

# राष्ट्रीय प्रौद्योगिकी संस्थान पटना / NATIONAL INSTITUE OF TECHNOLOGY PATNA

संगणक विज्ञान एंव अभियांत्रिकी विभाग / DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING अशोक राजपथ, पटना-८००००५, बिहार / ASHOK RAJPATH, PATNA-800005, BIHAR

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No:- Date:

CS34110 Discrete Mathematics and Graph Theory

L-T-P-Cr: 3-0-0-3

Pre-requisites: High school mathematics.

### **Objectives/Overview:**

- To know the classical notions of logic, set theory, main formulas in combinatorics, main definitions and some classical theorems on graphs and apply graphs in concrete situations.
- The purpose of the course is to provide the students with several concepts and methods of the number theory, graph theory and their applications in engineering and computer science.

#### **Course Outcomes:**

At the end of the course, a student should:

Sl. No.	Outcome	Mapping to POs
1.	Apply methods of counting methods in problem solving.	PO-1
2.	Apply permutation and combination for solving counting problem	PO-1, PO-2
3	Apply recurrence relation to solve counting problem	PO-2, PO-4
4.	Represent problems in computer science using graphs and trees.	PO-1
5.	Apply the concept of planarity of graph to solve computer science application.	PO-3, PO-2
6.	Apply the concept of colorings in computer science application	PO-2

UNIT I: Counting Lectures:12

Basic of Counting, product rule, sum rule, Principle of inclusion-exclusion and its application, Tree Diagram method, pigeon-hole principle, Generalized Pigeonhole Principle, Permutation and Combination, Generalized Permutation and Combination;

## **UNIT II: Advanced Counting Techniques**

Recurrence Relation, solving linear Recurrence Relation, Master Theorem, Recurrence Relation for solving counting problem, Generating function,

Lecture: 10

UNIT III: Graphs Lectures: 14

paths, cycles, walk; Trees and their characterization, diameter, center, degree sequences and realizability, Eulerian trails, Hamiltonian cycles---sufficient conditions, connectivity—cut points,

bridges, block, Whitney's theorem, Planarity, colourability, Coverings and independence, digraphs, tournaments, orientability, Matrix representation of graphs,

### **Text/Reference Books**

- 1) Discrete Mathematics and Its Applications with Combinatorics and Graph Theory, 8th Ed, by Kenneth Rosen, Kamala Krithivasan, Mc Graw Hill.
- 2) Discrete Mathematics for Computer Scientists and Mathematicians 2Nd Ed by Mott Kandel & Baker, PHI
- 3) Discrete Mathematics. K. A. Ross, Ch. R. B. Wright, Prentice Hall Inc., 1992
- 4) Graph Theory & its application. Narsingh Deo, TMH
- 5) Discrete Mathematical structures and applications to Computer Science. by Trembly & Manohar, TMH.