22STU517

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2025
(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 The two – phase simplex method is another method to solve a given _____ involving some artificial variables
(i) Transportation problem (ii) Assignment problem
(iii) Both (a) and (b) (iv) Linear programming problem

2 In Least cost method the allocation is done by selecting _____
(i) Upper right hand (ii) Upper left hand
(iii) Middle cell in the transportation table (iv) Cell with lowest cost

3 In assignment problem if number of rows is greater than column then _____.
(i) Add dummy row (ii) Add dummy column
(iii) Add row with cost 1 (iv) Add column with cost 1

4 In a game with a saddle point, maximum for player I equals….for Player II
(i) Minimax (ii) Maximin (iii)Row minima (iv) Column maxima

5 The path of least float in a project is called……..
(i) Free path (ii) Critical path (iii) Independent path (iv) Total path

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6. (a) Solve the following LPP using graphical method: Maximize $z = x_1+3x_2$
Subject to the constraints: $3x_1 + 6x_2 \leq 8$
$5x_1 + 2x_2 \leq 10$
and $x_1, x_2 \geq 0$.

(OR)

(b) Write the dual of the following linear programming problem:
Maximize $Z = 2x_1 + 3x_2 + x_3$ subject to the constriants:
$4x_1 + 3x_2 + x_3 = 6$, $x_1 + 2x_2 + 5x_3 = 4$ and $x_1, x_2, x_3 \geq 0$

7. (a) List out the methods of finding initial basic feasible solution.

(OR)

(b) Find the initial basic feasible solution using North West Corner rule.

		To D	E	F	G	
From	A	11	13	17	14	250
	B	16	18	14	10	300
	C	21	24	13	10	400
		200	225	275	250	

8. (a) What is an assignment problem?

(OR)

(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) Determine the range of value of p and q that will make the payoff element a22, a saddle point for the game whose payoff matrix is given below:

	Player B		
Player A	2	4	5
	10	7	q
	4	p	8

(OR)

Cont…

(b) Explain the term Pay off matrix in game theory

10. (a) What are the Basic Steps in PERT /CPM

(OR)

(b) Describe the rules of construction of network diagram.

SECTION -C (30 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11. (a) Solve the following LPP using Simplex method: Maximize $z = 5x_1+3x_2$

Subject to the constraints: $x_1 + x_2 \leq 2$

$5x_1 + 2x_2 \leq 10$

$3x_1 + 8x_2 \leq 12$

and $x_1, x_2 \geq 0$.

(OR)

(b) Solve the following LPP using big-M method: Maximize $z = x_1+3x_2$

Subject to the constraints: $3x_1 + 6x_2 \leq 8$

$5x_1 + 2x_2 \leq 10$

and $x_1, x_2 \geq 0$.

12. (a) Solve the following transportation problem:

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

(OR)

(b) Use Vogel's Approximation method to obtain an initial basic feasible solution of the transportation problem.

	D_1	D_2	D_3	D_4	Supply
S_1	20	25	28	31	200
S_2	32	28	32	41	180
S_3	18	35	24	32	110
Demand	150	40	180	170	

13. (a) Write down the Hungarian Algorithm to solve an Assignment problem.

(OR)

(b) Five jobs are offered with expected profit for each machines to the jobs that will result in a maximum profit.

	Job A	B	C	D	E
Machine 1	62	78	50	111	82
2	71	84	61	73	59
3	87	92	111	71	81
4	48	64	87	77	80

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 the types of strategy.

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

(OR)

(b) Constructthenetworkdiagramforaprojectwiththefollowingactivities:

Event-Event	Activity	PredecessorActivity
1-2	A	-
1-3	B	-
1-4	C	-
2-5	D	A
3-6	E	B
4-6	F	C
5-6	G	D

Z-Z-Z

END