

U.G. 6th Semester Examination - 2020**STATISTICS****Course Code : BSTSGERT18A****Course Title : Operations Research and
Statistical Inference**

Full Marks : 40

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their
own words as far as practicable.*1. Answer any **ten** of the following questions:

1×10=10

- Define linearly independent vectors.
- What do you mean by convex set?
- Check whether the vectors (1,2) and (2,5) are linearly dependent or independent.
- What is the condition of feasibility of a transportation problem?
- Which of the following is not true about a transportation problem?
 - it is unbounded
 - it is never unbounded

- What is the best method for solving a transportation problem?
- Which of the following method is used to solve an assignment problem?
 - VAM
 - Hungarian method
 - Graphical method
- What do you mean by point estimation?
 - Define Null hypothesis.
 - What is meant by level of significance?
 - Define simplex in an LPP.
 - Write down a two dimensional simplex.
 - In a maximization problem, to convert an LPP to its standard form, which variables are used?
 - Define non-degenerate solutions in an LPP.

2. Answer any **five** of the following questions :

2×5=10

- a) Find the dual of the following primal LPP :

$$\text{Max } Z = 3x_1 + 5x_2$$

$$\text{Subject to } 2x_1 + x_2 \leq 4$$

$$x_1 - x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

- b) What do you mean by pure and mixed strategy in a game?
- c) Define saddle point with an example.
- d) Solve the following transportation problem using North-West corner method :

	D ₁	D ₂	
O ₁	1	2	15
O ₂	5	3	20
	25	10	

- e) Write down two differences between transportation problem and assignment problem.
- f) Define extreme points in an LPP. Give an example of a set containing infinite member of extreme points.
- g) Discuss minimax and maximim criterion in a game theory.
- h) Trace out the extreme points of the region bounded by the following constraints :

$$x_1 + x_2 \leq 4$$

$$2x_1 + x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

3. Answer any **two** of the following questions :
5×2=10
- a) Solve the following LPP using graphical method :

$$\text{Min } Z = 5x_1 - 2x_2$$

$$\text{Subject to } 2x_1 + 3x_2 \geq 1$$

$$x_1, x_2 \geq 0$$

- b) Solve the following transportation problem; using Matrix-minima method :

	D ₁	D ₂	D ₃	
O ₁	1	2	3	10
O ₂	4	5	6	15
O ₃	2	1	7	25
	15	15	20	

- c) Show that whatever may be the value of 'a', the game with the following payoff matrix is strictly determinable :

		A	
		I	II
B	I	3	7
	II	-3	a

4. Answer any **one** of the following questions :

10×1=10

a) Use dual simplex method to solve the LPP :

$$\text{Maximize } Z = -2x_1 - x_3$$

$$\text{Subject to } x_1 + x_2 - x_3 \geq 5$$

$$x_1 - 2x_2 + 4x_3 \geq 8$$

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

b) Using VAM method solve the following transportation problem :

	D ₁	D ₂	D ₃	D ₄	D ₅	
O ₁	12	4	9	5	9	55
O ₂	8	1	6	6	7	45
O ₃	1	12	4	7	7	30
O ₄	10	15	6	9	1	50
	40	20	50	30	40	

c) Solve the following assignment problem for minimizing the cost :

Job	D ₁	D ₂	D ₃	Machines
J ₁	20	27	30	
J ₂	10	18	16	
J ₃	14	16	12	