

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION DECEMBER 2017
(Fifth Semester)**

Branch - **STATISTICS**

CORE ELECTIVE - I OPERATIONS RESEARCH -1

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 x 2 = 20)

- 1 List the uses of OR.
- 2 What are the different types of OR models?
- 3 Define slack variable.
- 4 Define surplus variable.
- 5 What is duality?
- 6 What is integer programming?
- 7 Define feasible solution of a transportation problem.
- 8 Give mathematical formulation of a transportation problem.
- 9 Define assignment problem.
- 10 Define unbalanced assignment problem.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

- 11 a Explain the general methods for solving OR models. .
OR
b Explain the limitations of linear programming problem.
- 12 a Explain the mathematical formulation of a linear programming problem and its matrix formulation.
OR
b Write the procedure of solving a LPP by two phase method.
- 13 a Explain the concept of duality.
OR
b Describe the algorithm of Gomory's integer programming problem.
- 14 a Describe the method of solving unbalanced transportation problem.
OR
b Describe the Vogel's Approximation method.
- 15 a Solve the assignment problem

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

b Explain the processing of n jobs to three machines in a sequencing problem.

Cont...

SECTION - C (30 Marks)

Answer any **THREE** Questions

ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Solve the following LPP graphically

$$\begin{aligned} \text{Max } Z &= 5x_1 + 3x_2 \\ \text{St., } 4x_1 + 5x_2 &< 1000 \\ 5x_1 + 2x_2 &< 1000 \\ 3x_1 + 8x_2 &< 1200 \\ \text{and } x_1, x_2 &> 0. \end{aligned}$$

17 Using Big M method to solve

$$\begin{aligned} \text{Min } Z &= 4x_1 + 3x_2 \\ \text{St., } 2x_1 + x_2 &> 10 \\ -3x_1 + 2x_2 &< 6 \\ x_1 + x_2 &> 6 \\ \text{and } x_1, x_2 &> 0 \end{aligned}$$

18 Using dual simplex method solve the LPP

$$\begin{aligned} \text{Min } Z &= x_1 + x_2 \\ \text{St., } 2x_1 + x_2 &> 2 \\ -x_1 - x_2 &> 1 \\ \text{and } x_1, x_2 &> 0. \end{aligned}$$

19 Solve the transportation problem

		Destination			Supply
		D1	D2	D3	
Origin	A	5	6	9	100
	B	3	5	10	75
	C	6	7	6	50
	D	6	4	10	75
Demand (units)		70	80	120	

Solve the following assignment problem

		Machine				
		1	2	3	4	5
Job	1	10	11	4	2	8
	2	7	11	10	14	12
	3	5	6	9	12	14
	4		15	11	10	7

Z-Z-Z

END