

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2018
(Fifth Semester)

Branch- STATISTICS

CORE ELECTIVE -1: OPERATIONS RESEARCH - I

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

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

- 1 Define Operations Research.
- 2 What is Linear Programming Problem?
- 3 What is meant by an artificial variable?
- 4 State the various methods of solving LPP.
- 5 Write the meaning of duality.
- 6 What is an IPP?
- 7 Define basic feasible solution.
- 8 What is degeneracy in a transportation problem?
- 9 What is meant by an assignment problem?
- 10 Define Sequencing problem.

SECTION - B (25 Marks)

Answer ALL Questions

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

- 11 a What are the limitations of O.R?
OR
- b Solve graphically
$$\text{Min } z=5x_1+4x_2$$

Subject to

$$4x_1+x_2>40$$
$$2x_1+3x_2>90 \text{ and } x_1, x_2>0$$
- 12 a Write a short note on Slack and Surplus variables.
OR
- b Describe the steps involved in the Simplex method.
- 13 a Explain the steps in the process of formulation of primal to dual.
OR
- b Explain the Gomory's algorithm.
- 14 a Find an initial basic feasible solution by North-West corner rule.

		Destination				
		I	II	III	IV	Supply
Source	S ₁	5	3	6	2	19
	S ₂	4	7	9	1	37
	S ₃	3	4	7	5	34
	Demand	16	18	31	25	

OR

- b Describe the method of finding an optimal solution by MODI method.
- 15 a Write down the steps in the Hungarian method of solving an assignment problem.
OR
- b State the assumptions used in a Sequencing problem.

SECTION - C (30 Marks)Answer any **THREE** Questions**ALL** Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Discuss the scope of Operations Research.

17 Solve the following LPP by Simplex method.

$$\begin{aligned} \text{Max } z &= 5x_1 + 3x_2 \\ \text{subject to the constraints} \\ x_1 + x_2 &< 2 \\ 5x_1 + 2x_2 &< 10 \\ 3x_1 + 8x_2 &< 12 \\ \text{and } x_1, x_2 &> 0 \end{aligned}$$

18 Use dual simplex method to solve the following LPP.

$$\begin{aligned} \text{Max } z &= 4x_1 + 2x_2 \\ \text{subject to the constraints} \\ x_1 + x_2 &> 3 \\ x_1 - x_2 &> 2 \\ \text{and } x_1, x_2 &> 0 \end{aligned}$$

19 Find the optimal solution for the following transportation problem:

	Warehouse				
	W ₁	W ₂	W ₃	W ₄	Capacity
Factory F ₁	10	30	50	10	7
Factory F ₂	70	30	40	60	9
Factory F ₃	40	8	70	20	18
Requirement	5	8	7	14	

20 Solve the following minimal assignment problem:

		Men			
		A	B	C	D
Job	1	18	26	17	11
	2	13	28	14	26
	3	38	19	18	15
	4	19	26	24	10

Z-Z-Z

END