

# KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg.) 2015 Admission  
IV<sup>th</sup> Semester Final Examination-July-2017

Cat. No: Math.2204

Marks: 50

Title: Engineering Mathematics IV(3+0)

Time: 2 hours

## I Fill up the blanks

(10x1=10)

1. The solution of the matrix equation  $AX = B$  is -----
2. Define inconsistency in system of linear equations.
3. If  $D=M'AM$ , then  $M$  is called a ----- matrix.
4. Two vectors  $x$  and  $y$  in an inner product space is orthogonal if  $\langle x, y \rangle =$  -----
5. The number of vertices of odd degree in a graph is always -----
6. A graph  $G$  is said to be ----- graph if there is atleast one path between every pair of vertices in  $G$ .
7. A tree with  $n$  vertices has ----- edges.
8. A graph  $G$  is connected if and only if it has a ----- tree.
9. The formula  $n - e + f = 2$  is called ----- formula.
10. A 3-regular graph with 10 vertices and 15 edges is called a ----- graph.

## II Write short notes/answers to any FIVE of the following

(5x2=10)

1. Find the rank of the matrix  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \end{bmatrix}$
2. What is a subgroup?
3. Define linear transformation.
4. What are Eigen values?
5. Define linear dependence and independence of vectors.
6. What do you mean by an isolated vertex of a graph? Give an example.
7. Write examples for walk, path and cycle.

## III Write short answers to any FIVE

(5x4=20)

1. Find the characteristic roots of the matrix  $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
2. Find a basis and dimension of the vector subspace  $V$  spanned by the vectors  $(4, -1, 7)$ ,  $(3, 3, 4)$ ,  $(2, 1, 3)$  and  $(1, -1, 2)$ .
3. Using Gram-Schmidt orthogonalization process, obtain an orthonormal basis for  $R^2$  from the basis  $\{(1, 1, 1), (-1, 0, -1), (-1, 2, 3)\}$ .
4. Explain isomorphism of graphs with suitable example.
5. Prove a connected graph with  $n$  vertices and  $n-1$  edges is a tree.
6. Prove that a connected graph  $G$  is Euler if and only if degree of every vertex is even.
7. Define spanning tree. Find any eight spanning trees of  $K_4$ .

## IV Write essay on any ONE

(1x10=10)

1. Verify Cayley Hamilton theorem for the Matrix  $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 1 & 1 \\ 2 & 3 & 1 \end{bmatrix}$ . Hence evaluate  $A^{-1}$ .
2. Prove that  $K_5$ , the complete graph on five vertices, is non planar.

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