**Annexure ‘CD – 01’**

****



U T T A R P R A D E S H

**FORMAT FOR COURSE CURRICULUM**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **L** | **T** | **P/S** | **SW/FW** | **No. of PSDA** | **TOTAL CREDIT UNITS** |
| **3** | **0** | **0** | **-** | **0** | **3** |

**Course Title: Discrete Mathematical Structures**

**Credit Units:3**

**Course Level: UG**

**Course Code: CSE208**

**Course Objectives:**

The Objective of this course is to

• Provide the fundamentals and the concepts of Discrete Mathematical Structures with Applications to Computer Sciences including Mathematical Logic, Boolean Algebra and its Applications, Graphs and Trees.

• Help the students to understand the computational and algorithmic aspects of Sets, Relations, Mathematical Logic, Boolean algebra, Graphs, Trees and Algebraic Structure in the field of Computer sciences and its applications.

**Pre-requisites:**

**Basic knowledge of Mathematics**

**Course Contents/Syllabus:**

|  |  |
| --- | --- |
|  | **Weightage (%)** |
| **Module I Set Theory and Mathematical Logic** | **25%** |
| Sets and Subsets, Venn Diagrams, Operations on sets, Laws of set theory, power sets and product of sets, principle of inclusion-exclusion. Proposition, Propositional Calculus- Propositional Variables and Compound propositions, Basic Logical Operations: Conjunction, Disjunction, Negation, Conditional, Biconditional. Compound Statements, Equivalence, Duality, Algebra of Statements, Valid and Invalid, Arguments, Tautologies, Contradiction, Contingency |
| **Module II Relations, diagraphs and lattices** | **20%** |
| Definition and Properties of relation, type of relation, diagraph representation of relation, equivalence and partially ordered relation, transitive closure and Warshall’s algorithm, posets and Hasse diagrams, Introduction to Lattice,  **Types of Lattice, Distributed and Complemented lattice, Lattice as a Boolean Algebra.** |
| **Module III Boolean Algebra and Applications** | **20%** |
| Definition of Boolean Algebra, Laws of Boolean Algebra, Basic Theorems, Boolean Functions – Disjunctive Normal Form, Conjunctive Normal Form, Duality Principle. Boolean Expression – Sum of Products, Product of Sum, Minterm and Maxterm, Applications of Boolean Algebra. |
| **Module IV Graphs and Trees** | **20%** |
| Graph: Finite graph, Infinite graph, connected graph, Disconnected graph, Null graph. Subgraph, Incidence, Adjacency, Degree, Directed Graph, Walk, Path, Circuit, Wheel, Eulerian graph, Hamiltonian graph, Planar graph, Isomorphism of Graph, coloring of Graph.  Tree: Properties of Tree, weighted tree, rooted tree, binary tree, Spanning Tree, Incidence Matrix, Adjacency Matrix. |
| **Module V Algebraic Structure** | **15%** |
| Algebraic structure with one binary operation, semi groups, monoid and groups, isomorphism, homomorphism, cyclic group. |

**Course Learning Outcomes:**

After completion of the course, student will be able to:

Understand and Demonstrate basics of mathematical Sets and proposition calculus.

Demonstrate the knowledge of relations, diagraphs and lattices.

Understand the concept Boolean algebra, its properties and circuit design.

Apply the knowledge of Graph theory and trees in computer science.

Demonstrate the knowledge of Algebraic Structures, its properties and various operations.

**Pedagogy for Course Delivery:**

**The course will be taught in theory based mode. The instructor will discuss numerical computation problems to the students for better understanding of the concept.**

**Assessment/ Examination Scheme:**

|  |  |  |
| --- | --- | --- |
| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **Total** |
| **100** |  | **100** |

**Theory Assessment (L&T):**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Continuous Assessment/Internal Assessment**  **(40%)** | | | | | | | **End Term Examination** |
| **Components (Drop down)** | **ATT** | **HA** | **Minor Exam** | **CT** |  |  |  |
| **Linkage of PSDA with Internal Assessment component, if any** |  |  |  |  |  |  |  |
| **Weightage (%)** | 5 | 10 | 15 | 10 |  |  | 60% |

**Theory Assessment (L&T):**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Continuous Assessment/Internal Assessment**  **(40%)** | | | | | | | **End Term Examination** |
| **Components (Drop down)** | **ATT** | **HA** | **VIVA** | **CT** | **Minor Experiment** | **Quiz** |  |
| **Linkage of PSDA with Internal Assessment component, if any** |  |  |  |  |  |  |  |
| **Weightage (%)** | 5 | 8 | 7 | 10 | 5 | 5 | 60% |

**Lab/ Practical/ Studio Assessment:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Continuous Assessment/Internal Assessment** | | | | **End Term Examination** | | |
| **Components (Drop down)** |  |  |  |  |  |  |  |
| **Weightage (%)** |  |  |  |  |  |  |  |

**Text Book:**

* C.L. Liu, Elements of Discrete Mathematics, Tata McGraw Hill, Second Edition
* Kenneth H. Rosen, Discrete Mathematics and its Applications, Mc.Graw Hill
* Seymour Lipschutz and Marc Lars Lipson, “Theory and Problems of DISCRETE MATHEMATICS”, Third Edition by by TMH
* Narsingh Deo, Graph Theory With Applications To Engineering And Computer Science
* SEYMOUR LIPSCHUTZ **SCHAUM'S**. **OUTLINE** OF Theory and Problems of **DISCRETE**. **MATHEMATICS**. Third Edition. McGRAW-HILL

**References:**

* J.P.Tremblay & R. Manohar, “Discrete Mathematical Structure with Applications to Computer Science” Mc.Graw Hill
* Colmun, Busby and Ross, Discrete Mathematical Structure, PHI, 6th Edition,

**Additional Reading:**

**Any other Study Material:**