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10CS/IS661

Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015
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. What is operations research? Briefly explain the various phases of operations research study. **(08 Marks)**

b. A person requires minimum 10, 12 and 12 units of chemicals for A, B and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B and C respectively per jar. A dry product contains 1, 2 and 4 units of A, B and C per jar. If the liquid product sells for Rs.3 per jar and dry product sells for Rs.2 per jar, how many of each should be purchased in order to minimize the cost and meet requirement. **(06 Marks)**

c. Use graphical method to solve the following :

$$\text{Max } z = 100x_1 + 40x_2$$

Subjected to $5x_1 + 2x_2 \le 1000$

$3x_1 + 2x_2 \le 900$

$x_1 + 2x_2 \le 500$

$x_1, x_2 \ge 0$ **(06 Marks)**

2 a. Solve the following LPP by using simplex method:

$$\text{Max } z = 3x_1 + 2x_2 + 5x_3$$

Subjected to $x_1 + 2x_2 + x_3 \le 430$

$3x_1 + 2x_2 \le 460$

$x_1 + 4x_2 \le 420$

$x_1, x_2, x_3 \ge 0$ **(10 Marks)**

b. Explain the steps involved in setting up of a simplex method. **(10 Marks)**

3 a. Solve the following LPP by using Big M method:

$$\text{Max } z = -2x_1 - x_2$$

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 using two-phase method:

$$\text{Max } z = 5x_1 + 8x_2$$

Subjected to $3x_1 + 2x_2 \ge 3$

$x_1 + 4x_2 \ge 4$

$x_1 + x_2 \le 5$

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

4 a. Explain the steps involved in revised simplex method. **(10 Marks)**

b. Use revised simplex method to solve the following LPP:

Min $z = x_1 + x_2$

Subjected to $x_1 + 2x_2 \geq 7$

$4x_1 + x_2 \geq 6$

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

PART – B

5 a. Explain the role of duality theory in sensitivity analysis. **(10 Marks)**

b. Write the dual of the following LPP:

i) Max $z = 3x_1 - x_2 + x_3$

Subjected to $4x_1 - x_2 \leq 8$

$8x_1 + x_2 + 3x_3 \geq 12$

$5x_1 - 6x_3 \leq 13$

$x_1, x_2, x_3 \geq 0$

ii) Min $z = 2x_2 + 8x_3$

Subjected to $3x_1 + x_2 \geq 12$

$2x_1 + x_2 + 6x_3 \leq 6$

$5x_1 - x_2 + 3x_3 = 4$

$x_1, x_2, x_3 \geq 0$ **(10 Marks)**

6 a. Find the initial solution to the following transportation problem using VAM: **(10 Marks)**

		Destination				
		D_1	D_2	D_3	D_4	Supply
Factory	F_1	3	3	4	1	100
	F_2	4	2	4	2	125
	F_3	1	5	3	2	75
	Demand	120	80	75	25	300

b. Explain Hungarian algorithm with example. **(10 Marks)**

7 a. Define the following with respect to games:

i) Pay off ii) Strategy iii) Saddle point. **(03 Marks)**

b. Solve the following game by graphical method:

$$\text{Player A} \begin{bmatrix} 3 & -3 & 4 \\ -1 & 1 & -3 \end{bmatrix} \quad \text{Player B}$$ **(07 Marks)**

c. Solve the following game by dominance property:

$$\text{Player A} \begin{bmatrix} 2 & -2 & 4 & 1 \\ 6 & 1 & 12 & 3 \\ -3 & 2 & 0 & 6 \\ 2 & -3 & 7 & 7 \end{bmatrix} \quad \text{Player B}$$ **(10 Marks)**

8 Write short notes on:

a. Genetic algorithm.

b. Metaheuristics.

c. Tabu search algorithm.

d. Simulated annealing algorithm. **(20 Marks)**

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