**SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF MATHEMATICS**

**LESSON PLAN**

**COURSE NAME: DISCRETE MATHEMATICS**

**COURSE CODE: SMTA1302**

| Unit | Dates | Period | Topics to be Covered |
|---|---|---|---|
| **I** | | | **LOGIC** |
| | | 1 | Statements, Truth tables |
| | | 2 | Connectives – AND, OR and NOT |
| | | 3 | Equivalent Propositions |
| | | 4 | Tutorials |
| | | 5 | Tautological Implications |
| | | 6 | Normal forms – Disjunctive and Conjunctive Normal Forms |
| | | 7 | Principal Disjunctive Normal forms, Principal Conjunctive Normal forms |
| | | 8 | Tutorials |
| | | 9 | Inference theory for Propositional Calculus, Consistency and Inconsistency of Premises |
| | | 10 | Predicate Calculus |
| | | 11 | Inference theory for Predicate Calculus |

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|---|---|---|---|
| **II** | | | **SET THEORY** |
| | | 1 | Basic concepts of Set theory |
| | | 2 | Laws of Set theory – problems using laws |
| | | 3 | Partition of a set, Relations - Types of Relations – Reflexive, Irreflexive, Symmetric, Antisymmetric, Transitive |
| | | 4 | Tutorials |
| | | 5 | Equivalence relations and Partial ordering relations |
| | | 6 | Graphs of relations, Hasse Diagram for Partial ordering relations |
| | | 7 | Functions - Injective, Surjective and Bijective functions |
| | | 8 | Tutorials |
| | | 9 | Compositions of functions, Identity and Inverse functions |
| | | 10 | Theorems on Functions |
| | | 11 | Problems based on Functions |
| | | 12 | Tutorials |

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| **III** | | | **GROUP THEORY** |
| | | **1** | **Introduction to Group Theory** |
| | | 2 | Properties of Groups |
| | | 3 | Semi Groups and Monoids (Definition and examples only) |
| | | 4 | Tutorials |
| | | 5 | Problems based on Groups, Semi group and Monoids |
| | | 6 | Subgroups, Cosets and problems based on it. |
| | | 7 | More Problems based on the above |
| | | 8 | Tutorials |
| | | 9 | Lagranges Theorem |

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|---|---|---|---|
| **IV** | | | **COMBINATORICS** |
| | | 1 | Mathematical Induction – The Basis of Counting |
| | | 2 | The Pigeon hole principle. |
| | | 3 | Permutation and Combinations |
| | | 4 | Tutorials |
| | | 5 | Recurrence relations – Solving linear recurrence relations |
| | | 6 | Generating functions. |
| | | 7 | More problems based on Generating functions |
| | | 8 | Tutorials |
| | | 9 | Inclusion and exclusion principle |

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|---|---|---|---|
| **V** | | | **GRAPH THEORY** |
| | | 1 | Basic concepts of Graph theory |
| | | 2 | Graph terminology & Representation of Graphs |
| | | 3 | Types of Graphs |
| | | 4 | Tutorials |
| | | 5 | Graph isomorphism |
| | | 6 | Connectivity of Graphs |
| | | 7 | Euler & Hamiltonian paths |
| | | 8 | Tutorials |
| | | 9 | Trees and Binary Trees |
| | | 10 | Theorems on Trees and Expression trees |