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10CS/IS661

Sixth Semester B.E. Degree Examination, June / July 2014
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 operations research. Explain the six phases of OR study. **(10 Marks)**

b. A firm manufactures two types of products A & B and sells them at a profit of Rs.2 on type A and Rs.3 on type B. Each product is processed on two machines G and H. Type A requires one minute of processing time on G and two minutes on H. Type B requires one minute on G and one minute on H. The machine G is available for not more than 6 hours 40 minutes while H is available for 10 hours during any working day. How many items of type A and type B should be produced so that the total profit is maximum?

i) Use mathematical formulation to the LPP.

ii) Use graphical method to solve the problem. **(10 Marks)**

2 a. Discuss the various aspects of the concept tie breaking in simplex method. **(10 Marks)**

b. Solve the following LPP by simplex method.

Maximize $z = 5x_1 + 3x_2$

Subjected to $3x_1 + 5x_2 \le 15$

$5x_1 + 2x_2 \le 10$

$x_1, x_2 \ge 0$ **(10 Marks)**

3 a. Solve the following LPP using two phase method:

Minimize $z = 4x_1 + x_2$

Subjected to $3x_1 + x_2 = 3$

$4x_1 + 3x_2 \ge 6$

$x_1 + 2x_2 \le 4$

$x_1, x_2 \ge 0$ **(10 Marks)**

b. Solve the following LPP by Big-M method:

Minimize $z = +2x_1 + x_2$

Subjected to the constraints

$x_1 + 2x_2 \le 4$

$4x_1 + 3x_2 \ge 6$

$3x_1 + x_2 = 3$

$x_1, x_2 \ge 0$ **(10 Marks)**

4 a. Use Revised simplex method to solve LPP,

Maximize $z = x_1 + 2x_2$

Subject to $x_1 + x_2 \le 3$

$x_1 + 2x_2 \le 5$

$3x_1 + x_2 \le 6,$

$x_1, x_2 \ge 0$ **(12 Marks)**

4 b. Explain the following:
i) The essence of duality theory.
ii) Primal dual relationship. **(08 Marks)**

PART – B

5 a. Use dual simplex method to solve LPP,
Minimize $z = 2x_1 + x_2$
Subjected to the constraints

$$3x_1 + x_2 \geq 3$$
$$4x_1 + 3x_2 \geq 6$$
$$x_1 + 2x_2 \leq 3$$
$$x_1, x_2 \geq 0$$ **(10 Marks)**

b. Briefly discuss about sensitivity analysis. **(10 Marks)**

6 a. Explain various steps involved in Hungarian algorithm with an example. **(10 Marks)**

b. A product is produced by 4 factories F_1, F_2, F_3 and F_4. Their unit production costs are Rs 2, 3, 1 and 5 respectively. Production capacity of the factories are 50, 70, 30 and 50 units respectively. The product is supplied to 4 stores S_1, S_2, S_3 and S_4. The requirements of which are 25, 35, 105 and 20 respectively. Unit costs of transportation are given below.

Factories \ Stores	S_1	S_2	S_3	S_4
F_1	2	4	6	11
F_2	10	8	7	5
F_3	13	3	9	12
F_4	4	6	8	3

Find the transportation plan such that the total production and transportation cost is minimum. **(10 Marks)**

7 a. Two players A and B are playing a game of tossing a coin simultaneously: Player A wins 1 unit of value when there are two heads, wins nothing when there are two tails and looses $\frac{1}{2}$ unit of value when there is one head and one tail. Determine the pay off matrix, the best strategies for each player and the value of the game. **(10 Marks)**

b. Define the following with reference to game theory, with an example:
i) Pure strategy ii) Mixed strategy iii) Saddle point
iv) Pay off matrix v) Two person-zero-sum-game **(10 Marks)**

8 Explain briefly the following:
a. Tabu search algorithm.
b. Genetic algorithm.
c. Metaheuristics.
d. Simulated annealing algorithm. **(20 Marks)**

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