MCA (2012 & onwards)   (Sem.–3)
COMPUTER BASED OPTIMIZATION TECHNIQUES
Subject Code : MCA-302
Paper ID : [B1158]

Time : 3 Hrs.   **Max. Marks : 100**

INSTRUCTION TO CANDIDATES :
 1. **SECTIONS-A, B, C & D contains TWO questions each carrying TEN 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. a) Define Operations Research (OR) and explain its main characteristic features. Also give examples to highlight the scope of Operations research in business and industry.

   b) For the following linear programming problem:

      i)   Identify the variables you will use and say precisely what each one represents,

      ii) List all the constraints on the variables and say where each is from,

      iii) Identify the objective function.

   Solve the problem graphically.

   A Stick Company makes two kinds of sticks. Type A sticks require 2 labor-hours for cutting, 1 labor-hour for stringing, and 2 labor-hours for finishing and are sold for a profit of Rs.8. Type B sticks require 1 labor-hour for cutting, 3 labor-hours for stringing, and 2 labor-hours for finishing and are sold for a profit of Rs.10. Each day the company has available 120 labor-hours for cutting, 150 labor-hours for stringing, and 140 labor-hours for finishing. How many sticks of each kind should be manufactured each day to maximize profits?

2. Apply the principle of duality to solve the following L.P.P. :

Maximize $z = 3x_1 - 2x_2$

Subject to the constraints :

$x_1 + x_2 \leq 5$

$x_2 \leq 4$

$1 \leq x_2 \leq 6$

$x_1, x_2 \geq 0$

SECTION-B

3. A company has a team of four salesmen and there are four districts where the company wants to start its business. The following is the profit per day in rupees for each salesman in each district:

Districts

		D1	D2	D3	D4
Salesmen	A	16	10	14	11
	B	14	11	15	15
C 15 15 13 12					
	D	13	12	14	15

Find the assignment of salesmen to various districts which will yield maximum profit, using the 'Hungarian Assignment Method'.

4. A company has three plants at locations A, B and C, which supply to warehouses located at D, E, F, G, and H. Monthly plant capacities are 800, 500 and 900 units respectively. Monthly warehouse requirements are 400, 400, 500, 400 and 800 units respectively. Unit representation costs (in Rs) are given below:

		To				
		D	E	F	G	H
	A	5	8	6	6	3
From	B	4	7	7	6	6
	C	8	4	6	6	4

Determine an optimum distribution for the company in order to minimize the total transportation cost.