R20 Regulation *Subject code:3B1AM*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B. Tech I Semester Supplementary Examinations, January 2026

LINEAR ALGEBRA & GRAPH THEORY

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

Maximum Marks: 70 Date: 05.01.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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	Define symmetric matrix.	2M	1	L1
2	Define Rank of a matrix	2M	1	L1
3	Determine the nature, index, and signature of the quadratic form. $x^2 - 6xy + y^2$.	2M	2	L1
4	Find the matrix of quadratic form. $2x^2 + 3y^2 - 5z^2 - 4xy + 8xz - 10yz$	2M	2	L1
5	Prove that A=$\begin{bmatrix} 4 & 1+3i \\ 1-3i & 7 \end{bmatrix}$ is Hermitian	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 isomorphism of two graphs.	2M	4	L1
8	Define dual of a planar graph and explain it through an example.	2M	4	L1
9	Define Chromatic number of a graph.	2M	5	L1
10	Define minimal spanning tree.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Find the rank of the matrix by reducing to Echelon form where A =	10M	1	L2

	$\begin{bmatrix} 4 & 2 & 3 \\ 8 & 4 & 6 \\ -2 & -1 & -1 \end{bmatrix}$.			
	OR			
12	Find the rank of the matrix by reducing to Normal form where $A = \begin{bmatrix} 2 & 3 & 1 & 4 \\ 5 & 2 & 3 & 0 \\ 9 & 8 & 0 & 8 \end{bmatrix}$	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	Verify Cayley-Hamilton theorem for the following matrix and hence find A^{-1} and A^4 Where A= $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.	10M	2	L2
15	Prove that the Eigen values of a Hermitian matrix are all real.	10M	3	L2
	OR			
16	Find the Eigen values and Eigen vectors of $\begin{bmatrix} 4 & 1-3i \\ 1+3i & 7 \end{bmatrix}$	10M	3	L2
17	Define graph colouring and chromatic number of a graph and find the chromatic number of $a)$ $K_{3,3}$ b) cycle with even number of vertices	5M 5M	4	L2
	OR			
18	Define the following terms. Give one suitable example for each a) Euler circuit b) Hamiltonian graph	5M 5M	4	L2
19	Write DFS algorithm.	10M	5	L2
	OR			
20	Write PRIMS algorithm.	10M	5	L2

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