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

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

UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2024.

(For those admitted in June 2021 and later)

PROGRAMME AND BRANCH: B.Sc., STATISTICS

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

Date & Session:15.11.2024/ 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.	State Operations research approach is. a) Multi-disciplinary b) Intuitive c) Objective d) Conditional
CO1	K2	2.	Which of the following are the decision variables in O.R. model? a) Parameters b) Controllable c) Uncontrollable d) Constants
CO2	K1	3.	For maximization linear programming problem, the simplex method is terminated when all the net-evaluations are. a) Zero b) Negative c) Non-negative d) Non-positive
CO2	K2	4.	Represent of primal, If dual has an unbounded solution. a) An infeasible solution b) A feasible solution c) An unbounded solution d) A graphical solution
CO3	K1	5.	The solution to a transportation problem with m-sources and n-destinations is feasible, if the number of allocations are. a) m+n b) m+n+1 c) m+n-1 d) m×n
CO3	K2	6.	Write the method used to solve the assignment problem. a) Reduced matrix method b) Hungarian method c) MODI method d) Big-M method
CO4	K1	7.	When maximin and minimax values of the game are same? a) Strategies are mixed b) There is a saddle point c) Solution does not exit d) Transportation of problem
CO4	K2	8.	Which principle can be used to reduce the size of the pay-off matrix of the game? a) Dominance b) Game transpose c) Rotation reduction d) Game inversion
CO5	K1	9.	Network problems have advantage in terms of project. a) Scheduling b) Planning c) Gaming d) Both (a) and (b)
CO5	K2	10.	The term commonly used for activity slack time is. a) Total float b) Free float c) Independent float d) All of the above

<table>
<tr><th>Course Outcome</th><th>Bloom's K-level</th><th>Q. No.</th><th><u>SECTION – B</u> (5 X 5 = 25 Marks)
Answer <u>ALL</u> Questions choosing either (a) or (b)</th></tr>
<tr><td>CO1</td><td>K3</td><td>11a.</td><td>State the features of Operations Research.
(OR)</td></tr>
<tr><td>CO1</td><td>K3</td><td>11b.</td><td>What are the procedures of mathematical formulation of linear programming problem?</td></tr>
<tr><td>CO2</td><td>K3</td><td>12a.</td><td>Define BIG-M method and specify its algorithm.
(OR)</td></tr>
<tr><td>CO2</td><td>K3</td><td>12b.</td><td>Explain various procedures for forming a dual problem.</td></tr>
<tr><td>CO3</td><td>K4</td><td>13a.</td><td>Obtain an IBFS to the following transportation problem using the NWC rule.
<table>
<tr><td></td><td>D</td><td>E</td><td>F</td><td>G</td><td>Available</td></tr>
<tr><td>A</td><td>11</td><td>13</td><td>17</td><td>14</td><td>250</td></tr>
<tr><td>B</td><td>16</td><td>18</td><td>14</td><td>10</td><td>300</td></tr>
<tr><td>C</td><td>21</td><td>24</td><td>13</td><td>10</td><td>400</td></tr>
<tr><td>Requirement</td><td>200</td><td>225</td><td>275</td><td>250</td><td></td></tr>
</table>
(OR)</td></tr>
<tr><td>CO3</td><td>K4</td><td>13b.</td><td>How to test for the Hungarian method in the assignment problem?</td></tr>
<tr><td>CO4</td><td>K4</td><td>14a.</td><td>What is a payoff matrix? State the rule for determining saddle point.
(OR)</td></tr>
<tr><td>CO4</td><td>K4</td><td>14b.</td><td>Determine the optimum strategies for the following payoff matrix.
$\begin{matrix} & P_2 \\ P_1 & \begin{bmatrix} 5 & 1 \\ 3 & 4 \end{bmatrix} \end{matrix}$</td></tr>
<tr><td>CO5</td><td>K5</td><td>15a.</td><td>Specify the important rules of network construction.
(OR)</td></tr>
<tr><td>CO5</td><td>K5</td><td>15b.</td><td>Draw a network diagram for the following data.
<table>
<tr><td>Activity</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><td>I</td><td>J</td></tr>
<tr><td>Preceding Activities</td><td>None</td><td>A</td><td>A</td><td>B</td><td>A</td><td>B,E</td><td>C</td><td>F,F</td><td>G</td><td>H,I</td></tr>
</table></td></tr>
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<table>
<tr><th>Course Outcome</th><th>Bloom's K-level</th><th>Q. No.</th><th><u>SECTION – C</u> (5 X 8 = 40 Marks)
Answer <u>ALL</u> Questions choosing either (a) or (b)</th></tr>
<tr><td>CO1</td><td>K3</td><td>16a.</td><td>Write in detail the advantages and limitations of the models in O.R.
(OR)</td></tr>
<tr><td>CO1</td><td>K3</td><td>16b.</td><td>Analyze the L.P.P through the graphical method. Max $z = 2x_1 + 3x_2$; S.C.: $x_1 + x_2 \le 30$, $x_1 - x_2 \ge 0$, $x_2 \ge 3$; $0 \le x_1 \le 20$ and $0 \le x_2 \le 12$.</td></tr>
<tr><td>CO2</td><td>K4</td><td>17a.</td><td>Examine the L.P.P. using simplex method. Max $z = 4x_1+10x_2$
S.C.: $2x_1+x_2 \le 50$, $2x_1+3x_2 \le 90$; $x_1 \ge 0$ and $x_2 \ge 0$.
(OR)</td></tr>
<tr><td>CO2</td><td>K4</td><td>17b.</td><td>Use two-phase simplex method to max $z = 5x_1 + 3x_2$ S.C.: $2x_1+x_2 \le 1$, $x_1+4x_2 \ge 6$ and $x_1, x_2 \ge 0$.</td></tr>
</table>

CO3 | K4 | 18a.

Use Vogel's approximation method to obtain IBFS of the transportation problem

	D	E	F	G	Supply
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	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			
		B_1	B_2	B_3	B_4
Player A	A_1	2	1	0	−2
	A_2	1	0	3	2

CO5 | K5 | 20a.

Activity		A	B	C	D	E	F	G	H
Immediate Predecessor		-	-	-	A	B	C	D,E	F,G
Estimated duration (days)	t_o	1	1	2	1	2	2	3	1
	t_m	1	4	2	1	5	5	6	2
	t_p	7	7	8	1	14	8	15	3

CO5 | K5 | 20b.

Draw the PERT network and find out the expected project completion time.

(OR)

(i) Distinction between CPM and PERT.
(ii) Discuss time-cost optimization algorithm.