

Discrete Mathematical Structures

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|--------------------------------|----------------|---------------------------------|-------|----------------------|-------------------|
| Course Code | 20BS1303 | Year | II | Semester | I |
| Course Category | Basic Sciences | Branch | CSE | Course Type | Theory |
| Credits | 3 | L-T-P | 3-0-0 | Prerequisites | Basic Mathematics |
| Continuous Evaluation : | 30 | Semester End Evaluation: | 70 | Total Marks: | 100 |

Course Outcomes

Upon successful completion of the course, the student will be able to

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|------------|---|-----------|
| CO1 | Understand the fundamental concepts of discrete mathematical structures | L2 |
| CO2 | Apply Normal forms/Rules of Inference for solving suitable problems. | L3 |
| CO3 | Apply the method of characteristic roots for solving different recurrence relations and make an effective document. | L3 |
| CO4 | Analyze various graph techniques to construct a tree. | L4 |

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | √ | | | | | | | | | | | | | |
| CO2 | √ | | | | | | | | | √ | | | | |
| CO3 | | | | | | | | | | √ | | | √ | |
| CO4 | | √ | | | | | | | √ | √ | | | | |

Syllabus

| Syllabus | | Mapped CO |
|----------|---|-----------------|
| Unit No. | Contents | |
| I | <p>Mathematical Logic: Introduction-Statements and Notations-Connectives(Negation,Conjunction,Disjunction)-Statement formulas and Truth Tables, Conditional and Bi-conditional, Well-Formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implication, Functionally Complete Sets of Connectives, Other Connectives.</p> <p>Normal Forms: Disjunctive Normal Forms (DNF), Conjunctive Normal Forms (CNF), Principal of Disjunctive Normal Forms (PDNF), Principal of Conjunctive Normal Forms (PCNF).</p> | CO1, CO2 |

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|------------|---|----------------|
| II | Theory of Inference for Statement Calculus: Validity using Truth Tables-Rules of Inference – Consistency of Premises and Indirect Method Proof. Predicate calculus: Introduction to Predicates - Statement functions, Variable and Quantifiers- Predicate Formulas-Free and Bound Variables-Universe of Discourse. | CO1,CO2 |
| III | Recurrence Relations -The Method of Characteristic Roots-Solutions in Inhomogeneous Recurrence Relation. | CO1,CO3 |
| IV | Relations and Directed Graphs -Special Properties of Binary Relations- Equivalence Relations- Ordering Relations, Lattices, and Enumerations- Operations on Relations- Paths and Closures-Directed Graphs and Adjacency Matrices | CO1,CO4 |
| V | Graphs - Basic Concepts- Isomorphism's and Sub graphs-Trees and Their Properties - Spanning Trees-Planar Graphs-Euler's Formula- Multi-graphs and Euler Circuits-Hamiltonian Graphs- Chromatic Numbers. | CO1,CO4 |

Learning Resources

Text Books

1. Discrete Mathematical Structures with Applications to Computer Science , J P Trembly and R Manohar, 1988, McGraw-Hill (**Unit-I,II**)
2. Discrete Mathematics for Computer Scientists & Mathematicians, Joe L. Mott. Abraham Kandel and Theodore P. Baker, Second Edition, 2017, PHI. (**Unit-III,IV,V**)

References

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, Seventh Edition, 2017, McGraw-Hill.

e-Resources & other digital material

1. <https://www.geeksforgeeks.org/engineering-mathematics-tutorials/>
2. https://www.tutorialspoint.com/discrete_mathematics/index.htm
3. <http://www.alas.matf.bg.ac.rs/~mi10164/Materijali/DS.pdf>
4. <https://nptel.ac.in/courses/111107058/>