R20 Regulation *Subject code:3B1AM*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations. September 2023

LINEAR ALGEBRA & GRAPH THEORY
(Common to CSE, CSE(AI&ML),CSE(DS) and IT)

Maximum Marks: 70 Date:29.09.2023 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)

1 Define symmetric matrix.

2 Define Rank of a matrix

3 Determine the nature, index, and signature of the quadratic form $x^2 - 6xy + y^2$.

4 Express the following quadratic form matrix notation

$$2x^2 + 3y^2 - 5z^2 - 2xy + 6xz - 10yz.$$

5 Define conjugate of a matrix with an example.

6 Define Hermitian matrix with an example.

7 Define complete bipartite graph with example.

8 Define a planar graph with an example.

9 Define spanning tree.

10 Define binary tree.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 Find the rank of the matrix by reducing to Echelon form where $A = \begin{bmatrix} 4 & 2 & 3 \\ 8 & 4 & 6 \\ -2 & -1 & -1 \end{bmatrix}$. [10]

OR

12 Find the rank of the matrix by reducing to Normal form where: [10]

$$A=\begin{bmatrix}2 & 3 & 1 & 4\\ 5 & 2 & 3 & 0\\ 9 & 8 & 0 & 8\end{bmatrix}$$

13 Determine the Eigen values and Eigen vectors of the following matrices; [10]

$$A=\begin{bmatrix}1 & 1 & 1\\ -1 & -3 & -3\\ 2 & 4 & 4\end{bmatrix}$$

OR

14 Verify Cayley – Hamilton theorem for $A=\begin{bmatrix}2 & -1 & 1\\ -1 & 2 & -1\\ 1 & -1 & 2\end{bmatrix}$ [10]

15 Show that the matrix $A=\begin{bmatrix}0 & i\\ i & 0\end{bmatrix}$ is Skew Hermitian and hence find it's Eigen values and Eigen vectors. [10]

OR

16 Find the Eigen values and Eigen vectors of $\begin{bmatrix}4 & 1-3i\\ 1+3i & 7\end{bmatrix}$ [10]

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. [10]

OR

18 Define the following terms. Give one suitable example for each [5+5]
a) Euler circuit b) Hamiltonian graph

19 Write prefix, postfix, infix notations of the expression ((x+y)↑2)+((x-4)/3) [10]

OR

20 Write BFS algorithm. [10]