Reg. No. | | | | | | | | |

G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.

UG DEGREE END SEMESTER EXAMINATIONS - APRIL 2025.

(For those admitted in June 2021 and later)

PROGRAMME AND BRANCH: B.Sc., STATISTICS

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
V	PART - III	CORE ELECTIVE	U21ST5E1A	OPERATIONS RESEARCH

Date & Session:30.04.2025/FN **Time : 3 hours** **Maximum: 75 Marks**

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer ALL Questions.
CO1	K1	1.	_____ is a linear programming problem. a) allocation b) assignment c) transportation d) all the above
CO1	K2	2.	If two constraints do not intersect in the positive quadrant of the graph, then_____. a) one of the constraint is redundant b) the solution is infeasible c) the solution is unbounded d) none of these
CO2	K1	3.	The Simplex Method is used to solve: a) Linear programming problems b) Non-linear programming problems c) Integer programming problems d) Dynamic programming problems
CO2	K2	4.	The Big M Method assigns a very large positive number (M) to which type of variable in the objective function? a) Slack Variable b) Artificial Variable c) Surplus Variable d) Decision Variable
CO3	K1	5.	The transportation problem deals with: a) Minimizing cost of transporting goods b) Maximizing profits in business c) Allocating resources dynamically d) Optimizing warehouse
CO3	K2	6.	The method used for solving an assignment problem is called_____. a) MODI method b) reduced matrix method c) Hungarian method d) vogel's approximation
CO4	K1	7.	Games which involve more than two players are called_____. a) biased games b) negotiable games c) conflicting games d) n-person games
CO4	K2	8.	A strategy that minimizes the maximum possible loss is called: a) Maximin Strategy b) Minimax Strategy c) Mixed Strategy d) Nash Equilibrium
CO5	K1	9.	In critical path CPM is _____. a) event oriented b) probabilistic in nature c) deterministic in nature d) dynamic in nature

CO5	K2	10.	In a project network, an activity is represented by: a) A square b) A circle c) An arrow d) A triangle
Course Outcome	**Bloom's K-level**	**Q. No.**	**SECTION – B (5 X 5 = 25 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	11a.	Write the algorithm of Graphical method. **(OR)**
CO1	K3	11b.	Write the following LPP in standard form:max $z = 8x_1 - 4x_2$ subject to $4x_1 + 5x_2 \leq 20, 2x_1 - 3x_2 \leq 23, x_1 \geq 0, x_2$ unrestricted.
CO2	K3	12a.	Write the algorithm of Big-M method. **(OR)**
CO2	K3	12b.	Solve minimize $z = 60x_1 + 80x_2$ *subject to* $20x_1 + 30x_2 \geq 900, 40x_1 + 30x_2 \geq 1200, x_1, x_2 \geq 0$.
CO3	K4	13a.	Write the algorithm of Hungarian method. **(OR)**
CO3	K4	13b.	Using Northwest corner method. Find the basic feasible to the following transportation problem.

	W_1	W_2	W_3	a_i
F_1	8	10	12	900
F_2	12	13	12	1000
F_3	14	10	11	1200
b_j	1200	1000	900	

CO4	K4	14a.	Two players A and B match coins. If the coins match, then A wins two units of value, if the coins do not match, then B wins 2 units of value. Determine the optimum strategies for the players and the value of the game. **(OR)**
CO4	K4	14b.	Elucidate on Min-Max principle.
CO5	K5	15a.	Explain the concept of Networks. **(OR)**
CO5	K5	15b.	Draw a network for the following project:

Activity	Immediate Predecessor
1-2	-
1-3	-
2-3	1-2
2-4	1-2
3-4	1-3, 2-3
4-5	2-4, 3-4

Course Outcome	**Bloom's K-level**	**Q. No.**	**SECTION – C (5 X 8 = 40 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	16a.	Solve the following LPP using graphical method. Maximize $Z = 25x_1 + 20x_2$ Subject to $16x_1 + 12x_2 \leq 100$ $8x_1 + 16x_2 \leq 80$ $x_1, x_2 \geq 0$ **(OR)**

CO1	K3	16b.	Solve the following LPP using graphical method Maximize $Z= 6x_1+15x_2$ Subject to $5x_1+3x_2 \leq 15$ $2x_1+5x_2 \leq 10$ $x_1 , x_2 \geq 0$
CO2	K4	17a.	Use simplex method to solve the following LPP Maximize $Z= 4x_1+10x_2$ Subject to Constraints $2x_1+x_2 \leq 50$ $2x_1+5x_2 \leq 100$ $2x_1+ 3x_2 \leq 90$ $x_1 , x_2 \geq 0$ **(OR)**
CO2	K4	17b.	Use Two-Phase simplex method to solve the following LPP Maximize $Z= 2x_1+ x_2+x_3$ Subject to Constraints $4x_1+6x_2 + 3x_3 \leq 8$ $3x_1-6x_2 -4x_3 \leq 1$ $2x_1+3x_2 -5x_3 \geq 4$ $x_1 , x_2, x_3 \geq 0$
CO3	K4	18a.	Apply Vogel's approximation method to obtain an initial basic feasible solution to the following transportation problem:

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

(OR)

CO3	K4	18b.	Find the optimum assignment and minimum total time from the following information.

	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

CO4	K5	19a.	Determine which of the following two-person zero-sum games are strictly and fair. a) Player A, Player B: $\begin{bmatrix}5 & 0\\0 & 2\end{bmatrix}$ b) Player A, Player B: $\begin{bmatrix}0 & 2\\-1 & 4\end{bmatrix}$ **(OR)**
CO4	K5	19b.	Solve the following 2 × 2 game graphically. Player B Player A: $\begin{matrix}\\A_1\\A_2\end{matrix}\begin{bmatrix}B_1 & B_2 & B_3 & B_4\\2 & 1 & 0 & -2\\1 & 0 & 3 & 2\end{bmatrix}$

<table>
<tr><td>CO5</td><td>K5</td><td>20a.</td><td>
<table>
<tr><td>Activity</td><td></td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td></tr>
<tr><td>Immediate Predecessor</td><td></td><td>-</td><td>-</td><td>-</td><td>A</td><td>B</td><td>C</td><td>D,E</td><td>F,G</td></tr>
<tr><td rowspan="3">Estimated duration (days)</td><td>t_o</td><td>1</td><td>1</td><td>2</td><td>1</td><td>2</td><td>2</td><td>3</td><td>1</td></tr>
<tr><td>t_m</td><td>1</td><td>4</td><td>2</td><td>1</td><td>5</td><td>5</td><td>6</td><td>2</td></tr>
<tr><td>t_p</td><td>7</td><td>7</td><td>8</td><td>1</td><td>14</td><td>8</td><td>15</td><td>3</td></tr>
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Draw the PERT network and find out the expected project completion time.

(OR)

Explain Critical Path Method.
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<tr><td>CO5</td><td>K5</td><td>20b.</td></tr>
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