**Discrete Mathematics**

**B.Tech (Second Semester)**

**(Syllabus for CSE)**

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**Course Objectives**:

• To introduce basics of mathematical logical operators and connectives

**.** To impart knowledge on normal forms and rules of inference.

. To impart knowledge on partially ordered and total ordered sets.

• Familiarize closed form solution of linear recurrence relations by various methods.

• To impart knowledge on basic concepts of algebraic structures..

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**Unit-1: Logic Operators and Connectives (5 hours)**

Negation, conjunction, disjunction, conditional and bi-conditional, well formed

formulae, tautologies, equivalence of formulae, duality, tautological implications.

Learning outcomes:

After completion of this unit, student will be able to

. To construct the truth table.

. To able to identify tautologies, Contradiction or at least satisfiable and solve the decision problem.

**Unit-2: Mathematical logic ( 5 hours)**

Conjunctive and disjunctive normal forms- principal disjunctive and conjunctive normal forms, Rules of inference for propositional calculus (Rule P, Rule T and CP rule).

**Learning Outcomes:**

After completion of this unit, student will be able to

• find equivalence formulas, implementation of logic for mathematical proofs

• apply inference theory to verify the consistence of data

**Unit-3: Sets and Relations (5 hours)**

Basic concepts of set theory, Power set, relations, properties of binary relations in a set, Equivalence relations, composition of binary relations, Partial ordering, Partially ordered set. Hasse diagram.

**Learning Otcomes:**

After completion of this unit, student will be able to

• identify different types of sets and relations

• test the given set is an equivalence relation or not

• understand for formalizing and reasoning about computation and the objects of   
 computation using these concepts.

**Unit-4: Recurrence relations (5hours)**

Recurrence relations, solving linear recurrence relations by characteristic roots method,

system of recurrence relations.

**Learning Outcomes:**

After completion of this unit, student will be able to

• construct recurrence relations of the sequences

• solve homogeneous linear recurrence relations

• solve complementary function and particular integral for non-homogeneous linear   
 recurrence relations

**Unit-5: Algebraic Structures ( 6 hours)**

Algebraic Structures-Semi group, Monoid ,Groups, subgroups, cosets((definition and examples) Lagrange's theorem on finite groups

**Learning Outcomes:**

After completion of this unit, student will be able to

• test the given algebraic structure is a group or not

• identify different types of groups

. understand the significance and applications of Lagrange’s theorem.

**Text Books:**

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 1997.
2. Kenneth H. Rosen, Discrete Mathematics and Applications, Seventh edition, Tata McGrawHill,2012.

**Reference books:**

1. Bhishma Rao, Mathematical Foundations of Computer Science, [SciTech Publications   
 (India) Pvt Ltd](https://www.sapnaonline.com/shop/publisher/scitech-publications--india-pvt-ltd).

2. Discrete Mathematical Structures,Sixth edition-Kolman,Busby,Ross

**Course Outcomes :**

Upon successful completion of this course the student should be able to

• Check the validity of a statement formula

• analyze the concepts in set theory

• find a general solution of recurrence equation

• build the algebraic structures and implement in algorithms