? How many jobs are ahead of the average set just brought in? [6+10]
7. (a) Derive the Economic Order Quantity Formula with instantaneous replenishment when shortages are allowed.
- (b) Given the following data for an item of uniform demand, instantaneous delivery time and Back order facility.  
 Annual demand = 900 units, cost of an item = Rs. 50/-, Ordering cost = Rs. 900/-, Inventory carrying cost = 30%, Back order cost = Rs. 15. Find out
- Minimum cost order quantity
  - Maximum number of back orders
  - Maximum Inventory level
  - Time between orders
  - Total annual cost. [8+8]
8. State Bellman's principle of optimality and explain by an illustrative example how it can be used to solve multistage problem with finite number of stages. [16]

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