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06CS/IS661

Sixth Semester B.E. Degree Examination, Dec.2013/Jan.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. What is operation research? Mention six phases of an operation research study. **(05 Marks)**

b. A manufacturer produces three models I, II, III of certain product using raw materials A and B. The following table gives the data for the problem formulate the LP model:

Raw material	Requirement per unit			Availability
	I	II	III	
A	2	3	5	4000
B	4	2	7	6000
Min demand	200	200	150	-
Profit per unit (Rs.)	30	20	50	-

(05 Marks)

c. Define:
i) Feasible solution
ii) Feasible region
iii) Optimal solution
iv) Degeneracy
v) Infeasible solution. **(10 Marks)**

2 a. Define slack and surplus variables. **(04 Marks)**

b. Find all the basic solutions of 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. Solve the following LPP using simplex method in tabular form:
Maximize $Z = 5x_1 + 3x_2$
Subject to, $x_1 + x_2 \le 2$
$5x_1 + 2x_2 \le 10$
$3x_1 + 8x_2 \le 12$
$x_1, x_2 \ge 0$ **(10 Marks)**

3 a. Express the following LPP in canonical form
Maximize $Z = 2x_1 + 3x_2 + x_3$
Subject to, $4x_1 - 3x_2 + x_3 \le 6$
$x_1 + 5x_2 - 7x_3 \ge -4$
$x_1, x_2 \ge 0$ **(06 Marks)**

b. Explain the computational steps of Big-M method. **(04 Marks)**

c. Solve by Big-M method
Minimize $Z = 4x_1 + x_2$
Subject to, $3x_1 + x_2 = 3$
$4x_1 + 3x_2 \ge 6$
$x_1 + 3x_2 \le 3$
$x_1, x_2 \ge 0.$ **(10 Marks)**

4 a. Use two phase method to minimize
$5x_1 - 6x_2 - 7x_3$
Subject to, $x_1 + 5x_2 - 3x_3 \geq 15$
$5x_1 - 6x_2 + 10x_3 \leq 20$
$x_1 + x_2 + x_3 = 5$
$x_1, x_2, x_3 \geq 0$ **(10 Marks)**

b. Brief out the important characteristics of duality. **(04 Marks)**

c. Construct the dual of an LPP
Minimize $Z = 3x_1 - 2x_2 - x_3$
Subject to, $2x_1 + 3x_2 + x_3 \leq 15$
$4x_1 - 2x_2 \geq 9$
$-8x_1 + 4x_2 + 3x_3 = 8$
$x_1, x_2, x_3 \geq 0.$ **(06 Marks)**

PART – B

5 a. Solve by dual simplex method
Minimize $Z = 2x_1 + x_2$
Subject to, $3x_1 + x_2 \leq 3$
$4x_1 + 3x_2 \geq 6$
$x_1 + 2x_2 \geq 3$
$x_1, x_2 \geq 0$ **(12 Marks)**

b. Explain parametric integer linear programming and its significance. **(08 Marks)**

6 a. A dairy farm has 3 plants located at 3 different places and daily milk production of each plant is given as follows:

Plant	Production (in million ltrs)
1	6
2	1
3	10

Each day the firm must fulfill the needs of its 4 destination centres. Minimum requirement of each centre is as follows:

Centres	Requirement (million ltrs)
1	7
2	5
3	3
4	4

Cost of shipping 1 million ltr of milk from each plant of each centre is given in the below table

	1	2	3	4
1	2	3	11	7
2	1	0	6	1
3	5	8	15	9

Formulate the LP model. **(10 Marks)**

b. Solve the following transportation problem by North West corner rule and find the optimal solution: **(10 Marks)**

15	26	3	350
3	7	8	100
9	4	3	110
80	150	330	

7 a. Find the optimality assignment for the following matrix: **(10 Marks)**

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

b. Cable operator is planning to give cable network connections to six housing blocks shown below. The distances are given in hundreds of meters. Give optimum connection details. **(05 Marks)**

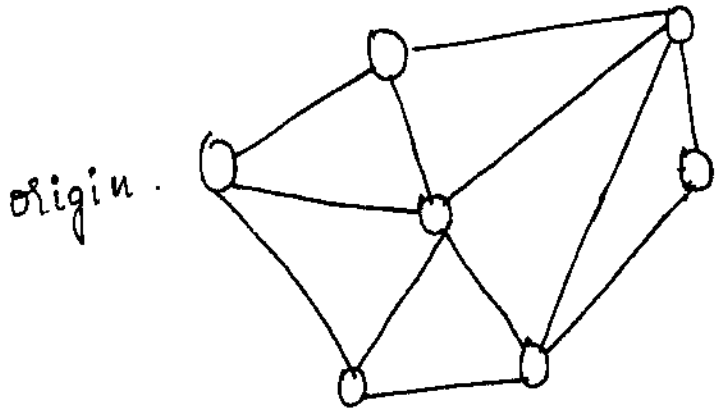

Fig.Q.7(b)

c. Solve the following game:

	B_1	B_2
A_1	-7	6
A_2	7	-4
A_3	-4	-2
A_4	8	-6

(05 Marks)

8 a. Explain the nature of meta heuristics. **(05 Marks)**

b. Write a note on solving a non-linear programming problem. Explain tabu search. **(10 Marks)**

c. Explain the outline of a basic genetic algorithm. **(05 Marks)**

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