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

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

UG DEGREE END SEMESTER EXAMINATIONS - APRIL 2025.

(For those admitted in June 2023 and later)

PROGRAMME AND BRANCH: B.Sc., COMPUTER SCIENCE

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
IV	PART-III	ELECTIVE GENERIC 4	U23CS4A4	OPTIMIZATION TECHNIQUES

Date & Session: 03.05.2025/AN **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.	The region of feasible solution in LPP graphical method is called. a) Infeasible region b) Infinite region c) Unbounded region d) Feasible region
CO1	K2	2.	What have been constructed for operations research problems and methods for solving the models that are available in many cases? a) Scientific Models b) Algorithms c) Mathematical models d) None of the above
CO2	K1	3.	Graphic method can be applied to solve a LPP when there are. only_____variable. a) One b) More than one c) Two d) Three
CO2	K2	4.	To find the optimal solution we apply_____. a) LPP b) VAM c) LCM d) ModI method
CO3	K1	5.	If the total supply is less that the total demand, a dummy source(row) is included in the cost matrix with_____. a) Zero cost b) Dummy Demand c) Dummy supply d) Both C and D
CO3	K2	6.	_____method is used in Assignment Problem. a) LCM b) Hungarian c) VAM d) NCWR
CO4	K1	7.	The longest path in the network diagram is called ____. a) Head Path b) Sub path c) Critical path d) Sub Critical Path
CO4	K2	8.	The shortest time in the PERT is called ____time. a) expected b) Pessimistic c) Optimistic d) Most likely
CO5	K1	9.	The total time required to complete all the jobs in a job sequence problem is known as_____. a) Processing order b) Processing time b) Idle time d) Elapsed time
CO5	K2	10.	According to transportation problem number of basic cells will be exactly_____. a) m+n-0 b) m+n-1 c) n+m-0 d) m-n-1

<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>a) A firm manufactures two types of products A and B and sells them at a profit of Rs.2 on type A and Rs.3 on type B) Each product is processed on two machines M1 and M2. Type A requires 1 minute of processing time on M1 and 2 Minutes on M2. Type B requires 1 minute on M1 and 1 Minute on M2. Machine M1 is available for not more than 6 hours 40 minutes while machine M2 is available for 10 hours during any working day. Formulate the problem as a LPP so as to maximize the profit.
(OR)</td></tr>
<tr><td>CO1</td><td>K3</td><td>11b)</td><td>Solve the following LPP by the graphical method
Max $z = 3x_1 + 2_{x2}$
Subjet to $- 2x_1 + x_2 \leq 1$
$X_1 \leq 2$
$X_1 + x_2 \leq 3$
and $x_1, x_2 \geq 0$</td></tr>
<tr><td>CO2</td><td>K3</td><td>12a)</td><td>Determine basic feasible solution to the following transportation problem using North West Corner Rule:
<table><tr><th></th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>Supply</th></tr><tr><td>P</td><td>2</td><td>11</td><td>10</td><td>3</td><td>7</td><td>4</td></tr><tr><td>Q</td><td>1</td><td>4</td><td>7</td><td>2</td><td>1</td><td>8</td></tr><tr><td>R</td><td>3</td><td>9</td><td>4</td><td>8</td><td>12</td><td>9</td></tr><tr><td>Demand</td><td>3</td><td>3</td><td>4</td><td>5</td><td>6</td><td></td></tr></table></td></tr>
<tr><td>CO2</td><td>K3</td><td>12b)</td><td>(OR)
Find the Initial basic feasible solution for the following transportation problem by VAM.
<table><tr><th></th><th>D1</th><th>D2</th><th>D3</th><th>D4</th><th>Availability</th></tr><tr><td>S1</td><td>11</td><td>13</td><td>17</td><td>14</td><td>250</td></tr><tr><td>S2</td><td>16</td><td>18</td><td>14</td><td>10</td><td>300</td></tr><tr><td>S3</td><td>21</td><td>24</td><td>13</td><td>10</td><td>400</td></tr><tr><td>Requirements</td><td>200</td><td>225</td><td>275</td><td>250</td><td></td></tr></table></td></tr>
<tr><td>CO3</td><td>K4</td><td>13a)</td><td>Explain about the Hungaraian method?
(OR)</td></tr>
<tr><td>CO3</td><td>K4</td><td>13b)</td><td>Solve the following Assignment Problem:
Job
<table><tr><th></th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>A</td><td>8</td><td>4</td><td>2</td><td>6</td><td>1</td></tr><tr><td>B</td><td>0</td><td>9</td><td>5</td><td>5</td><td>4</td></tr><tr><td>C</td><td>3</td><td>8</td><td>9</td><td>2</td><td>6</td></tr><tr><td>D</td><td>4</td><td>3</td><td>1</td><td>0</td><td>3</td></tr><tr><td>E</td><td>9</td><td>5</td><td>8</td><td>9</td><td>5</td></tr></table></td></tr>
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CO4	K4	14a)	Solve the following Game whose pay off matrix is given below: $\begin{pmatrix} 9 & 3 & 1 & 8 & 0 \\ 6 & 5 & 4 & 6 & 7 \\ 2 & 4 & 3 & 3 & 8 \\ 5 & 6 & 2 & 2 & 1 \end{pmatrix}$ **(OR)**
CO4	K4	14b)	Solve the following 3*3 games Player B Player A $\begin{pmatrix} 3 & -1 & -3 \\ -3 & 3 & -1 \\ -4 & -3 & 3 \end{pmatrix}$
CO5	K5	15a)	Write the difference between CPM and PERT **(OR)**
CO5	K5	15b)	Draw the network for the project whose activities and their precedence relationships are given below:

