**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**CSE-Data Science/Data Science, IV semester**

## CD401 Introduction to Discrete Structure & Linear Algebra

**Unit 1:** Set Theory, Relation, Function, Theorem Proving Techniques:Set theory: definition of sets, Venn Diagram, proofs of some general identities on set,Relation: Definition, Types of relation ,Composition of relation ,Equivalence relation, Partial ordering relation,POSET,Hasse diagram and Lattice .

**Unit 2:**Algebraic structure: Definition, Properties, types: Semi Group, Monoid, Groups, Abelian Group, Properties of group, cyclic group, Normal subgroup, Ring and Fields: definition and standard result, Introduction to Recurrence Relation and Generating Functions.

**Unit 3:**Propositional logic: Proposition, First order Logic, Basic logical operation, Truth tables, Tautologies and Contradiction, algebra of proposition, logical implication, logical equivalence ,predicates, Normal Forms, Quantifiers

Graph theory: Introduction and basic terminology of graph, types of graph, Path, Cycles, Shortest path in weighted graph, graph colorings.

**Unit 4:** Matrices: Determinant and Trace,Cholesky Decomposition, Eigen decomposition,Singular Value decomposition(SVD),Gradient of a matrix:Useful identities For computing Gradient.

**Unit 5:** Test of Hypothesis : Concept and Formulation ,Type-I and Type-II Errors,Time Series Analysis ,Analysis of Variance (ANOVA)

**References:**


1. C.L.Liu, “Elements of Discrete Mathematics” Tata Mc Graw-Hill Edition.

2. Trembley, J.P & Manohar; “Discrete Mathematical Structure with Application CS”, McGraw Hill.

3. Kenneth H. Rosen, “Discrete Mathematics and its applications”, McGraw Hill.

4. Bisht, “Discrete Mathematics”,Oxford University Press

5. Biswal,”Discrete Mathematics & Graph Theory”, PHI

6. Mathematics For Machine Learning-Marc Peter Deisenroth,A. Aldo Faisal,Cheng soon ong

7.Statistical Method- S.P. Gupta


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