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Total No. of Pages : 02

Total No. of Questions : 09

MCA (2012 & Onward) (Sem.-3)
COMPUTER BASED OPTIMIZATION TECHNIQUES

Subject Code : MCA-302

Paper ID : [B1158]

Time : 3 Hrs.

Max. Marks :100

INSTRUCTIONS TO CANDIDATES :

1. **SECTIONS-A, B, C & D** contains **TWO** questions each carrying **TWENTY** marks each and students has to attempt any **ONE** question from each **SECTION**.
2. **SECTION-E** is **COMPULSORY** consisting of **TEN** questions carrying **TWENTY** marks in all.
3. Use of non-programmable **scientific calculator** is allowed.

SECTION-A

1. State the different types of models used in operations research. Explain briefly the general methods for solving these operations research models.

2. Using simplex method solve the L.P. problem :

Minimize $Z = 4x_1 + 8x_2 + 3x_3$, subject to :

$$x_1 + x_2 \geq 2, 2x_1 + x_3 \geq 5, x_1, x_2, x_3 \geq 0.$$

SECTION-B

3. Use duality to solve the following L.P.P. :

Maximize $Z = 2x_1 + x_2$ subject to the constraints :

$$x_1 + 2x_2 \leq 10, x_1 + x_2 \leq 6, x_1 - x_2 \leq 2, x_1 - 2x_2 \leq 1; x_1, x_2 \geq 0.$$

4. Explain N-W corner method with example.

SECTION-C

5. (a) From a bag containing 10 black and 05 white balls, a ball is drawn at random. What is the probability that it is white?

(b) Divide a positive quantity in such a way that their product is maximum.

6. Use dynamic programming to find the value of maximum $Z = y_1 \cdot y_2 \cdot y_3$

subject to the constraints : $y_1 + y_2 + y_3 = 5, y_1, y_2, y_3 \geq 0$.

SECTION D

7. Use branch and bound method to solve the following integer L.P.P. :

Maximize $Z = x_1 + 2x_2$ subject to the constraints :

$$x_1 + 2x_2 \leq 12, 4x_1 + 3x_2 \leq 14 ; x_1, x_2 \geq 0, \text{ and are integers.}$$

8. Find the optimum integer solution to the following L.P.P :

Maximize $Z = x_1 + 2x_2$ subject to the constraints :

$$x_1 + x_2 \leq 7, 2x_1 \leq 11, 2x_2 \leq 7 ; x_1, x_2 \geq 0, \text{ and are integers.}$$

SECTION E

9. **Write briefly :**

- a. *"O.R. is no more than a quantitative analysis of a problem"*. Comment.
- b. Explain the term Optimum Solution.
- c. Explain the meaning of the terms bounded and unbounded solutions of an L.P.P.
- d. Explain in brief the term artificial variables.
- e. Describe the transportation table.
- f. What is degeneracy in Transportation Problem?
- g. Give a mathematical formulation of the Assignment Problem.
- h. Define Probability.
- i. Define Normal Distribution.
- j. What do you mean by algebra of events? Explain.