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06CS/IS661

Sixth Semester B.E. Degree Examination, June 2012
Operation Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART - A

1 a. The following table gives the data for a problem. Formulate the problem as a LP model. **(06 Marks)**

Raw Materials	Requirement / Unit			Availability
	I	II	III	
A	2	3	5	4000
B	4	2	7	6000
Min Demand	200	200	150	
Profit / Unit	30	20	50	

b. Define i) Feasible solution ii) Feasible region iii) Optimal solution iv) Degeneracy **(04 Marks)**

c. Using graphical method, solve the LPP

Maximize $Z = 5x_1 + 4x_2$

Subject to $6x_1 + 4x_2 \leq 24$

$x_1 + 2x_2 \leq 6$

$-x_1 + x_2 \leq 1$

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

2 a. Define and illustrate with examples, slack and surplus variables. **(04 Marks)**

b. Find all the basic solutions to the following system of equation identifying in each case the basic and non – basic variables.

$2x_1 + x_2 + 4x_3 = 11$; $3x_1 + x_2 + 5x_3 = 14.$ **(06 Marks)**

c. Using simplex method, solve the following LPP.

Maximize $Z = 4x_1 + 3x_2 + 6x_3$

Subject to $2x_1 + 3x_2 + 2x_3 \leq 440$

$4x_1 + 3x_3 \leq 470$

$2x_1 + 5x_2 \leq 430$

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

3 a. Using Big – M method, solve the following

Minimize $Z = 3x_1 + 2x_2 + x_3$

Subject to $x_1 + x_2 = 7$

$2x_1 + x_2 + x_3 \geq 10$

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

b. Using Two phase method, solve the following LPP

Maximize $Z = 7.5x_1 - 3x_2$

Subject to $3x_1 - x_2 - x_3 \geq 3$

$x_1 - x_2 + x_3 \geq 2$

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

4 a. Explain the basic idea behind primal – dual relationship. **(04 Marks)**

b. Obtain the dual of the following primal problem

Minimize $Z = 3x_1 - 2x_2 - x_3$

Subject to $2x_1 + 3x_2 + x_3 \leq 5$

$4x_1 - 2x_2 \geq 9$

$-8x_1 + 4x_2 + 3x_3 = 8.$ **(06 Marks)**

c. Use revised simplex method to solve the following LPP

Maximize $Z = x_1 + x_2$

Subject to $3x_1 + 2x_2 \leq 6$

$x_1 + 4x_2 \leq 4$

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

PART - B

5 a. Solve the following LPP using dual simplex method

Minimize $Z = 2x_1 + x_2$

Subject to $3x_1 + x_2 \geq 3$

$4x_1 + 3x_2 \geq 6$

$x_1 + 2x_2 \geq 3$

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

b. Write the working procedure of dual simplex method. **(05 Marks)**

c. Explain parametric integer linear programming and its importance. **(05 Marks)**

6 a. Find the initial basic feasible solution using North West corner and Vogel's approximation methods for the following transportation problem. **(10 Marks)**

19	30	50	10	7
70	30	40	60	9
40	8	70	20	18
5	8	7	14	

b. Write the procedure of Hungarian method. **(05 Marks)**

c. Solve the assignment problem represented by the following matrix using column reduction.

	A	B	C	D
1	2	3	4	5
2	4	5	6	7
3	7	8	9	8
4	3	5	8	4

(05 Marks)

7 a. Solve the game whose pay off matrix is given below

	B_1	B_2	B_3	B_4
A_1	-5	2	0	7
A_2	5	6	4	8
A_3	4	0	2	-3

Give the value of game and strategies adopted by A and B. **(05 Marks)**

b. Find out the value of game, given the following pay off matrix **(05 Marks)**

	B_1	B_2
A_1	4	-4
A_2	-4	4

c. Solve the problem Q7(b), using graphical method. **(05 Marks)**

d. Find out the route of traveling sales person, given the following distances between cities.

	A	B	C	D	E
A	-	4	10	14	2
B	12	-	6	10	4
C	16	14	-	8	14
D	24	8	12	-	10
E	2	6	4	16	-

(05 Marks)

8 a. Explain in detail the minimum spanning tree with constraints. **(08 Marks)**

b. Explain genetic algorithm and simulate annealing algorithm. **(12 Marks)**

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