

| Module No. | Unit No.   | Details of Topic  | Hrs. |
|------------|------------|---|------|
| <b>1.0</b> | <b>1</b>   | <b>Set Theory</b>   | (03) |
|            | <b>1.1</b> | Sets, Venn diagrams, Operations on Sets                                       |      |
|            | <b>1.2</b> | Laws of set theory, Power set and Products                                    |      |
|            | <b>1.3</b> | Partitions of sets, The Principle of Inclusion and Exclusion                  |      |
| <b>2.0</b> | <b>2</b>   | <b>Logic</b>  | (04) |
|            | <b>2.1</b> | Propositions and logical operations, Truth tables                             |      |
|            | <b>2.2</b> | Equivalence, Implications   |      |
|            | <b>2.3</b> | Laws of logic, Normal Forms   |      |
|            | <b>2.4</b> | Predicates and Quantifiers  |      |
|            | <b>2.5</b> | Mathematical Induction  |      |
| <b>3.0</b> | <b>3</b>   | <b>Relations, Digraphs</b>  | (07) |
|            | <b>3.1</b> | Relations, Paths and Digraphs   |      |
|            | <b>3.2</b> | Properties and types of binary relations                                      |      |
|            | <b>3.3</b> | Manipulation of relations, Closures, Warshall's algorithm                     |      |
|            | <b>3.4</b> | Equivalence relations   |      |
| <b>4.0</b> | <b>4</b>   | <b>Posets and Lattice</b>   | (05) |
|            | <b>4.1</b> | Partial ordered relations (Posets), Hasse diagram                             |      |
|            | <b>4.2</b> | Lattice, sublattice   |      |
|            | <b>4.3</b> | Types of Lattice, Boolean Algebra   |      |
| <b>5.0</b> | <b>5</b>   | <b>Functions and Pigeon Hole Principle</b>                                    | (04) |
|            | <b>5.1</b> | Definition and types of functions: Injective, Surjective and Bijective        |      |
|            | <b>5.2</b> | Composition, Identity and Inverse   |      |
|            | <b>5.3</b> | Pigeon-hole principle, Extended Pigeon-hole principle                         |      |
| <b>6.0</b> | <b>6</b>   | <b>Graphs and Subgraphs</b>   | (06) |
|            | <b>6.1</b> | Definitions, Paths and circuits, Types of Graphs, Eulerian and Hamiltonian    |      |
|            | <b>6.2</b> | Planer graphs   |      |
|            | <b>6.3</b> | Isomorphism of graphs   |      |
|            | <b>6.4</b> | Subgraph  |      |
| <b>7.0</b> | <b>7</b>   | <b>Algebraic Structures</b>   | (08) |
|            | <b>7.1</b> | Algebraic structures with one binary operation: semigroup, monoids and groups |      |
|            | <b>7.2</b> | Cyclic groups, Normal subgroups   |      |
|            | <b>7.3</b> | Hamming Code, Minimum Distance  |      |
|            | <b>7.4</b> | group codes, encoding-decoding techniques                                     |      |
|            | <b>7.5</b> | Parity check Matrix, Maximum Likelihood                                       |      |
| <b>8.0</b> | <b>8</b>   | <b>Recurrence Relations</b>   | (02) |

|              |            |                       |           |
|--------------|------------|-----------------------|-----------|
|              | <b>8.1</b> | Recurrence relations. |           |
| <b>Total</b> |            |                       | <b>39</b> |

### Recommended Books

1. Bernard Kolman, Busby, "Discrete Mathematical Structures", PHI.
2. Kenneth H. Rosen. "Discrete Mathematics and its Applications", Tata McGraw-Hill.
3. Seymour Lipschutz, Marc Lipson "Schaum's Outline of Discrete Mathematics", Revised Third Edition Tata McGraw-Hill.
4. D. S. Malik and M. K. Sen, "Discrete Mathematical Structures", Thompson.
5. C. L. Liu, D. P. Mohapatra, "Elements of Discrete Mathematics" Tata McGrawHill.
6. J. P. Trembley, R. Manohar "Discrete Mathematical Structures with Applications to Computer Science", TataMcgraw-Hill.
7. Y N Singh, "Discrete Mathematical Structures", Wiley-India.

### Term Work:

Note: The faculty should conduct 8 tutorials based on the above syllabus

### Suggested List of Tutorials:

1. Sets, Mathematical induction.
2. Relation and digraphs.
3. Relation types.
4. Functions.
5. Posets
6. Graph
7. Group
8. Coding theory.