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10CS/IS661

# Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
## 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 OR. Explain the nature and impact of OR. **(10 Marks)**

b. Old hens can be bought at Rs. 2 each but young ones at Rs. 5 each. The old hens lay 3 eggs per week and the young ones lay 5 eggs per week, each egg being worth 30 paise. A hen (young/old) costs Rs. 1 per week to feed. You have only Rs. 80 to spend for buying hens. How many of each kind should you buy to give a profit of more than Rs. 6 per week, assuming that you cannot house more than 20 hens. Write a mathematical model of the problem. **(10 Marks)**

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

b. Use simplex method to solve the following LPP :

Maximize $Z = 4x_1 + 10x_2$

Subject to constraints : $2x_1 + x_2 \leq 50$

$2x_1 + 5x_2 \leq 100$

$2x_1 + 3x_2 \leq 90$

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

3 a. Explain the post optimality analysis in simplex method. **(10 Marks)**

b. Solve the following LPP by using Big M Method.

Maximize $Z = 6x_1 + 4x_2$

Subject to constraints $2x_1 + 3x_2 \leq 30$

$3x_1 + 2x_2 \leq 24$

$x_1 + x_2 \geq 3$

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

4 a. Explain the economic interpretation of duality with an example. **(10 Marks)**

b. Solve the following LPP by using revises simplex method.

Maximize $Z = x_1 + 2x_2$

Subject to $x_1 + x_2 \leq 3$

$x_1 + 2x_2 \leq 5$

$3x_1 + x_2 \leq 6$

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

## PART – B

5 a. Explain the essence of sensitivity analysis. **(05 Marks)**

b. Solve the following LPP by using dual simplex method.

Maximize $Z = 2x_1 + x_2$

Subject to the constrains

$$x_1 + 2x_2 \leq 10$$
$$x_1 + x_2 \leq 6$$
$$x_1 - x_2 \leq 2$$
$$x_1 - 2x_2 \leq 1$$
$$\text{and } x_1, x_2 \geq 0$$

**(15 Marks)**

6 a. Explain Hungarian Algorithm to solve assignment problem. **(10 Marks)**

b. Solve the following Transportation problem.

i) Use minimum cost method for IBFS

ii) Use u-v method for obtaining optimum solution

| | | | | Supply points |
|---|---|---|---|---|
| 4 | 6 | 8 | 8 | 40 |
| 6 | 8 | 6 | 7 | 60 |
| 5 | 7 | 6 | 8 | 50 |
| Demand points 20 | 30 | 50 | 50 | |

**(10 Marks)**

7 a. Explain the following terms :

i) Pure strategy

ii) Mixed strategy

iii) Saddle point

iv) Payoff matrix

v) Two – person zero sum game. **(10 Marks)**

b. Obtain the optimal strategies for both persons and the value of the game for zero – sum two – person game whose payoff matrix is as follows :

$$\begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 6 \\ 4 & 1 \\ 2 & 2 \\ -5 & 0 \end{bmatrix}$$

**(10 Marks)**

8 Write a short notes on :

a. Nature of Metaheuristic

b. Tabu Search algorithm

c. Genetic algorithm

d. Simulated Annealing. **(20 Marks)**

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