Roll No. **Total No. of Pages : 03**

Total No. of Questions : 07

BCA (2007 to 2010 Batch) (Sem.–5th)

OPERATION RESEARCH

Subject Code : BC-504

Paper ID : [B0222]

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION 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 has to attempt any FOUR questions.**

SECTION-A

1. Write briefly :

ue of objective function of the following LPP by inspection of its dual.

$$\text{Minimize } Z = 2x_1 + x_2 + 3x_3$$

$$\text{s.t. } x_1 - x_2 + x_3 \geq 6,$$

$$x_1, x_2, x_3 \geq 0.$$

(b) What is the main difference between simplex method and dual simplex method?

(c) Does every transportation problem has a feasible solution? Justify your answer.

(d) What is degeneracy in transportation problem.

(e) Find all basic solutions of system :

$$4x_1 - x_2 + x_3 \leq 1$$

$$2x_1 + x_3 \geq 6;$$

$$x_1, x_2, x_3 \geq 0.$$

(f) Write the mathematical formulation (model) of an Assignment Problem.

(g) Is set S = $\{(x, 0) : x \in$ Rational Numbers$\}$ convex ? Justify your answer.

(h) While solving LPP,

$$\text{Maximize } Z = CX$$

$$\text{st. } AX = b,\ x \geq 0;$$

What indicates "no feasible solution."

(i) Write advantages of Dynamic programming.

(j) Write three limitations of Operation Research.

SECTION-B

2. Solve the simultaneous equations using simplex method.

$$x_1 + 2x_2 - 3x_3 = 1,$$

$$2x_1 - x_2 + x_3 = 4,$$

$$x + 2x - x = 6,$$

$$x_1, x_2, x_3 \geq 0.$$

3. Solve the following LPP using Big-M method :

$$\text{Maximize } Z = 4x_1 + 5x_2 + 2x_3 \text{ s.t.}$$

$$2x_1 + x_2 + x_3 \geq 10$$

$$x_1 + 3x_2 + x_3 \leq 12$$

$$x_1 + x_2 + x_3 = 6;$$

$$x_1, x_2, x_3 \geq 0$$

4. The demand pattern of certain bolt made in a factory is as follows :

No. of bolts demanded	0	1	2	3	4	5
Probability	0.05	0.10	0.25	0.60	0.20	0.10

If the manufacturing cost is Rs. 3 per unit and selling price is Rs. 5 per unit, how many bolts should factory make to maximise his profit ? Use Decision Analysis to solve this problem.