

| <i>DEPARTMENT OF COMPUTER SCIENCE</i> | | | | <i>CLASS: I B.Sc. Computer Science</i> | | | | |
|---------------------------------------|-----------------|-------------|----------------------|--|--------------------|-----|-----|-------|
| Semester | Course Type | Course Code | Course Title | Credits | Contact Hours/week | CIA | Ext | Total |
| I | Allied theory-1 | 20U1DAT1 | Discrete mathematics | 3 | 4 | 25 | 75 | 100 |

COURSE OBJECTIVES :

To familiarize the students about the concept and techniques of propositional logic , equivalences and their applications to logic theory. To study about Graph and Graph modules.

| Units | Discrete mathematics --Course Contents | Total Hours: 60 |
|---------|--|--------------------|
| Unit -I | Propositional Logic – Propositional equivalences-Predicates and quantifiers-Nested Quantifiers-Rules of inference-introduction to Proofs-Proof Methods and strategy | 12 hrs |
| Unit-2 | Mathematical inductions-Strong induction and well ordering-.The basics of counting-The pigeon hole principle –Permutations and combinations-Recurrence relations Solving Linear recurrence relations-generating functions-inclusion and exclusion and applications | 12 hrs |
| Unit-3 | Graphs and graph models-Graph terminology and special types of graphs-Representing graphs and graph isomorphism -connectivity-Euler and Hamilton paths | 12 hrs |
| Unit-4 | Algebraic systems-Semi groups and monoids-Groups-Subgroups and Homomorphism's Cosets and Lagrange's theorem- Ring & Fields (Definitions and examples) | 12 hrs |
| Unit-5 | Partial ordering-Posets-Lattices as Posets- Properties of lattices-Lattices as Algebraic systems –Sub lattices –direct product and Homomorphism-Some Special lattices Boolean Algebra | 12 hrs |

TEXT BOOKS:

1. Kenneth H.Rosen, “Discrete Mathematics and its Applications” ,Special Indian edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi,2011.
2. Trembly J.P and Manohar R, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th edition2007.

REFERENCES:

1. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2009.
2. Thomas Koshy, ”Discrete Mathematics with Applications”, Elsevier Publications, 2006.

Lesson Plan:

| Unit | Topic | Hours | Mode |
|--|---|-------------------------|--|
| | Ice Breaking Session Expectations from the course will also be discussed | 1 | Activity: Getting to Know You The students will write down their expectations from the course and share it with the faculty Discussion on the course outline |
| I | Propositional Logic | 1 | Power Point PPT followed by classroom discussion |
| | Propositional Equivalences | 1 | Chalk and Talk |
| | Predicates and Quantifiers | 2 | Chalk and Talk followed by classwork activity involving problems |
| | Nested Quantifiers | 1 | Group presentation |
| | Rules of inference | 2 | Chalk and Talk followed by classwork activity |
| | Introduction to proofs | 2 | Chalk an Talk |
| | Proof Methods and Strategy | 2 | Power Point Presentation followed by classroom activity involving problems |
| II | Mathematical Inductions, Strong Induction and well ordering | 2 | Chalk and Talk followed by classroom activity of problem solving |
| | The Basics of Counting, The Pigeon Hole Principle | 2 | Chalk and Talk followed by classroom activity |
| | Permutations and Combinations | 2 | Group Presentation |
| | Recurrence Relations, Solving Linear Recurrence Relations | 2 | Chalk and Talk followed by individual classroom activity involving solving recurrence relations |
| | Generating Functions, Inclusion and Exclusion and Applications | 4 | Power Point Presentation followed by classroom activity involving solving problems |
| | III | Graphs and Graph Models | 2 |
| 1 | | | Group Activity: Students will be divided into groups and each group will come up with a presentation on a graph model |
| Graphs Terminology and Special Types of Graphs | | 2 | Chalk and Talk followed by a Quiz |
| Representing Graphs and Graph Isomorphism | | 3 | Chalk and Talk |
| III | | 1 | Classroom Debate: Students will be divided into groups and each group will come up with the pros and cons of each representation of graphs |
| | Euler and Hamilton Paths | 3 | Chalk and Talk followed by a Quiz |
| IV | Algebraic Systems, Semigroups and Monoids | 3 | Chalk and Talk followed by a Quiz |
| | Groups-Subgroups and Homomorphisms | 3 | Chalk and Talk followed by Group Assignment |
| | Cosets and Lagrange's Theorem | 3 | Power Point PPT followed by Discussion |
| | Ring and Fields | 3 | Chalk and Talk followed by classroom activity of problem solving |
| V | Partial Ordering, Posets | 2 | Chalk and Talk followed a Quiz |
| | Lattices as Posets, Properties of Lattices | 3 | Power Point PPT followed by Discussion |
| | Lattices as Algebraic Systems, | 2 | Chalk and Talk |
| | Sub-Lattices | 1 | Group Presentation |
| | Direct Product and Homomorphism | 1 | Chalk and Talk |
| | Some Special Lattices | 1 | Group Assignment: Students will be divided into groups and each group will be asked to do a presentation on one Special Lattices |
| | Boolean Algebra | 2 | Chalk and Talk followed by a Quiz |

COURSE LEARNING OUTCOMES:

On the completion of the course the students will be able to

| | COURSE LEARNING OUTCOME | Knowledge Level (basis of Bloom's Taxonomy) |
|-------|--|--|
| CLO-1 | Use And illustrate the concepts of proposition disjunction, conjunction and conditional statements and their use in problem solving. | K3 |
| CLO-2 | Explain and illustrate the concepts of mathematical induction and its use . | K3,K4 |
| CLO-3 | Explain and illustrate the algebraic systems, semi groups, monoids and homomorphism. | K3,K4 |
| CLO-4 | solve the concepts of lattices and Boolean algebra. | K3 |
| CLO-5 | Solve and explain the concepts of permutations and combinations and recurrence relations. | K4 |

MAPPING OF CLOs WITH PSO:

| Course Learning Outcomes | PSO 1 (Knowledge Base) | PSO 2 (Problem Analysis & Investigation) | PSO 3 (Communication Skills & Design) | PSO 4 (Individual and Team Work) | PSO 5 (Professionalism Ethics and equity) | PSO 6 (Life Long Learning) |
|---------------------------------|-----------------------------------|---|--|---|---|---------------------------------------|
| CLO-1 | 3 | 2 | 2 | 1 | 1 | 1 |
| CLO-2 | 1 | 3 | 1 | 1 | 2 | 1 |
| CLO-3 | 3 | 2 | 3 | 1 | 1 | 2 |
| CLO-4 | 2 | 2 | 3 | 1 | 2 | 3 |
| CLO-5 | 3 | 2 | 3 | 3 | 2 | 3 |

3- Advanced Application

2- Intermediate

1- Introductory