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CS6702 GRAPH THEORY AND APPLICATIONS L T P C 3 0 0 3

- OBJECTIVES:** The student should be made to:
- Be familiar with the most fundamental Graph Theory topics and results.
 - Be exposed to the techniques of proofs and analysis.

UNIT I INTRODUCTION 9
Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.

UNIT II TREES, CONNECTIVITY & PLANARITY 9
Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-isomorphism – 2-isomorphism – Combinatorial and geometric graphs – Planar graphs – Different representations of a planar graph.

UNIT III MATRICES, COLOURING AND DIRECTED GRAPHS 8
Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.

UNIT IV PERMUTATIONS & COMBINATIONS 9
Fundamental principles of counting – Permutations and combinations – Binomial theorem – combinations with repetition – Combinatorial numbers – Principle of inclusion and exclusion – Disjointness – Arrangements with forbidden positions.

UNIT V GENERATING FUNCTIONS 10
Generating functions – Partitions of integers – Exponential generating function – Summation operator – Recurrence relations – First order and second order – Non-homogeneous recurrence relations – Method of generating functions.

TOTAL: 45 PERIODS

OUTCOMES:

- Upon Completion of the course, the students should be able to:
- Write precise and accurate mathematical definitions of objects in graph theory.
 - Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
 - Validate and critically assess a mathematical proof.
 - Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
 - Reason from definitions to construct mathematical proofs.

TEXT BOOKS:
1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.

REFERENCES:
1. Clark J. and Hobson D.A., "A First Look at Graph Theory", Alford Publishers, 1995.
2. Moret J.J., Korfel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice Hall of India, 1996.
3. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill, 1968.
4. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill, 2007.

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