



Subject Code: 01MA0231

Subject Name: Discrete Mathematics and Graph Theory

B. Tech. Year – II (Semester III)

Objective:

Engineering Mathematics is one of the very useful tool for learning Technology, Engineering and Sciences. In this course Learners will come across a number of standard concepts which helps them to solve core real world problems. This course is aimed to cover a variety of different concepts in Graph Theory. Theorems will be stated and proved formally using various Mathematical rules. Various graphs algorithms will also be discussed along with detail analysis.

Credits Earned: 05 Credits

Course Outcomes: After completion of this course, student will be able to:

1. Understand the basics of minimization of various functions.
2. Understand the concepts of graph theory, Lattices, and Boolean Algebra analysis of various computer science applications.
3. Apply the knowledge of Boolean algebra in computer science for its wide applicability in switching theory.
4. Apply the knowledge of graphs in building basic electronic circuits and design of digital computers.
5. Understand the application of various types of graphs in real life problem.
6. Find the shortest possible distance between two objects using the concepts of Dijkstra's algorithm.

Teaching and Examination Scheme:

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial / Practical Marks		Total Marks
				E	I		V	T	
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term Work	
4	2	0	5	50	30	20	25	25	150



Contents:

Unit	Topics	Contact Hours
1	Logic and Predicates Introduction, Logical expressions and Operators, Predicates, Rules of quantifiers, Rules of Inference for predicates and propositions.	10
2	Lattices Different types of Relations, Partially ordered set, Hasse diagram, Lattice as Partially ordered set, Properties of lattices, Lattice as an algebraic system, Concept of Duality	10
3	Boolean Algebra Introduction to Boolean algebra and properties, Sub-Boolean algebra, Atoms and anti-atoms, Boolean Expression and It's equivalences, Minterms and Maxterms, Values of Boolean expressions, Canonical forms, Karnaugh map	10
4	Graphs and Trees Introduction to graph theory, degree and incidence, walks, paths, circuits, Reachability in Graphs , Hamilton Graphs and Euler Graphs, Introduction to Acyclic Graph(Tree) and its properties, Binary tree, Spanning Tree and Minimal Spanning Tree.	10
5	Representation Graph using Matrix Edge and vertex connectivity, Separability, Fundamental cycles and cut sets Graph Isomorphism : 1-Isomorphic and 2-Isomorphic Graphs, Matrix form of graphs, Adjacency and Incidence matrix, Dijkstra's Algorithm.	10
6	Planar and Non-planar Graphs Planar and Non-planar Graphs, Stereographic Graph embedding on a sphere, Kurtowski's first and second graphs, Euler's formula, Detection of planarity and elementary reduction.	10
Total Hours		60

Suggested Text books / Reference books:

1. Rosen Kenneth: Discrete Mathematics and its Applications. McGraw Hill Publication- New Delhi.
2. Stanat and McAlister: Discrete Mathematics for Computer Science, PHI
3. Narsingh Deo: Graph Theory with Applications to Engineering and Computer Science, PHI, 1974.
4. B.Kolman and R.C. Busby: Discrete Mathematical Structures for Computer Science, Prantice Hall, New-Delhi.
5. J.P. Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer Science, McGraw Hill Publication- New Delhi.
6. S. Malik and M. K. Sen: Discrete Mathematics, Cengage Learning India Pvt. Ltd.



Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
3. Practical examination will be conducted at the end of semester for evaluation of learners in Tutorial work.
4. Students will use supplementary resources such as online videos, NPTEL videos, E-courses, Virtual Labs.

Supplementary Resources:

1. www.tutorialspoint.com/graph_theory
2. www.ied.edu.hk/has/phys/de/de-ba.htm