Sixth Semester B.E. Degree Examination, June/July 2013
Operations Research

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1. a. Define the following terms:
   i) Objective function   ii) Constraints   iii) Optimal solution   **(06 Marks)**

   b. A firm manufacture three products A, B and C. The profits are ₹3, ₹2 and ₹4 respectively. The firm has two machines and required processing time in minutes for each machine on each product is given below:

		Product	
Machine	A	B	C
D	4	3	5
E	2	2	4

   Machine D and E have 2000 and 2500 machine minutes respectively. The firm must manufacture 100 A's, 200 B's and 50 C's but not more than 150 A's. Setup an LPP to maximize the profit.   **(07 Marks)**

   c. Solve the following LPP using graphical method.
   Minimize $Z = 20x_1 + 10x_2$
   Subject to the constraints, $x_1 + 2x_2 \le 40$
   $$3x_1 + x_2 \ge 30$$
   $$4x_1 + 3x_2 \ge 60 \quad \text{and} \quad x_1, x_2 \ge 0$$ **(07 Marks)**

2. a. Explain the concept of proportionality, additivity, divisibility and certainty with respect to linear programming.   **(06 Marks)**

   b. Discuss about key solution concepts used in simplex method.   **(06 Marks)**

   c. Solve the following LPP using simplex method.
   Maximize $Z = 4x_1 + 10x_2$
   Subject to the constraints, $2x_1 + x_2 \le 50,$ $2x_1 + 5x_2 \le 100$
   $$2x_1 + 3x_2 \le 90, \quad\quad x_1, x_2 \ge 0$$ **(08 Marks)**

3. a. Using Big-M method, solve the following problem:
   Minimize $Z = 4x_1 + 3x_2$
   Subject to the constraints, $2x_1 + x_2 \ge 10,$ $-3x_1 + 2x_2 \le 6$
   $$x_1 + x_2 \ge 6, \quad\quad x_1, x_2 \ge 0$$ **(12 Marks)**

   b. What is meant by post optimality analysis? Discuss the task, purpose and the techniques used in post optimality analysis.   **(08 Marks)**

4. a. Using revised simplex method solve the following problem:
   Maximize $Z = 2x_1 + x_2$
   Subject to the constraints, $3x_1 + 4x_2 \le 6,$ $6x_1 + x_2 \le 3,$ $x_1, x_2 \ge 0$ **(10 Marks)**

   b. Explain the steps of converting a primal problem into its dual considering a general case. Summarize the primal and dual relationships.   **(10 Marks)**

PART – B

5 a. Discuss about the role of duality theory in sensitivity analysis.   **(08 Marks)**

    b. Solve the following problem using dual simplex method:

Maximize $Z = -3x_1 - 2x_2$

Subject to the constraints, $x_1 + x_2 \geq 1$, $x_1 + x_2 \leq 7$,

$x_1 + 2x_2 \geq 10$, $x_2 \leq 3$, $x_1, x_2 \geq 0$ **(12 Marks)**

6 a. Solve the following transportation problem.   **(12 Marks)**

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

    b. Solve the following assignment problem to minimize the cost.   **(08 Marks)**

	V	W	X	Y	Z
A	3	5	10	15	8
B	4	7	15	18	8
C	8	12	20	20	12
D	5	5	8	10	6
E	10	10	15	25	10

7 a. What are mixed strategies? How a game with mixed strategies handled? Explain. **(10 Marks)**

    b. How a decision tree is constructed and used for performing problem analysis. **(10 Marks)**

8 a. Give the outline of basic simulated annealing algorithm. What are the details required about a problem before applying this algorithm? **(10 Marks)**

    b. Write a detailed note on genetic algorithm and its application for solving traveling salesman problem. **(10 Marks)**

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