Activity:	P	Q	R	S	T	U
Predecessor:	-	-	-	P,Q	P,R	Q,R

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)	Use Simplex method to solve the LPP maximize $Z=4x_1 + 10\ x_2$ Subject to $2x_1+x_2 \leq 50$ $2x_1+5x_2 \leq 100$ $2x_1+3x_2+ \leq 90$ and $x_1,x_2 \geq 0$ **(OR)**
CO1	K3	16b)	Use revised Simplex Method to solve the LPP maximize $Z=x_1+x_2$ Subject to $3x_1+2x_2 \leq 6$ $x_1 +4x_2 \leq 4$ $x_1,x_2 \geq 0$
CO2	K4	17a)	Solve the Transportation problem

	1	2	3	4	Supply
I	21	16	25	3	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

CO2	K4	17b)	**(OR)** Solve the Transportation problem with unit transportation costs, demands and supplies are as given below :

	D1	D2	D3	D4	Supply
S1	6	1	9	3	70
S2	11	5	2	8	55
S3	10	12	4	7	70
Demand	85	35	50	45	

CO3	K4	18a)	a) A Company has 4 machines to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table : Machines 1 2 3 4 Jobs A 18 24 28 32 B 8 13 17 19 C 10 15 19 22 What are job assignments which will minimize the cost? **(OR)**
CO3	K4	18b)	Solve the following Travelling Salesman Problem? To A B C D From A - 46 16 40 B 41 - 50 40 C 82 32 - 60 D 40 40 36 -
CO4	K5	19a)	Solve the following 2 * 2 Game: B A 5 1 3 4 **(OR)**
CO4	K5	19b)	Using Graphical method, solve the rectangular game whose payoff matrix for player . A is 2 -1 5 -2 6 -2 4 -3 1 0
CO5	K5	20a)	Computer the earliest start, earliest finish latest start and latest finish of each activities of the project given below: Activity : 1-2 1-3 2-4 2-5 3-4 4-5 Duration (in days) 8 4 10 2 5 3 **(OR)**
CO5	K5	20b)	The following table indicates the details of a project. The durations are in days 'a' refers to Optimistic time, 'm' refers to most likely time and 'b' refers to pessimistic time duration. i. Draw the network ii. Find the Critical Path iii. Determine the expected Standard Deviation of the Completion time.

Activity	1-2	1-3	1-4	2-4	2-5	3-5	4-5
a	2	3	4	8	6	2	2
m	4	4	5	9	8	3	5
b	5	6	6	11	12	4	7