

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2024
(Fifth Semester)

Branch – STATISTICS

OPERATIONS RESEARCH

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

1. _____ are introduced just to obtain an initial basic feasible solution
(i) Slack variables (ii) Surplus variables
(iii) Artificial variables (iv) All the above
2. In North west corner rule the allocation is done in _____
(i) Upper right hand (ii) Upper left hand
(iii) Middle cell in the transportation table (iv) Cell with lowest cost
3. The method used for solving an assignment problem is called _____
(i) Graphical method (ii) MODI method
(iii) Hungarian method (iv) None of these
4. Every game results in an outcome is loss or gain or a draw, usually called
(i) Payoff (ii) strategy
(iii) Value of the game (iv) Zero sum game
5. The number of time estimates involved in PERT problem is...
(i) 4 (ii) 2 (iii) 3 (iv) 1

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

6. (a) (i) Define Slack variables in LPP.
(ii) What will be the value of the artificial variable in the final solution of Big- M method?

(OR)

- (b) What are the components of Linear Programming Problem?

7. (a) What is degeneracy in transportation problem?

(OR)

- (b) Obtain an initial basic feasible solution to the following transportation problem using least cost method:

		Destinations				Availability
		D ₁	D ₂	D ₃	D ₄	
Origin	O ₁	1	2	1	4	30
	O ₂	3	3	2	1	50
	O ₃	4	2	5	9	20
Requirement		20	40	30	10	100

8. (a) Write the mathematical formulation of the assignment problem.

(OR)

Cont...

(b) Solve the following Assignment Problem:

	1	2	3	4	5
A	85	75	65	125	75
B	90	78	66	132	78
C	75	66	57	114	69
D	80	72	60	120	72
E	76	64	56	112	68

9. (a) What is two person zero sum game?

(OR)

(b) Define pure and mixed strategies.

10 (a) Describe the difference between PERT and CPM.

(OR)

(b) Draw a network diagram for the following data:

Activity :	A	B	C	D	E	F	G	H	I	J
Preceding activities :	None	A	A	B	A	B,E	C	D, F	G	H,I

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks

(5 x 6 = 30)

11 (a) Solve the following LPP using Big -M method:

$$\text{Maximize } Z = 5X_1 + X_2$$

Subject to the constraints:

$$5X_1 + 2X_2 \leq 20,$$

$$X_1 \geq 3 \text{ and } X_2 \leq 5$$

$$X_1, X_2 \geq 0.$$

(OR)

(b) Solve the following LPP:

$$\text{Maximize } Z = 5X_1 + X_2$$

Subject to the constraints:

$$5X_1 + 2X_2 \leq 20,$$

$$X_1 \geq 3 \text{ and } X_2 \leq 5$$

$$X_1, X_2 \geq 0.$$

12(a) Obtain an initial basic feasible solution to the following transportation problem using least cost method:

		Destinations				Availability
		D ₁	D ₂	D ₃	D ₄	
Origin	O ₁	1	2	1	4	30
	O ₂	3	3	2	1	50
	O ₃	4	2	5	9	20
Requirement		20	40	30	10	100

(OR)

(h) Find the initial basic feasible solution for the following data using Vogel's Approximation Method:

		To			Availability
		A	B	C	
From	I	6	8	4	14
	II	4	9	8	12
	III	1	2	6	5
Requirement		6	10	15	31

Cont...

13. (a) Solve the following assignment problem:

	1	2	3	4
A	10	12	19	11
B	5	10	7	8
C	12	14	13	11
D	8	15	11	9

(OR)

(b) Explain the travelling salesman problem.

14. (a) Solve the following game:

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

(OR)

(b) Explain in details dominance property.

15. (a) A project schedule has the following characteristics:

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time	4	1	1	1	6	5	4	8	1	2	5	7

(i) Construct PERT network, (ii) Compute T_E , T_L for each event, (iii) Find critical path.

(OR)

(b) Explain the rules of network construction.

Z-Z-Z END