



R20 Regulation

Subject code: 3BIAM

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, June 2024

LINEAR ALGEBRA & GRAPH THEORY

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

Maximum Marks: 70

Date:25.06.2024 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	Define orthogonal matrix.	1	L1
2	Define symmetric matrix.	1	L1
3	Prove that the Eigen values of a real symmetric matrix are real.	2	L1
4	Determine the nature of the quadratic form $x^2 - 6xy + y^2$.	2	L1
5	Define Hermitian matrix .	3	L1
6	Prove that the matrix $\frac{1}{\sqrt{3}} \begin{bmatrix} 1 & 1+i \\ 1-i & -1 \end{bmatrix}$ is unitary.	3	L1
7	Define the following subgraphs of a graph a) Closed Walk and Open walk b) Trail	4	L1
8	Define isomorphism of two graphs.	4	L1
9	Define minimal spanning tree	5	L1
10	Define rooted tree	5	L1

Part-B

Answer All the following questions. (10M X 5=50Marks)			
11	Find the rank of the matrix by reducing to Normal form where $A = \begin{bmatrix} 1 & 2 & 3 & -1 \\ 2 & 1 & 3 & 1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix} \quad [10]$	1	L2
OR			
12	For what values of μ does the following system of equations possess a nontrivial solution? Obtain the solutions for real values of μ . $3x + y - \mu z = 0$; $4x - 2y - 3z = 0; 2\mu x + 4y - \mu z = 0$ [10]	1	L2

13	Determine the Eigen values and Eigen vectors of the following matrices $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ [10]	2	L2												
OR															
14	Reduce the following quadratic form to canonical form by orthogonal transformation $3x^2 + 5y^2 + 3z^2 - 2xy - 2yz + 2xz$ [10]	2	L2												
15	Solve by matrix method $\frac{d^2x}{dt^2} - 5\frac{dx}{dt} + 6x = 0$, $x(0) = 1, x'(0) = 2$ [10]	3	L2												
OR															
16	a) Prove that the Eigen values of a Skew-Hermitian matrix are purely imaginary or zero. [5] b) Find the Eigen values and Eigen vectors of $\begin{bmatrix} 4 & 1 - 3i \\ 1 + 3i & 7 \end{bmatrix}$ [5]	3	L2												
17	State and Prove Euler's formula in plane graphs. [10]	4	L2												
OR															
18	a) Write incident matrix and adjacency matrix to the graph whose adjacency list is given by [5]	4	L2												
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>vertices</th> <th>Adjacent vertices</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>b,e</td> </tr> <tr> <td>b</td> <td>a,c,d,</td> </tr> <tr> <td>c</td> <td>b,d</td> </tr> <tr> <td>d</td> <td>e,b,c,</td> </tr> <tr> <td>e</td> <td>a,d</td> </tr> </tbody> </table>				vertices	Adjacent vertices	a	b,e	b	a,c,d,	c	b,d	d	e,b,c,	e	a,d
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b) Define the terms with examples 1)Eulerian graph 2) Hamiltonian graph [5]															
19	Draw minimal spanning tree using PRIMs method. [10]	5	L2												
OR															
20	Write algorithm for DFS & BFS. [10]	5	L2												