Total No. of printed pages = 6

EE 131703

Roll No. of candidate | | | | | | | | | | |

2017

B.Tech. 7th Semester End-Term Examination

Electrical

OPERATIONS RESEARCH

Full Marks – 100 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *six* from the rest.

(10 × 1 = 10)

1. (a) Operations Research attempts to find the best and ———— solution to a problem.

   (i) Optimal

   (ii) Perfect

   (iii) Degenerate

   (iv) None of the above

   (b) The world 'Linear' means that the relationships are represented by ————.

   (i) Diagonal lines

   (ii) Curved lines

   (iii) Straight lines

   (iv) Slanting lines

[Turn over

(c) Graphical method can be applied to solve a LPP when there are only ———— variables.

(i) One

(ii) More than One

(iii) Two

(iv) Three

(d) In simplex method, we add ———— variables in the case of " = ".

(i) Slack Variables

(ii) Surplus Variables

(iii) Artificial Variables

(iv) None of the above

(e) Which variables are fictitious and cannot have any physical meaning?

(i) Optimal variables

(ii) Decision variables

(iii) Artificial variables

(iv) None of the above

(f) In a transportation problem a basic feasible solution in which the total number of non negative allocations is less than ———— is called degenerate basic feasible solution(Take 'm' as the no. of rows and 'n' as the no. of columns).

(g) Vogel's Method is used to find solutions for ———— Problems.

(h) A Cell Evaluation Matrix in minimization of transportation problems, having negative entries indicates that another optimal solution ———— (exists/does not exist).

(i) With the Transportation model, the initial solution can be generated in any fashion one chooses. The only restriction is that

(i) The rim conditions for supply and demand are satisfied

(ii) Solution must be optimal

(iii) One must use the North-West Corner Rule

(iv) The solution is not degenerative

(j) The purpose of a dummy source or a dummy destination in a Transportation Problem is to

(i) Make certain that the total cost doesn't exceed some specified figure

(ii) Obtain a balance between total supply and total demand

(iii) Prevent the solution from becoming degenerate

(iv) Provide a means of representing a dummy problem

2. (a) Describe some of the applications of Operations Research. (2)

(b) What are the different phases of Operations Research? (5)

(c) Differentiate between the Standard and Canonical forms of linear programming problem. (3)

(d) A person wants to decide the constituents of a diet which will fulfill his daily requirements of proteins, fats and carbohydrates at the minimum cost. The choice is to be made from four different types of food. The yields per unit of these foods are given in the following table. Formulate a linear programming model for the problem. (5)

Food type	Yield per unit			Cost per unit (Rs.)
	Proteins	Fats	Carbohydrates	
1	3	2	6	45
2	4	2	4	40
3	8	7	7	85
4	6	5	4	65
Minimum requirement	800	200	700	

3. (a) Define Operations Research. (2)

(b) Find graphically the minimum value of $Z = -x_1 + 2x_2$ (13)

Subject to $-x_1 + 3x_2 \le 10$

$x_1 + x_2 \le 6$

$x_1 - x_2 \le 2$

$x_1, x_2 \ge 0$

4. Solve by Simplex method the following linear programming problem : (15)

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

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

$4x_1 + 3x_3 \le 470$

$2x_1 + 5x_2 \le 430$

$x_1, x_2, x_3 \ge 0$

5. Solve the following LP problem : (15)

Miximize $Z = 3x_1 - x_2$

Subject to $2x_1 + x_2 \le 2$

$x_1 + 3x_2 \ge 3$

$x_2 \le 4$

$x_1, x_2 \ge 0$

6. Use the Two phase simplex method to find the optimal solution : (15)

Maximize $Z = 5x_1 - 4x_2 + 3x_3$

Subject to $2x_1 + x_2 - 6x_3 = 20$

$6x_1 + 5x_2 + 10x_3 \le 76$

$8x_1 - 3x_2 + 6x_3 \le 50$

$x_1, x_2, x_3 \ge 0$

7. Find the optimal solution to the following transportation problem in which the cells contain the transformation cost in Rupees. (15)

	W_1	W_2	W_3	W_4	W_5	Available
F1	7	6	4	5	9	40
F2	8	5	6	7	8	30
F3	6	8	9	6	5	20
F4	5	7	7	8	6	10
Required	30	30	15	20	5	100 Total

8. A company has one surplus truck in each of the cities A, B, C. D and E and one deficit truck in each of the cities 1, 2, 3, 4, 5 and 6. The distance between the cities in kilometers is shown in the matrix below. Find the assignment of trucks from cities in surplus to cities in deficit so that the total distance covered by the vehicles is minimum. (15)

	1	2	3	4	5	6
A	12	10	15	22	18	8
B	10	18	25	15	16	12
C	11	10	3	8	5	9
D	6	14	10	13	13	12
E	8	12	11	7	13	10

9. Consider the following unbalanced transportation problem :

	To			
From	1	2	3	Supply
1	5	1	7	10
2	6	4	6	80
3	3	2	5	15
Demand	75	20	50	

Since there is not enough supply, some of the demands at these destinations may not be satisfied. Suppose there are penalty costs for every unsatisfied demand unit which are given by 5, 3 and 2 for destination 1, 2 and 3 respectively. Find the optimal solution. (15)