

COURSE STRUCTURE

Course Code	MAS2068B			
Course Category	Basic Sciences			
Course Title	Discrete Mathematics and Basic Statistics			
Teaching Scheme and Credits	L	T	Laboratory	Credits
Weekly load hrs.	03	01	--	3+1+0=4
<u>Pre-requisites:</u> <ul style="list-style-type: none"> Basic Mathematics 				
<u>Course Objectives:</u> <ol style="list-style-type: none"> To understand the logic for solving problems using set theory and combinatorial problem using probability theory To gain the knowledge of relations and functions to solve relevant problems in computer science To acquire knowledge of concepts and applications of Number Theory. 				
<u>Course Outcomes:</u> <p>After completion of this course students will be able to:</p> <ol style="list-style-type: none"> Analyze and Articulate the logic to solve a problem using set theory and combinatorial problem using probability theory Apply knowledge of relations and functions to solve relevant problems in computer science Demonstrate the concepts and applications of Number Theory in Computer Science. 				
<u>Course Contents:</u> <p>Set Theory: Sets, Combinations of sets, Venn Diagrams, Finite and Infinite sets: Uncountable and Countable, Principle of inclusion and exclusion, Multisets, Cartesian Product and Power Set</p> <p>Relations and Functions: Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Warshall's Algorithm to find transitive closure, Equivalence Relations, Partial Orderings - Chain, Anti chain and Lattices.</p>				

Function: surjective, injective and bijective functions, Inverse Functions and Compositions of Functions, Recursive Function.

COUNTING: The Basics of Counting, Permutations and Combinations, Binomial Coefficients, Algorithms for generating Permutations and Combinations, The Pigeonhole Principle,

Algebraic structure: algebraic system , Semi Groups, Monoids , Groups, Homomorphism , subgroups, Normal Subgroups and congruence relations, Rings, Integral Domains and Fields.

Statistics

Introduction to statistics, Measures of central tendency, measures of dispersion, coefficient of variation, moments, skewness and kurtosis, Correlation, rank correlation, Linear regression.

Probability: Introduction to basic Probability, Random Variable, Discrete & continuous, Cumulative Distributive function, Probability Density function, Probability distribution: Binomial, Poisson and Normal Distributions. Test of hypothesis: Chi-square distribution.

Number Theory and Its Applications: Modular Arithmetic & its properties, The Euclidean Algorithm, Extended Euclidean algorithm, Solving Congruence equations, The Chinese Remainder Theorem, Fermat's Theorem, Primitive Roots and Discrete Logarithms.

Tutorial :

- 1) Problem Solving on Set Theory
- 2) Relations, equivalence and partial order relation
- 3) functions
- 4) permutation, combination
- 5) Pigeonhole principle
- 6) Group , subgroup, Homomorphism
- 7) Rings, Integral domain.
- 8) Fields.
- 9) Measures of central tendency, variability
- 10) Moments ,skewness, kurtosis, correlation ,regression
- 11) Probability distribution
- 12) Chi square test
- 13) Problem solving on Number Theory.

Two tutorials will be conducted using Mathematical Software. Tutorial shall be engaged in four batches (batch size of 15 students) per division.

Learning Resources:

Text Books:

1. Kenneth H. Rosen, —Discrete Mathematics and its Applications, Tata McGraw-Hill, ISBN 978-0-07-288008-3, 7th Edition.
2. C. L. Liu, —Elements of Discrete Mathematics, TMH, ISBN 10:0-07-066913-9.

Reference Books:

1. Bernard Kolman, Robert C. Busby and Sharon Ross, —Discrete Mathematical Structures, Prentice-Hall of India /Pearson, ISBN: 0132078457, 9780132078450.
2. Dr. K. D. Joshi, — Foundations of Discrete Mathematics, New Age International Limited, Publishers, January 1996, ISBN: 8122408265, 9788122408263

Supplementary Reading:

1. N. Biggs, “Discrete Mathematics”, 2nd Edition, Oxford University Press
2. Data Structures – Seymour Lipschutz, Schaum’s outlines, MCGraw – Hill Inc.

Web Resources:

<https://learn.saylor.org/course/cs202>

<https://www.mooc-list.com/tags/discrete-mathematics>

Web links:

https://www.tutorialspoint.com/discrete_mathematics/index.htm

MOOCs:

<http://nptel.ac.in/courses/106106094/3>

<https://www.coursera.org/learn/discrete-mathematics>

Pedagogy:

- Chalk and Board
- PPT
- Two Teacher Method
- Video Lectures

Assessment Scheme:

Class Continuous Assessment (CCA): 60 marks

Class test/home assignments	Tutorial	Mid Term Test	Total
10 Marks	30 Marks	20 Marks	60 Marks

Term End Examination: 40 Marks

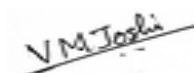
Syllabus:

Theory:

Module No.	Contents	Workload in Hrs		
		Theory	Tut	Assess
1	Set Theory: Sets, Combinations of sets, Venn Diagrams, Finite and Infinite sets: Uncountable and Countable, Principle of inclusion and exclusion, Multisets, Cartesian Product and Power Set Fuzzy sets, Basic concepts and types of Fuzzy sets, Operations on Fuzzy sets	07	2	--
2	Relations and Functions: Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Warshall's Algorithm to find transitive closure, Equivalence Relations, Partial Orderings - Chain, Anti chain and Lattices. Function: surjective, injective and bijective functions, Inverse Functions and Compositions of Functions, Recursive Function.	08	2	-
3	COUNTING: The Basics of Counting, Permutations and Combinations, Binomial Coefficients, Algorithms for generating Permutations and Combinations, The Pigeonhole Principle, Algebraic structure : algebraic system , Semi Groups, Monoids , Groups, Homomorphism , subgroups, Normal Subgroups and congruence relations, Rings, Integral Domains and Fields.	08	3	-
4	Statistics Introduction to statistics, Measures of central tendency, measures of dispersion, coefficient of variation, moments, skewness and kurtosis, Correlation, rank correlation, Linear regression.	07	3	-
5	Probability: Introduction to basic Probability, Random Variable, Discrete & continuous, Cumulative Distributive function, Probability Density function, Probability distribution: Binomial,	07	2	

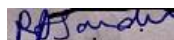
	Poisson and Normal Distributions. Test of hypothesis: Chi-square distribution.			
6	Number Theory and Its Applications: Modular Arithmetic & its properties, The Euclidean Algorithm, Extended Euclidean algorithm, Solving Congruence equations, The Chinese Remainder Theorem, Fermat's Theorem, Primitive Roots and Discrete Logarithms	08	3	

Prepared By



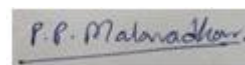
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