Code :9F00205

MCA II Semester Supplementary Examinations, January 2011
OPERATIONS RESEARCH
(For students admitted in 2009-2010 only)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions
All questions carry equal marks
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1. (a) Discuss the significance and scope of OR in modern management.
   (b) Maximize $Z = 2x_1 + x_2$,
   Subject to $x_1 + 2x_2 \leq 10$,
   $x_1 + x_2 \leq 6$,
   $x_1 - x_2 \leq 2$,
   $x_1 - 2x_2 \leq 1$,
   $x_1, x_2 \geq 0$.

2. Consider the problem
   Maximize $Z = 5x_1 + 8x_2$,
   Subject to $x_1 - x_2 \leq 2$,
   $x_1 - 2x_2 \geq 0$,
   $-x_1 + 4x_2 \leq 1$,
   $x_1, x_2 \geq 0$.

   What is the dual of the above problem? Find the solution of the primal problem by solving its dual.

3. (a) Describe the traveling salesman problem.
   (b) Find the basic feasible solution of the following transportation problem by north-west corner rule. Also find the optimal transportation plan.

	1	2	3	4	5	Available
A	4	3	1	2	6	80
B	5	2	3	4	5	60
C	3	5	6	3	2	40
D	2	4	4	5	3	20
Required	60	60	30	40	10	

4. (a) State the assumptions made in sequencing.
   (b) We have five jobs, each of which must go through the two machines A and B in the order AB. Processing times are given in the table below.

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

   Determine a sequence for the five jobs that will minimize the elapsed time T.

5. (a) What is group replacement?
   (b) A scooter costs Rs. 6,000 when new. The running cost and salvage value (Sale price) at the end of the year is given in table. If the interest rate is 10% per year and running costs are assumed to have occurred at mid year, find when the scooter should be replaced.

Year	1	2	3	4	5	6	7
Running cost (Rs.)	1,200	1,400	1,600	1,800	2,000	2,400	3,000
Salvage value (Rs.)	4,000	2,666	2,000	1,500	1,000	600	600

6. In a cargo loading problem, there are 4 items of different weights/units and different value/unit as given below.

Item (i)	Weight/unit (wi, kg/unit)	Value/unit (pi. Rs./unit)
1	1	1
2	3	5
3	4	7
4	6	11

The maximum cargo load is restricted to 17. How many units of each item be loaded to maximize the value?

7. (a) What is two person zero-sum game?

   (b) Consider the following pay off matrix for two firms. What is the best mixed strategy for both the firms and also find out the value of the game.

	No Advertising	Medium advertising	Large advertising
No advertising	60	50	40
Medium advertising	70	70	50
Large advertising	80	60	75

8. A dealer supplies you the following information with regard to a product dealt-in by him:
   Annual demand : 10,000 units
   Ordering cost : Rs. 10 per order
   Inventory carry cost: 20% of value of inventory per year
   Price : Rs. 20 per unit.
   The dealer is considering the possibility of allowing some back-order (stock-out) to occur. He has estimated that the annual cost of back-ordering will be 25% of the value of inventory.

   (a) What should be the optimum number of units of the product he should buy in one lot?

   (b) What quantity of the product should be allowed to be back-ordered, if any?

   (c) What would be the maximum quantity of inventory at any time of the year?

   (d) Would you recommend allowing back-ordering? If so, what would be the annual cost saving by adopting the policy of back-ordering?

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