

### Discrete Mathematical Structures

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

#### Course Outcomes

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

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

#### Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3													
<b>CO2</b>	2									1				
<b>CO3</b>										1			2	
<b>CO4</b>		3							1	1				

Syllabus		Mapped CO
Unit No.	Contents	
<b>I</b>	<p><b>Mathematical Logic:</b> 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><b>Normal Forms:</b> Disjunctive Normal Forms (DNF), Conjunctive Normal Forms (CNF), Principal of Disjunctive Normal Forms (PDNF), Principal of Conjunctive Normal Forms (PCNF).</p>	<b>CO1, CO2</b>

<b>II</b>	<b>Theory of Inference for Statement Calculus:</b> Validity using Truth Tables-Rules of Inference – Consistency of Premises and Indirect Method Proof. <b>Predicate calculus:</b> Introduction to Predicates - Statement functions, Variable and Quantifiers- Predicate Formulas-Free and Bound Variables-Universe of Discourse.	<b>CO1,CO2</b>
<b>III</b>	<b>Recurrence Relations</b> -The Method of Characteristic Roots-Solutions in Inhomogeneous Recurrence Relation.	<b>CO1,CO3</b>
<b>IV</b>	<b>Relations and Directed Graphs</b> -Special Properties of Binary Relations- Equivalence Relations- Ordering Relations, Lattices, and Enumerations- Operations on Relations- Paths and Closures-Directed Graphs and Adjacency Matrices	<b>CO1,CO4</b>
<b>V</b>	<b>Graphs</b> - 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.	<b>CO1,CO4</b>

### 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](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/>