MCA- E208 Graph Theory				
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Course objective:

1. To explain basic concepts in combinatorial graph theory.
2. To define how graphs, serve as models for many standard problems

Course outcomes:

1. Solve problems using basic graph theory
2. Identify induced subgraphs, matchings, covers in graphs
3. Determine whether graphs are Hamiltonian and/or Eulerian
4. Solve problems involving vertex and edge connectivity, planarity and crossing numbers
5. Solve problems involving vertex and edge coloring
6. Model real world problems using graph theory

Introduction: Applications of Graphs; Finite and Infinite Graphs; Incidence and Degree; Isolated and Pendant Vertex; Isomorphism; Sub Graph, Walks, Paths and Circuits; Connected and Disconnected Graphs; Components of A Graph; Euler Graphs; Hamiltonian Paths and Circuits; The Traveling Salesman Problem.

Trees, Circuits and Cut-sets: Properties of Trees; Pendant Vertices in A Tree; Center of A Tree; Rooted and Binary Trees; Spanning Tree, Spanning Trees in A Weighted Graph, Algorithm for Shortest Spanning Tree, Fundamental Circuits, Cut-sets and Cut Vertices; Fundamental Cut-sets, Connectivity and Separability.

Planar Graphs: Combinatorial Vs Geometric Graphs; Planar Graph; Kuratowski's Graphs; Detection of Planarity; Geometric Dual; Thickness and Crossings.

Matrix representation and coloring: Path Matrix, Cut- Set Matrix, Circuit Matrix, Incidence Matrix, Adjacency Matrix and Their Properties. Chromatic Number, Chromatic Polynomial, Chromatic Partitioning, Matchings, Covering and Four-Color Problem;

Directed Graphs: Digraphs and Binary Relations; Directed Path and Connectedness; Adjacency Matrix of Digraph

Directed Tree: Arborescence; Paired Comparison and Tournaments; Counting Labeled and Unlabeled Trees.

Algorithms: Shortest path, minimal spanning tree, Connectedness and components, Fundamental circuits, Cut- vertices and separability, Isomorphism.

Recommended Books:

1. N. Deo, Graph Theory with Applications to Engineering and Computer Science, PHI
2. Richard J. Trudeau, Introduction to Graph Theory, Dover Publications Inc

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