Code No: 57022 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, December - 2014
OPERATIONS RESEARCH
(Common to ME, MCT, AME)

Time: 3 Hours **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks

1.a) Using Graphical Method solve the following Linear Programming Problem
Max $Z = 3x_1 + 4x_2$
Subject to $x_1 - x_2 \geq 0; 2.5x_1 - x_2 \leq -3$ *and* $x_1, x_2 \geq 0$.

b) Write the Simplex method algorithm to solve Linear Programming Problem.

2.a) Write a least-cost method algorithm to solve transportation problem.

b) The assignment cost of assigning any one operator to any one machine is given in the following table:

Machines	Operator			
	I	II	III	VI
A	10	5	13	15
B	3	9	18	3
C	10	7	3	2
D	5	11	9	7

Find the optimal assignment.

3.a) Seven jobs go first over machine 1 and then machine 2. Processing times in hours are given as:

Job	:	A	B	C	D	E	F	G
Machine 1	:	6	24	30	12	20	22	18
Machine 2	:	16	20	20	12	24	2	6

Find the optimum sequence in which jobs should be processed.

b) Write the types of replacement decisions.

4.a) Define the following terms:
i) Finite game
ii) Infinite game
iii) Zero sum game
iv) Saddle point.

b) Solve the following game whose pay-off matrix is given by:

A	B				
		I	II	III	VI
	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

5.a) Explain about the elements of the waiting line systems.

b) A supermarket has a single cashier. During the peak hours, customers arrive at a rate of 20 customers per hour. The average number of customers that can be processed by the cashier is 24 per hour. Calculate:
i) The probability that the cashier is idle.
ii) The average number of customers in the queuing system.
iii) The average time a customer in the queuing system.

6.a) Briefly explain about types of inventory models.

b) Compute Economic order quantity (EOQ) and the total variable costs for the following items:
Annual demand = 5000 Units; Unit price = Rs.20; Order cost = Rs.13;
Storage rate = 2% per annum; Interest rate = 12% per annum;
Obsolescence rate = 6% per annum.

7.a) Use dynamic programming to solve the following linear programming problem.
Max $Z = 3x_1 + 5x_2$ subject to the constrains $x_1 \le 4, x_2 \le 6, 3x_1 + 2x_2 \le 18$
and $x_1, x_2 \ge 0$.

b) State the "Bellman's principle of optimality".

8.a) Write the practical applications of simulation.

b) A management wants of judge whether a project X is worth taking up or not. The data with regard to this project (having 10 years' life) is given below:

year	1	2	3	4	5	6	7	8	9	10
Net benefits (Rs)	7000	9800	10800	11100	9400	7600	5700	4000	2000	2000

If the initial outlay on the project is Rs.40,000/- with a salvage value of Rs.10,000/-, find out the Net present value of the project, given the opportunity cost of investment as 10%.

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