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 2024

LINEAR ALGEBRA & GRAPH THEORY

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

Maximum Marks: 70 Date: 18.01.2024 Duration: 3 hours

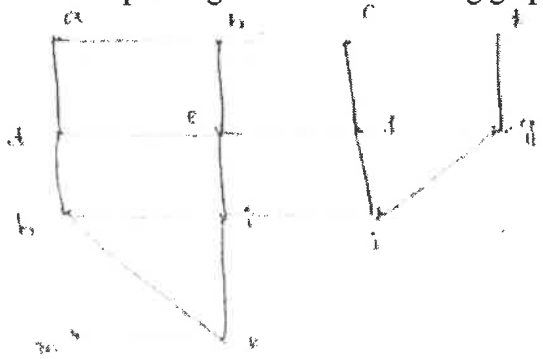
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

	All the following questions carry equal marks (10x2M=20 Marks)	CO	Bloom Tx
1	Find the rank of the matrix $A=\begin{bmatrix}1 & 1 & 1\\ 1 & -1 & 0\\ 1 & 1 & 1\end{bmatrix}$	CO1	L3
2	Define symmetric matrix.	CO1	L1
3	If 'λ' is an Eigen value of the matrix A then 'λ' is also an Eigen value of A^T	CO2	L3
4	Determine the nature of the quadratic form $x^2 - 6xy + y^2$.	CO2	L1
5	Define conjugate of a matrix with an example.	CO3	L1
6	Prove that the matrix $\frac{1}{\sqrt{3}}\begin{bmatrix}1 & 1+i\\ 1-i & -1\end{bmatrix}$ is unitary.	CO3	L3
7	Define Complete graph.	CO4	L1
8	Define isomorphism of two graphs.	CO4	L1
9	Define minimal spanning tree	CO5	L1
10	Write about pre-order traversal in trees.	CO5	L1

Part-B

	Answer All the following questions. (5X10M=50Marks)		
11	A. Find the rank of the matrix by reducing to Normal form were $A=\begin{bmatrix}2 & 3 & 1 & 4\\ 5 & 2 & 3 & 0\\ 9 & 8 & 0 & 8\end{bmatrix}$ [5M] B. Examine the consistency of the following system of equations. $2x - y - z = 2$; $x + 2y + z = 2$; $4x - 7y - 5z = 2$. [5M]	CO1	L3
	OR		
12	Investigate for what values of k the equations $x + y + z = 1$; $2x + y + 4z = k$; $4x + y + 10z = k^2$ have infinite number of solutions. [10M]	CO1	L5

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]	CO2	L3
	OR		
14	Show that the matrix satisfies Cayley Hamilton theorem and also find the value of the Matrix $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ Where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ [10M]	CO2	L3
15	Solve by matrix method $\frac{d^2x}{dt^2} - 5\frac{dx}{dt} + 6x = 0\,, x(0) = 1, x'(0) = 2$ [10M]	CO3	L3
	OR		
16	A. Prove that the Eigen values of a Hermitian matrix are all real. [5M] B. Find the Eigen values and Eigen vectors of the Hermitian matrix $\begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ [5M]	CO3	L3
17	State and Prove Euler's formula in plane graphs. [10M]	CO4	L3
	OR		
18	Define the following with suitable examples [4+3+3]M i) Planar graph ii) Regular graph iii) Bipartite graph	CO4	L3
19	A. Write BFS algorithm. [5M] B. What is the value of postfix 723*-93/+. [5M]	CO5	L3
	OR		
20	Use BFS method to find the spanning tree to the following graph. [10M] 	CO5	L3