Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Second Year Bachelor of Engineering (CE/IT) – Semester III

(With effect from: Academic Year 2018-19)

Subject Code: CC302B-N	Subject Title: Discrete Mathematics
Pre-requisite:	

Teaching scheme				Total Credit	Evaluation Scheme						
L	**T**	**P**	**Total**		**Theory**		**Mid Sem Exam**	**CIA**	**Pract.**	**Total**	
Hours	**Hours**	**Hours**	**Hours**		**Hours**	**Marks**	**Marks**	**Marks**	**Marks**	**Marks**	
3	1	-	4	4	03	70	30	50	-	150	

Course Objective:

Throughout the course, students will be expected to demonstrate their understanding of Discrete Mathematics by being able to do each of the following:

1. Use mathematically correct terminology and notation.

2. Construct correct direct and indirect proofs.

3. Use division into cases in a proof.

4. Use counterexamples. 5. Apply logical reasoning to solve a variety of problems.

Outline Of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Set, Relation & Function	4
2	Lattices	6
3	Propositional Logic	7
4	Algebraic Structures and Morphism	16
5	Graphs and Trees	15
	Total	48

Total hours (Theory): 48
Total hours (Tutorial): 16
Total hours: 64

Detailed Syllabus

Sr. No	Topic	Lecture	Weightage(%)
1	**Set, Relation & Function**: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Power set theorem.	H4ou r	10%
2	**Lattices:** Hasse Diagrams, Lattices as poset, properties of lattices, complemented lattices, bounds of lattices, distributive lattice, complemented lattices.	6	15%
3	**Propositional Logic:** Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contrapositive, Proof of Necessity and Sufficiency.	7	15%
4	**Algebraic Structures and Morphism:** Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Permutation Groups, Normal Subgroups, cyclic groups, homomorphisms Algebraic Structures with two Binary Operation: Rings, Integral Domain and Fields (definition and properties). Boolean Algebra, Identities of Boolean Algebra, joinirreducible, meet-irreducible, atoms, anti atoms, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.	16	30%
5	**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Planar Graphs, Graph Colouring: Colouring maps, Colouring Vertices, Colouring Edges (definition, properties and Examples), trees, rooted trees and spanning trees, weighted trees and prefix codes, Shortest distances.	15	30%
	T o tal	**48**	100%

Instructional Method and Pedagogy:
- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- In Tutorial, class will be divide into two subclasses & faculties will solve or assign the problem of the subject in each subclass.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 10 Marks.
- One internal exam of 30 marks is conducted as a part of internal theory evaluation.
  At regular intervals assignments is given to all students which carries 30 marks

Learning Outcome:

On successful completion of this course, the student should be able to:
1. For a given logic sentence express it in terms of predicates, quantifiers, and logical connectives.
2. For a given a problem, derive the solution using deductive logic and prove the solution based on logical   Inference.
3. For a given a mathematical problem, classify its algebraic structure.
4. Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
5. Develop the given problem as graph networks and solve with techniques of graph theory.

Text / Reference Books:
1. " Discrete Mathematics and its Applications", Kenneth H. Rosen, Tata McGrawHILL .
2. "Discrete Mathematics with Applications,4th edition", Susanna S. Epp, Wadsworth Publishing Co. Inc.
3. "Elements of Discrete Mathematics A Computer Oriented Approach", C L Liu, D P   Mohapatra, Tata McGraw-Hill.
4. "Discrete Mathematical Structure and It's Application to Computer Science", J.P. Trembla and R. Manohar, TMG Edition, Tata McGraw-Hill.
5"Discrete Mathematical Structure", Bernard Kolmann & others, Sixth Edition ,Pearson Education.
6."Discrete Mathematics with Graph Theory",   Edgar G. Goodaire, Michael M. Parmenter. PHI

7"Logic and Discrete Mathematics", , J. P. Tremblay and W. K. Grassman, Pearson Education.
8"Discrete Mathematics", Norman L. Biggs, 2nd Edition, Oxford University Press.
9"Schaum's Outlines Series", Seymour Lipschutz, Marc Lipson.

List of Tutorials:

Sr. No.	Tutorial Content
1	Problem solving on "**Set, Relation & Function".**
2	Assignment on "**Lattices".**
3	Problem solving "**Propositional Logic".**
4	Assignment on "**Algebraic Structures and Morphism".**
5	Assignment on "**Graphs and Trees".**