R20 Regulation *Subject code:3B1AM*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech I Semester Supplementary Examinations, July 2025

LINEAR ALGEBRA & GRAPH THEORY

(Common to CSE, CSE(AI&ML), CSE(DS) & IT)

Maximum Marks: 70 Date:10.07.2025 Duration: 3 hours

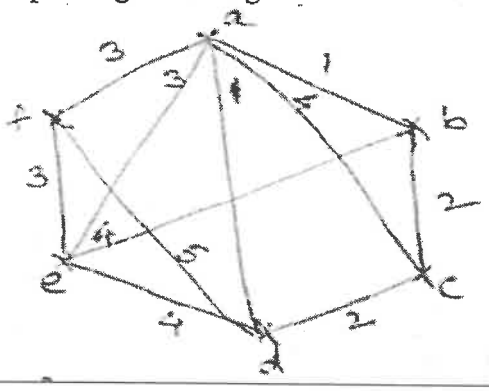
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Find the rank of the matrix $A=\begin{bmatrix}1 & 1 & 1\\ 1 & -1 & 0\\ 1 & 1 & 1\end{bmatrix}$	2M	1	L1
2	Define symmetric matrix.	2M	1	L1
3	If 'λ' is an Eigen value of the matrix A then 'λ' is also an Eigen value of A^T	2M	2	L1
4	Express the following quadratic form in matrix notation $2x^2 + 3y^2 - 5z^2 - 2xy + 6xz - 10yz$	2M	2	L1
5	Define Hermitian matrix.	2M	3	L1
6	Prove that the matrix $\frac{1}{\sqrt{3}}\begin{bmatrix}1 & 1+i\\ 1-i & -1\end{bmatrix}$ is unitary.	2M	3	L1
7	Define the following subgraphs of a graph a) Closed Walk and Open walk & b) Trail	2M	4	L1
8	Define a planar graph with an example.	2M	4	L1
9	Define Binary tree.	2M	5	L1
10	Define rooted tree.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Using elementary row operations(Gauss Jordan method) find the inverse of the matrix $A=\begin{bmatrix}1 & -1 & 1\\ 2 & 2 & -3\\ 1 & -4 & 9\end{bmatrix}$	10M	1	L2
	OR			
12	Show that the only real number λ for which the system $x+2y+3z=\lambda x$; $3x+y+2z=\lambda y$; $2x+3y+z=\lambda z$ has non-zero solution is 6 and solve them when $\lambda=6$.	10M	1	L2

13	Determine the Eigen values and Eigen vectors of the following matrices ; $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & -3 & -3 \\ 2 & 4 & 4 \end{bmatrix}$	10M	2	L2
	OR			
14	Reduce the following quadratic form to canonical form by orthogonal transformation $3x^2 + 5y^2 + 3z^2 - 2xy - 2yz + 2xz$;	10M	2	L2
15	Solve by matrix method $\frac{d^2x}{dt^2} - 5\frac{dx}{dt} + 6x = 0$, $x(0) = 1, x'(0) = 2$	10M	3	L2
	OR			
16	a) Prove that the Eigen values of a Hermitian matrix are all real. b) Find the Eigen values and Eigen vectors of the Hermitian matrix $\begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$	5M 5M	3	L2
17	State and Prove Euler's formula in plane graphs.	10M	4	L2
	OR			
18	Define i)Cut edge ii) Cut vertex iii) Subgraph iv) Spanning subgraph with examples	10M	4	L2
19	Draw minimal spanning tree using PRIMs method 	10M	5	L2
	OR			
20	a) Write BFS algorithm. b) What is the value of postfix 723*-93/+.	5M 5M	5	L2