

Roll No.

Total No. of Pages : 02

Total No. of Questions : 07

**BCA (Sem.-5)**  
**OPERATIONS RESEARCH**  
Subject Code : BC-504  
Paper ID : [B0222]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

**SECTION-A**

1. Answer briefly :

- a) Define Unbalanced Transportation Problem.
- b) Write any three limitations of OR.
- c) Define convex set.
- d) What is basic feasible solution?
- e) What is degeneracy in transportation problem? How it may be removed?
- f) What do you understand by decision making under risk?
- g) Explain the uses of integer Programming.
- h) What is the relationship between Primal and Dual?
- i) What are the assumptions in the transportation Problem?
- j) What is the condition to check the optimality for a minimization Problem?

**SECTION-B**

2. Explain in detail various phases in the solution of an optimization problem.

3. Find the dual of given LP problem, solve the dual and interpret the result of the solution :

$$\text{s.t. } 4x + 40y \geq 160$$

$$3x + 10y \geq 60$$

$$4x + 5y \geq 40$$

$$x, y \geq 0$$

4. Solve the following LPP by simplex method :

$$\text{Maximize } Z = 3x_1 + 2x_2$$

$$\text{s.t. } x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

5. Find the initial solution to the following transportation problem :

		Destination					
		D1	D2	D3	D4	D5	
Origin	O1	7	6	4	5	9	40
	O2	8	5	6	7	8	30
	O3	6	8	9	6	5	20
	O4	5	2	7	8	6	10
		30	30	15	20	5	
		Demand					

6. A farmer has to plant two kinds of trees P and Q in a land of 4000 sq m area. Each P tree requires at least 25 sq m and Q tree requires at least 40 sq. m. of land. The annual water requirement of P trees is 30 units and of Q tree is 15 units per tree, while at most 3000 units of water is available. It is also estimated that the ratio of number of Q trees to the number of P trees should not be less than  $\frac{6}{19}$  and should not be more than  $\frac{17}{8}$ . The return per tree from P is expected to be one and a half times as much as Q tree. Formulate the problem LP model.
7. What is integer Programming? Explain whether an Integer Programming Problem can be solved by rounding off the corresponding Simplex Solution.