Code: R7410301

$$\boxed{R7}$$

IV B.Tech I Semester (R07) Supplementary Examinations, May 2012
OPERATIONS RESEARCH
(Mechanical Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE questions
All questions carry equal marks
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1. (a) Define and explain the following terms used in linear programming.
        (i) Objective functions   (ii) Constraints
        (iii) Feasible solutions   (iv) Optimums solutions

    (b) Solve the following problem by simplex method
            Minimize $Z = x_1 - 3x_2 + 2x_3$
        Subject to constraints $3x_1 - x_2 + 3x_3 \le 7$
                            $-2x_1 + 4x_2 \le 12$
                            $-4x_1 + 3x_2 + 8x_3 \le 10$
                            $x_1, x_2, x_3 \ge 0$

2. (a) Explain Vogel's approximation method of solving a transportations problem

    (b) There are fire jobs, each of which must go through machines A, B and C in the order ABC process times are given in table.

Job	Processing times		
	A	B	C
1	8	5	4
2	10	6	9
3	6	2	8
4	7	3	6
5	11	4	5

    Determine a sequence for five jobs that will minimize the elapsed tone. Also final out the idle times of A, B and C machines.

3. (a) Write short notes as group replacement policy.

    (b) A form pays Rs. 10000/- for its equipments their operating and maintenance cost are about Rs. 2500/- per year for the first two years and theirs go up by approximately Rs. 1500/- per year. When such equipment be replaced the discount rate is 10% per year.

4. (a) Explain with suitable example maximum and minimax principle used is game theory.

    (b) Two companies are competating for the same product. Their differ at strategies are given in the following pay off matrix.

		Company A		
		a_1	a_2	a_3
Company B	b1	4	-1	0
	b2	-1	4	2

    What are the best strategies for both companies? Find the value of the game.

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5. (a) Explain the meaning of a queue with suitable examples.

(b) A self-service store employs an cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assume Poisson distribution for arrival rate and exponential distribution for service rate, find.
(i) Average number of customers in the systems
(ii) Average number of customers in the queue.
(iii) Average time a customer spends in the systems.
(iv) Average time a customer waits before being served.

6. (a) The annual demand for an automobile component nut is 36,000 units. The carrying cost is Rs. 0.5 per unit per year. The ordinary cost is Rs.25/- per order and the shortage cost is Rs. 15 per unit per year. Find the optimal values of :
(i) Economic order quantity　　　　　(ii) Maximum inventory
(iii) Cycle time　　　　　　　　　　(iv) No. of orders.

(b) The demand for an item is 16000 units per year. Its products rate is 900 units per month. The carrying cost is Rs.400 per unit per year and the set up cost is Rs.3000/- per setup. The penalty cost is Rs.1000/- per unit per year. Find out:
(i) Economic order quantity　　　　　(ii) Number of orders per year
(iii) Time between two consecutive orders.

7. (a) Define dynamic programming problem. List and explain the technologies of dynamic programming problem. What are the applications areas of dynamic programming?
(b) Write short notes on decision tree and Bellman's principle of optimality.

8. (a) Explain the importance of simulation in optimization.
(b) How do you apply simulation technique to an inventory problem?

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