

Course Title	Discrete Mathematics and Statistical Methods
Course Code	MA404
Course Credit	Lectures : 03
	Practical : 00
	Tutorial : 01
	Total : 04
Course Learning Outcomes	
<p>After Successful completion of the above course, students will be able to:</p> <ul style="list-style-type: none"> <li>➤ <b>CLO 1:</b> Understand the foundations of Computer Science and appreciate some of its theoretical and applied uses. We will learn ways to represent graphs as data structures and develop graph algorithms for classical problems in graph theory.</li> <li>➤ <b>CLO 2:</b> Students will develop a strong foundation in programming, software development and data manipulation and become familiar with theoretical aspects of computer science.</li> <li>➤ <b>CLO 3:</b> Appreciate and develop facility with mathematical structures. We will connect the different representations and properties of graphs and develop facility in their use in algorithms.</li> <li>➤ <b>CLO 4:</b> Students must be able to understand and write rigorous arguments (i.e., proofs) for theorems.</li> <li>➤ <b>CLO 5:</b> Learn, <b>Interpret</b>, and communicate definitions, examples, fundamental theorems.</li> <li>➤ <b>CLO6:</b> <b>Applications</b> relevant to the study of mathematical statistics.</li> <li>➤ <b>CLO7:</b> <b>Solve</b> the problems in mathematical statistics.</li> </ul>	

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Detailed Syllabus		
Sr. No.	Name of chapter & Details	Hours Allotted
<b>Section – I</b>		
1.	<b>Graph Theory</b> Basic Concept of Graph theory, path, reach - ability, Connectedness, Matrix representation of graph, tree, Application of graph	08
2.	<b>Mathematical logic and Set Theory</b> Introduction, Connectives, statement formulas, principle of substitution, validity of arguments, Quantifiers, Propositional Calculus: Tautology, contradiction, Predicates, Introduction to Fuzzy set theory, function and Relation and its applications.	04
3.	<b>Boolean Algebra And Lattices</b> Lattices, Lattices as Poset, Direct product, Homomorphism, Complete Lattices , Bounds of Lattices , distributive Lattices , Boolean Algebra, sub Boolean Algebra, Direct product, Atoms, Anti- Atoms, Stone’s representation theorem (without proof), Boolean expression and their equivalence, minterms and maxterms, free Boolean algebra, Values of Boolean expression, Canonical forms, Boolean functions, representation of Boolean function.	10
4.	<b>Group Theory</b> Definition of group, Abelian group, Cyclic group, Permutation group, Sub group, Homomorphism. Applications of Group.	06
<b>Section – II</b>		
5.	<b>Probability and Distribution</b> Defining Probability, Conditional Probability, Normal Distribution, Binomial Distribution.	04
6.	<b>Sampling Techniques</b> Concept of sampling, Simple Random Sampling, Systematic Sampling.	03
7.	<b>Foundation for Inference</b> Variability in estimates and the central limit theorem, Confidence Intervals, Hypothesis Test.	04
8.	<b>Inference for Numerical Variables</b> Comparing two means, Inference with t-distribution, Comparing three or more means, Inference for categorical variables, Comparing three or more Proportions (Chi-Square).	04

9.	<b>Introduction to linear regression and Co-relation</b> Relationship between two numerical variables, Linear regression with a single Predictor, Outliers in linear regression, Inference for linear regression, Co-relation.	05
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**Instructional Method and Pedagogy:**

- Lectures will be conducted with the aid of multi-media projector & blackboard.
- Assignments based on course content will be given to the students attend of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/will be conducted.
- The course includes tutorials, where students have an opportunity to practice the examples for the concepts being taught in lectures.

**Reference Books:**

1. Higher Engineering Mathematics by Grewal B. S. and Grewal J. S., Khanna Book Publishing Co. (P) Ltd. Delhi (39th edition)
2. Graph Theory with Applications to Engineering and Computer Science by Deo Narsingh, Prentice-Hall of India Private Limited New Delhi (1st edition)
3. Discrete Mathematical Structures with Applications to Computer Science, Tremblay J. P. Manohar R., TATA Mc Graw-Hill Publishing Company Limited, New Delhi (1st edition)
4. Discrete Mathematics by Malik D.S., Cengage Learning India New Delhi (1st edition)
5. Kapoor Gupta, Fundamental of mathematical Statistics by S.Chand & Sons Publications.