| Branch: B.Sc.(IT) | Semester-I |
|---|---|
| Subject Code: 1104 | Lecture: 04 Credit: 04 |
| Course Opted | Core Course-3 (Theory) |
| Subject Title | Mathematics-I |

**Course Objective**:
- To introduce fundamental concepts of differential and applications of discrete structures and differential equations in the field of computer science
- Work with matrices and determine if a given square matrix is invertible.
- To learn about First order differential equations
- To introduce the basics of the theory of sets and some of its applications.

**Learning Outcomes**:
- After the completion of the course, Students will be able to
- Find the inverse of a square matrix. Solve the matrix equation Ax = b using row operations and matrix operations. Find the determinant of a product of square matrices, of the transpose of a square matrix, and of the inverse of an invertible matrix
- Will understand First order differential equations
- Will learn the basics of the theory of sets and some of its applications

| Modules | Sr. No. | Topic and Details | No. of Lectures Assigned | Marks Weight age % |
|---|---|---|---|---|
| UNIT-I | 1 | Matrices and Determinants Definition of a matrix; Operations on matrices; Square Matrix and its inverse; determinants; properties of determinants; the inverse of a matrix; solution of equations using matrices and determinants; solving equations using determinants; eigen values and eigen vectors of a matrix | 14 | 28 |
| UNIT-II | 2 | Differential Equation First order differential equations; practical approach to Differential equations; first order and first degree differential equations; homogeneous equations. Linear equations; ; Exact Differential Equations. | 14 | 28 |
| UNIT-III | 3 | Set Theory: Definition of Sets, Subsets, Cardinality of Sets, types of sets: Equal Sets, Universal Sets, Finite and Infinite Sets, proper set, power sets, Operations on Sets: Union, Intersection, Complement of Sets, set difference, Cartesian Product, Venn Diagrams, and Algebra of sets | 6 | 12 |
| | 4 | Properties of integers: Definition of GCD, LCM, Theorems Euclidean algorithm and problems | 5 | 10 |

| | 5 | Relations:<br>Definitions of Relation, Reflexive Relation, Symmetric Relation, Transitive relation, Equivalence Relation | 6 | 12 |
|---|---|---|---|---|
| **UNIT-IV** | 6 | Functions :<br>Define Function ,Injective functions ,Surjective functions, Bijective functions, Composite function, Inverse of a function, Domain and Range | 5 | 10 |
| | | **Total** | 50 | 100 |

**Outcomes:**
On the successful completion of the course, the student will be able to:
- Apply the knowledge of matrices to solve the problems
- Understand the theory and techniques of set, functions ,relation .
- Understand some basic properties discrete structures, and be able to relate these to practical examples.
- Apply the knowledge and skills obtained to investigate and solve problems related to differential equations .

**Text & Reference Books:**

- Kolman, Busby and Ross, "Discrete mathematical Structures and graph theory" , 6ᵗʰ Edition, 2009
- Alan Doerr, K. Levasseur , "Applied discrete structure for computer science",  Galgotia publications, 1988
- P. N. Wartikar & J. N. Wartikar, "Elements of Applied Mathematics", 7th, Pune Vidyarthi Graha, 1988,
- Grewal. B.S, "Higher Engineering Mathematics", 41 st Edition, Khanna Publications, Delhi, 2011.
- Dass, H.K., and Er. Rajnish Verma," Higher Engineering Mathematics", S. Chand Private Ltd., 2011.