

Code No: 57022

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, May/June - 2015

OPERATIONS RESEARCH
(Common to ME, MCT, AME)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) Write down the Graphical Method procedure for solving linear programming problem.
- b) Solve the LPP: Minimize $z = x_1 + x_2$, subject to $2x_1 + x_2 \geq 4$, $x_1 + 7x_2 \geq 7$ and $x_1, x_2 \geq 0$ using Two phase method. [7+8]

- 2.a) Solve the assignment problem represented by the following matrix.

	1	2	3	4
I	2	3	4	5
II	4	5	6	7
III	7	8	9	8
IV	3	5	8	4

- b) Write down the vogel's approximation method algorithm.
- c) Determine an initial feasible solution to the following transportation problem using the north-west corner rule, where O_i and D_j represent i^{th} origin and j^{th} destination respectively. [5+5+5]

	D_1	D_2	D_3	D_4	Supply
O_1	6	4	1	5	14
O_2	8	9	2	7	16
O_3	4	3	6	2	5
Demand	6	10	15	4	35

- 3.a) The cost of a machine is Rs.6,100 and its scrap value is only Rs.100. The maintenance costs are found from experience to be:

year	:	1	2	3	4	5	6	7	8
Maintenance Cost Rs.	:	100	250	400	600	900	1250	1600	2000

When should machine be replaced?

- b) There are five jobs, each of which must go through the two machines A and B in the order AB. Processing times are given below: [7+8]

Processing time					
Job	1	2	3	4	5
Time for A	5	1	9	3	10
Time for B	2	6	7	8	4

- 4.a) Define the following terms
 i) competitive game ii) Zero-sum game iii) Payoff matrix iv) Mixed strategy
 b) Solve the game whose payoff matrix to the player A is given in the table: [7+8]

		B		
		I	II	III
A	I	-4	6	3
	II	-3	-3	4
	III	2	-3	4

- 5.a) Define the following terms:
 i) Stationary waiting line
 ii) Absence of after effects
 iii) The orderliness of the waiting line
 b) At what average rate must a clerk at a supermarket work in order to ensure a probability of 0.90 that the customers arrive will not have to wait longer than 12 minutes? It is assumed that there is only one counter to which customers arrive in a poisson fashion at an average rate of 15 per hour. The length of service by the clerk has an exponential distribution [7+8]
- 6.a) What are the important inventory models and briefly explain about those models ?
 b) An aircraft company uses rivets at an approximate customer rate of 2,500kg. per year. Each unit costs Rs.30 per kg. and the company personnel estimate that it costs Rs.130 to place an order, and that the carrying cost of inventory is 10% per year. How frequently should orders for revets be placed? Also determine the optimum size of each order. [7+8]
7. A truck can carry a total of 10 tons of product. Three types of product are available for shipment. Their weights and values are tabulated. Assuming that at least one of each type must be shipped determine the loading which will maximize the total value. [15]

Type	Value (Rs.)	Weight (tones)
A	20	1
B	50	2
C	60	2

- 8.a) Explain simulation modeling.
 b) An automobile production line turns out about 100cars a day, but deviations occur owing to many causes. The production is more accurately described by a probability distribution as given below:

Production(per day)	:	95	96	97	98	99	101	102	102	103	104	105
Probability	:	0.03	0.05	0.07	0.10	0.15	0.20	0.15	0.10	0.07	0.05	0.03

Finished cars are transported across the bay at the end of each day by ferry. If the ferry has space only for 101 cars, what will be the average number of cars waiting to be shipped? [7+8]