

Total No. of printed pages = 4

**EE 131703 (NR)**

Roll No. of candidate

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28/2122 2021

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Avenue, Haldia, West Bengal,  
Pin: 721017

**B.Tech. 5<sup>th</sup> Semester End-Term Examination**

**EE**

**OPERATION RESEARCH**

**(New Regulation)**

Full Marks – 70

Time – Three hours

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

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

1. Answer the following (MCQ/ Fill in the blanks) : (10 × 1 = 10)
- (i) In operations research, the \_\_\_\_\_ are prepared for situations.
- (a) mathematical models  
(b) physical models diagrammatic  
(c) diagrammatic models  
(d) none of these
- (ii) Which of the following is not the phase of OR methodology?
- (a) Formulating a problem      (b) Constructing a model  
(c) Establishing controls      (d) Controlling the environment
- (iii) OR has characteristics that it is done by a team of
- (a) Scientists      (b) Mathematicians  
(c) Academics      (d) All of the above
- (iv) A solution can be extracted from a model either by
- (a) Conducting experiments on it  
(b) Mathematical analysis  
(c) Both (a) and (b)  
(d) Diversified Techniques

[Turn over



2. Solve graphically the following LPP (15)

$$\text{Maximize } Z = 3x + 2y$$

Subject to constraints

$$-2x + 3y \leq 9$$

$$3x - 2y \leq -20$$

$$x, y \geq 0.$$

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3. A company plans to assign 5 salesman to five different districts in which it operates. Estimates of sales revenue in thousand of rupee for each given salesman in different districts are given in the following table. What should be the placement of the salesman if the objective is to maximize the expected sales revenue? (15)

	District				
	D1	D2	D3	D4	D5
Supply S1	40	46	48	36	48
S2	48	32	36	29	44
S3	49	35	41	38	45
S4	30	46	49	44	44
S5	37	41	48	43	47

4. Solve the following LPP by using its Dual. (15)

$$\text{Maximize } Z = 5x_1 - 2x_2 + 3x_3$$

Subject to

$$2x_1 + 2x_2 - x_3 \geq 2$$

$$3x_1 - 4x_2 \leq 3$$

$$x_2 + 3x_3 \leq 5$$

$$x_1, x_2, x_3 \geq 0.$$

5. In the following transportation problem, if a unit from a source is not shipped to one of its destination, a storage cost at the rate of \$5, \$4 and \$3 for sources 1, 2 and 3 is incurred. Additionally all the supply at the source 2 must be shipped out to make room for a new product. Find the optimal solution. (15)

	1	2	3	Supply
A	1	2	1	20
B	0	4	5	40
C	2	3	3	30
Demand	30	20	20	

6. Write short notes on (any three)

(3 × 5 = 15)

- (a) Phases of Operation Research
- (b) Applications of Operation Research
- (c) Degeneracy in transportation problem
- (d) Hungarian Problem
- (e) Basic feasible solution.

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