Bengal Engineering and Science University, Shibpur

BE (CE/ME/MET/MIN/CST/IT) 8th Semester Final Examination, 2013

**Method of Optimization Techniques and Operations Research
M-803 (Elective)**

Time: 2 hours   Full Marks: 35

Answer any **FIVE** questions: 7×5

1. Solve the following L. P. P by Big-M method:

$$\text{Maximize } z = 3x_1 + 4x_2 + 5x_3$$
$$\text{Subject to} \quad 3x_1 + 5x_2 + 4x_3 = 9$$
$$-3x_1 + 6x_2 + 5x_3 = 8$$
$$x_1, x_2, x_3 \geq 0.$$

2. (a) Show that dual of dual is primal.

   (b) Formulate the dual of the following L. P. P:

$$\text{Maximize } z = 3x_1 + 5x_2 + 4x_3$$
$$\text{Subject to} \quad 4x_1 - 5x_2 + 6x_3 = 9$$
$$2x_1 + 5x_2 \quad \leq 2$$
$$2x_2 - 7x_3 \geq 5$$
$$x_1, x_2 \geq 0 \text{ and } x_3 \text{ is unrestricted in sign.}$$

3. Find the dual of the following problem and then solve it:

$$\text{Maximize } z = 3x_1 + 4x_2$$
$$\text{Subject to} \quad 3x_1 - 4x_2 \leq 6$$
$$2x_1 + 3x_2 \geq 5$$
$$3x_1 - 4x_2 \leq 5$$
$$x_1, x_2 \geq 0$$

4. Solve the following problem by dual Simplex method:

$$\text{Minimize } z = 2x_1 + 4x_2 + 5x_3$$
$$\text{Subject to } 3x_1 + 2x_2 + 5x_3 \geq 7$$
$$2x_1 + 4x_2 - 5x_3 \geq 8$$
$$x_1, x_2, x_3 \geq 0$$

5. Find the optimal assignments for the assignment problem with the following cost matrix:

	I	II	III	IV	V
A	17	13	19	11	17
B	13	14	17	12	14
C	18	11	18	19	12
D	17	13	13	15	19
E	12	16	17	16	17

6. Solve the travelling salesman problem given by the following matrix:

	A	B	C	D	E
A	-	7	6	4	3
B	6	-	7	2	4
C	7	8	-	9	7
D	5	3	8	-	6
E	6	5	4	7	-

7. Use dynamic programming to show that $\sum_{i=1}^{n} p_i \log p_i$, subject to $\sum_{i=1}^{n} p_i = 1$, is minimum, when $p_1 = p_2 = p_3 = \text{.......} = p_n = 1/n$.