COURSE PLAN

For

Discrete Mathematical Structures (ECSE209L)

Faculty Name : Dr. Madhushi Verma, Dr. Gunjan Rehani

Course Type : Core

Semester and Year: II Semester and I Year

L-T-P : 3-1-0

Credits : 4

Department : Computer Science Engineering

Course Level : UG

SCHOOL OF ENGINEERING AND APPLIED SCIENCES

Department of Computer Science Engineering

BENNETT UNIVERSITY
A TIMES GROUP INITIATIVE

Bennett University

Greater Naida, Uttar Pradesh

COURSE CONTEXT

SCHOOL	**SEAS**	**VERSION NO. OF CURRICULUM/SYLLABUS THAT THIS COURSE IS A PART OF**	**Version 2**
DEPARTMENT	**CSE**	**DATE THIS COURSE WILL BE EFFECTIVE FROM**	**Mar-Jun, 2021**
DEGREE	**B. Tech.**	**VERSION NUMBER OF THIS COURSE**	**Version 1**

COURSE BRIEF

COURSE TITLE	**Discrete Mathematical Structures**	**PRE-REQUISITES**	**NA**
COURSE CODE	**ECSE209L**	**TOTAL CREDITS**	4
COURSE TYPE	**Core**	**L-T-P FORMAT**	**3-1-0**

COURSE SUMMARY

Discrete mathematical structures deal with discrete objects and forms the mathematical foundation of computer and information science. The main topics of this course includes: Introduction to propositional logic, Sets, Functions and Relations, Number Theory and Counting Techniques, Group, Monoid, Ring, Field, Graph, Tree, Euler graph, Hamiltonian circuit, Clique and Matching.

COURSE-SPECIFIC LEARNING OUTCOMES (CO)

By the end of this program, students should have the following knowledge, skills and values:

CO1: Learn logical notation to illustrate sets, relations, functions, and integers.

CO2: Identify induction hypotheses and prove elementary properties of modular arithmetic.

C03: Apply graph theory models of data structures and construct state machines to solve problems of connectivity and constraint satisfaction.

How are the above COs aligned with the Program-Specific Objectives (POs) of the degree?

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Detailed Syllabus

Module 1 (Contact hours: 11)
Introduction to Propositional Logic, Proposition, Logical Operators, Tautology, Contradiction Logical Equivalence, Tautological Implication, Methods of Proof. Introduction to Sets, Some Standard Sets, Subset and Proper, Power Set, Venn Diagrams, Operations on Sets, Some Other Classes of Sets. Definition of Function, Types of Functions, Sum and Product of Functions, Functions Used in Computer Science, Definition of Relation.

Module 2 (Contact hours: 11)
Relation vs Function, Different Types of Relations, Pictorial or Graphical Representation of Relations, Matrix Representation of Relations. Closure of relations, Representation of integers, GCD, residue classes, linear congruence. Euclidean theorem, Chinese remainder theorem, inclusion-exclusion principle. Binomial coefficients, permutation, and combination.

Module 3 (Contact hours: 10)
Pigeonhole principle, Definition of semi-group, monoid, and group. Types of groups. Addition and Multiplication modulo m, definition of ring and field. Definition of ring and field contd., introduction to partially ordered set, concept, and properties of lattices.

Module 4 (Contact hours: 10)
Introduction to graph, Homomorphism and Isomorphism, Euler graph, Hamiltonian circuit, travelling salesman problem, definition of trees, spanning trees, Kruskal and Prims algorithm.Chromatic number, clique, and matching.

TEXTBOOKS/LEARNING RESOURCES:

a) Bisht, R.K. and Dhami, H.S., *Discrete Mathematics* (1st ed.), Oxford University Press, 2015. ISBN 978-0199452798.
b) O'Donnell, J., Hall, C. and Page, R., *Discrete Mathematics Using a Computer* (2nd ed.), Springer - International, 2006. ISBN 978-1846282416.

REFERENCE BOOKS/LEARNING RESOURCES:

a) Biggs, N.L., *Discrete mathematics* (2nd ed.), Oxford University Press, 2002.ISBN 978-0198507178.
b) https://www.coursera.org/learn/discrete-mathematics

EVALUATION POLICY

Components of Course Evaluation	Percentage
Mid Term Examination	20
End Term Examination	35
Assignment	5
Quiz	30
Class Participation	10