COURSE TITLE	**DISCRETE MATHEMATICS**
COURSE CODE	**01CE0409**
COURSE CREDITS	**4**

Objective:

1 Engineering Mathematics is one of the very useful tools 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.

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

1 Understand the concept of mathematical logic to solve verity of problem.

2 Apply set theory, functions and relation in communication and manipulation of data.

3 Apply concept of group theory to solve problem of coding theory

4 Apply combinatorial analysis and algebraic structure to various problem.

5 Apply the knowledge of graphs in building basic electronic circuits and design of digital computers.

Pre-requisite of course: Linear Algebra and Probability and Statistics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	50	30	20	0	0

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	6
2	**Lattices** Sets and 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	7
3	**Group Theory and Combinatorics** Algebraic structures with one binary operation, Semigroup, Monoid, Group, Subgroup, normal subgroup, Group Permutations, Coset, Homomorphic subgroups, Lagrange's theorem, Combinatorics: counting, recurrence relation, generating function	9

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DR. RAJENDRASINH BAHADURSINH JADEJA
Digitally signed by (Name of Dean/ Principal)

Contents : Unit	Topics	Contact Hours
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, Dijkstra's Algorithm	8
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	6
6	**Planar and Non-planar Graphs** Planar and Non-planar Graphs, Stereographic Graph embedding on a sphere, Kuratowski's first and second graphs, Euler's formula, Detection of planarity and elementary reduction, Coloring, graph matching	6
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorial:1** unit 1	1
2	**Tutorial 2** Unit 2	1
3	**Tutorial 3** Unit 3	1
4	**Tutorial 4** Unit 4	1
5	**Tutorial 5** Unit 5	1
6	**Tutorial 6** Unit 6	1
Total Hours		**6**

Textbook :

1 Discrete Mathematics and its Applications., Rosen Kenneth:, Tata McGraw Hill, 2011

References:

1 Discrete Mathematics for Computer Science,, Discrete Mathematics for Computer Science,, Stanat and McAlister:, PHI, 1977

2 Graph Theory with Applications to Engineering and Computer Science,, Graph Theory with Applications to Engineering and Computer Science,, Narsingh Deo:, PHI,, 1974

3 Discrete Mathematical Structures for Computer Science,, Discrete Mathematical Structures for Computer Science,, B.Kolman and R.C. Busby:, Prantice Hall, New-Delhi., 1984

References:

4 Discrete Mathematical Structures with Application to Computer Science, Discrete Mathematical Structures with Application to Computer Science, J.P. Tremblay and Manohar:, McGraw Hill Publication-, 2017

Suggested Theory Distribution:

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

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	25.00	30.00	15.00	10.00	0.00

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 performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1 Graph theory - Wikipediahttps://en.wikipedia.org › wiki › Graph_theory

2 graphonline.ru

3 https://archive.nptel.ac.in/courses/111/106/111106086/

4 https://nptel.ac.in/courses/106108227

5 https://nptel.ac.in/courses/106106183

6 https://www.coursera.org/courses?query=discrete%20mathematics

7 https://www.edx.org/learn/discrete-mathematics