BHARATI VIDYAPEETH'S
INSTITUTE OF COMPUTER APPLICATIONS & MANAGEMENT (BVICAM)
(Affiliated to Guru Gobind Singh Indraprastha University, Approved by AICTE, New Delhi)
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Lesson Plan

Course: MCA-101 – Discrete Structures	
MCA – 1st Semester	No. of Theory Hours per Week: 04

Course Outcomes (COs):

COs for Theory (MCA-253)	
CO$_1$	Choose appropriate discrete structures and Combinatorics for basic problems. (BTL1)
CO$_2$	Interpret and illustrate the basics of Group Theory. (BTL2)
CO$_3$	Examine and infer mathematical logic and Boolean Algebra.(BTL4)
CO$_4$	Evaluate applications of number theory.(BTL5)
CO$_5$	Implement and create models for computer science problems by understanding the concepts of Graph Theory. (BTL6)

Recommended Books:

Books	S. No.	Details of the Books
Text Books	1.	Kenneth H. Rosen, "Discrete Mathematics & its Applications: With Combinatorics and Graph Theory", McGraw Hill, 7 th Edition, 2017 **[TB1].**
	2.	.J. P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 1 st Edition, 2001 **[TB2]**
	3.	Swapan Kumar Sarkar, "A Textbook of Discrete Mathematics", S. Chand Publishing, 9 th Edition, 2019. **[TB3]**
Reference Books	1.	Kolman, Busby and Ross, "Discrete Mathematical Structures", Pearson, 10 th Edition, 2015.**[RB1]**
	2.	D. S. Malik and M. K. Sen, "Discrete Mathematics: Theory and Applications", Cengage, 1 st Edition, 2012.**[RB2]**
	3.	C. L. Liu, D. P. Mohapatra, "Elements of Discrete Mathematics", McGraw Hill, 4 th Edition, 2012 **[RB3]**
	4.	S. Santha, "Discrete Mathematics with Combinatorics and Graph Theory", Cengage, 1 st Edition, 2009 **[RB4]**

| | 5. | Narsingh Deo, "Graph Theory with Applications to Engineering and Computer Science", PHI, 1 st Edition (1979), 24 th Indian Print, 2003**[RB5]** |
| | | **RB1.** |

Lesson Plan for Theory:

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
UNIT - I		
1.	Sets, Subsets, Power Set, Multi-sets, Operations on Sets and Algebra of sets.	TB1 [Chapters 2, 4, 5, 6, 7]; TB2 [Chapters 2, 3]; TB3 [Chapter 4, 7, 8, 10, 11]
2.	Principle of Inclusion and Exclusion and Cartesian Product	
3.	Relations and Types of Relations	
4.	Equivalence Relation, Partial Order Relation and Closure of Relation	
5.	Function, Properties of Functions, One-one Function, Many-one Function, Onto function, Composition of a Function and Invertible Function.	
6.	Permutation, Combination, Combination with Unlimited Repetition	
7.	Pigeonhole Principle, Recurrence Relations: Definition, Solution of Linear First-order Recurrence Relations with Constant Coefficients (Homogeneous)	
8.	Solution of Linear First-order Recurrence Relations with Constant Coefficients (Non-homogeneous).	
9.	Buffer Reserved for Revision	
UNIT – II		
10.	Statement, Symbolic Representation, Tautologies, Fallacy and Operations on Logic	TB1 [Chapters 1, 4, 5, 10]; TB2 [Chapters 1, 4]; TB3 [Chapters 2, 3, 9]
11.	Logically Equivalence, Algebra of Propositions, Arguments and Validity, Rules of Inference for Propositional Logic, and Normal Forms.	
12.	Methods of Proofs: Direct Proof, Indirect Proof, Proof by Contradiction and Proof by Exhaustive Cases	
13.	Principle of Mathematical Induction,	

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
	Principle of Complete Induction.	
14.	Lattices: Poset and Lattice	
15.	Sublattices, Types of Lattices - Bounded Lattice, Distributive Lattice, Complemented Lattice and Isomorphic Lattices.	
16.	Boolean Algebra: Definition, Subalgebra, Boolean Function, Boolean Expressions, Minimization of Boolean Function, K-Map	
17.	Buffer Reserved for Revision	
UNIT – III		
18.	Primes, Division Algorithm, Greatest Common Divisor (GCD)	TB1 [Chapters 3, 11]; TB2 [Chapters 3, 6]; TB3 [Chapters 6, 12, 20]
19.	LCM, Euclidean Algorithm, Fundamental Theorem of Arithmetic,	
20.	Congruences, Linear Congruence equations, Chinese-Remainder Theorem, Euler Phi function, Fermat's Little Theorem, Applications of Congruences – ISBN, UPC, Introduction to Cryptography.	
21.	**Group Theory**: Definition, Groups as Symmetries,	
22.	Subgroups, Cosets,	
23.	Cyclic Group, Normal Subgroups,	
24.	,Quotient Group, Lagrange's Theorem,	
25.	Homomorphism, Permutation Group	
26.	Buffer Reserved for Revision	
UNIT - IV		
27.	Graphs, Types of Graphs, Degree of a Vertex,	TB1 [Chapter 8]; TB2 [Chapter 5]; TB3 [Chapters 14, 15]
28.	Subgraphs and Isomorphic Graphs,	
29.	Representation of Graphs, Operations of Graphs, Walks and Paths, Connectivity,	
30.	Weighted Graphs, Euler Graph, Fluery's Algorithm,	
31.	Hamiltonian Graph, Cut-Vertices and Cut-Edges,	
32.	Planar Graphs, Euler's formula,	

Lecture No.	Topics/Concepts to be Covered	Reference of the Book and its Chapter
33.	Graph Colouring - Vertex Colouring, Edge Colouring, Chromatic Number and Chromatic Polynomial, Welch-Powell Algorithm	
34.	Four Colour Conjecture, Five Colour Theoremregistration	
35.	Buffer Reserved for Revision	

Testing Schedule:

Nature of Test	August	September	October	
Surprise Test (ST)	ST in any of the Weeks	-	-	-
Mid Term Test (MT)	-	TBAL	-	-
Class Test (CT)	-	-	CT in any of the Weeks	-
Supplementary Test (Sp. T)	-	-	Sp. T in 1st Week	
Assignment Submission Schedule	**Assignment-1** is to be submitted One Week after completion of Unit-1 and Unit-2. **Assignment-2** is to be submitted One Week after completion of Unit-3. **Assignment-3** is to be submitted One Week after completion of Unit-4.			