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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Program: Bachelor of Science Honours (Information Technology) | | | | | | | Semester: I | | | |
| Course: Discrete Mathematics | | | | | | | Code: | | | |
| Teaching Scheme | | | | | Evaluation Scheme | | | | | |
| Lecture | Practical | Tutorial | | Credits | Theory | | | | Practical | |
| Internal | External | | | Internal | External |
| 30 | Nil | Nil | | 02 | 20 | 30 | | | Nil | Nil |
|  | | | | | | | | | | |
| Internal Component | | | | | | | | | | |
| Class Test Duration Mins | | | Assignment& projects | | | | | Class Participation | | |
| 10 Marks 20 Mins | | | 10 Marks | | | | | Nil | | |
|  | | | | | | | | | | |
| Learning Objectives   1. To think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems. 2. To be capable of managing complex IT projects with consideration of the human, financial and environmental factors. 3. To develop an aptitude to engage in continuing professional development to think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems. | | | | | | | | | | |
| Learning Outcomes   1. Mathematics Basis of various algorithms and logic building 2. Mathematics basis for recursive functions 3. Mathematics behind sequence and series 4. Mathematics of Graph and Trees 5. Combination and probability concepts. | | | | | | | | | | |
| Pedagogy   * PPTs, Case studies, Group discussions, Classroom Activity, Videos, Research papers, News articles etc. | | | | | | | | | | |

**Module 1 (10)**

Set Theory Basics – Union, Intersection, De morgan’s law, Set Difference and other Laws The Logic of Compound Statements: Logical Form and Logical

Equivalence, Conditional Statements, Valid and Invalid Arguments Quantified Statements: Predicates and Quantified Statements, Statements with Multiple Quantifiers, Arguments with Quantified Statements Elementary Number Theory and Methods of Proof: Introduction to Direct Proofs Rational Numbers, Divisibility, Division into Cases and the Quotient-Remainder Theorem, Floor and Ceiling.

**Module 2 (10)**

Sequences, Mathematical Induction, and Recursion:

Defining sequences recursively, solving recurrence relations by iteration, Second order linear homogenous recurrence relations with constant coefficients. General recursive definitions and structural induction. Functions: Functions Defined on General Sets, One-to-One and Onto, Inverse Functions, Composition of Functions, Cardinality with Applications to Computability Relations: Relations on Sets, Reflexivity, Symmetry, and Transitivity, Equivalence Relations, Partial Order Relations

**Module 3** (10)

Graphs and Trees: Definitions and Basic Properties, Trails, Paths, and Circuits, Matrix Representations of Graphs, Spanning trees and shortest paths. Counting and Probability: Introduction, Possibility Trees and the Multiplication Rule, Possibility Trees and the Multiplication Rule Probability Axioms and Expected Value, Conditional Probability, Bayes’ Formula, and Independent Events. Introduction to Game theory.