SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Computer Applications

Integrated MCA I Semester 1

Subject Name: Mathematics-1 **Subject Code:** MTCI11109

Type of course: Basic Science

Prerequisite (if any):
- Mathematical Fundamentals

List of Courses where this course will be prerequisite:
- Data Structures

Rationale: To understand Set Theory, Propositional Logic, Graph Theory, Trees and Fundamental Circuits, Planar Graphs and Matrix and their computations.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks		Practical Marks		Total
L	T	P	C	TEE	CAT	TEP	CAP	
3	1	0	4	60	40	-	-	100

CAT: Continuous Assessment Theory comprised of CA1 and CA2 **CA1:** Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CAP:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Content	Teaching Hrs.	Module Weightage
1	**Set Theory, Propositional & Predicate Logic** Set Theory : Basic Concepts of Set Theory: Definition, Two Methods to Describe (Represent) Sets; Examples, (Im)proper Subsets, Superset, Equality of Sets; Empty (Null) Set, Universal Set, Finite and Infinite Sets, Power Set; Operations on Sets: Union, Intersection, Complement, Venn Diagrams; Disjoint Sets, Various Laws: Identity, Idempotent, Commutative, Associative, Distributive, Absroption, DeMorgan; Difference (Relative Complement),Symmetric Difference of Two Sets; Cartesian Product; Power Set of a Set	**10**	**20%**
2	**Propositional Logic:** Definition, Statement (Proposition) & Notation, Truth Values, Connectives: Negation, Conjunction, Disjunction, Implication (condition), Bi implication (Bi conditional), Truth Tables for all Connectives, Statement Formulas (Well-formed Formulas), Truth Tables, Tautologies, Contradiction, Logical Equivalence: Commutative Laws, Associative Laws, Distributive Laws, Absorption Laws, Idempotent Laws, Double Negation Law, DeMorgan's laws, Examples; Validity of Arguments, Some Valid Argument Forms: Modus Ponen s, Modus Tollens, Disjunctive Syllogism, Dilemma, Equivalence of Formulas: Conjunctive Simplification, Disjunctive Addition, Conjunctive Addition, Examples and Exercises **Integers and Algorithms:** Binary expansions, Hexadecimal expansions, Base Conversion	**10**	**25%**
3	**Basic concept of Graph Theory:** What is graph? Application of graph, Directed graph, Finite and Infinite graphs, Incidence and Degree, Isolated Vertex, Pendent Vertex and Null graph, Simple graph, Regular graph Paths and Circuits : Isomorphism, Sub graphs, A puzzle with multi-coloured cubes, Walks, Paths and circuits, Connected graphs, disconnected graphs and components, Decomposition, Euler graphs, Universal graph, Operations on graphs-Union, Intersection, Ring Sum, Complete graph, Hamiltonian paths and	**10**	**20%**

	circuits, Seating arrangement problems, The travelling salesman problem		
4	**Trees and Fundamental Circuits:** Trees, Some properties of Trees, Distance and Centres in a tree, Rooted and Binary trees, On Counting trees, Spanning trees, Finding all Spanning trees of graph, Fundamental cirucuits, Spanning trees in a Weighted Graph	**5**	**15%**
5	**Planar Graphs :** Combinatorial vs Geometric Graphs, Planar Graphs, Non-planar Graphs, Kuratowski's $K_{3,3}$ and K_5 graphs, Different representation of planar graph **Matrix representation of graphs:** Incidence matrix, Sub matrices of A(G), Path matrix, Adjacency matrix	**10**	**20%**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	10	15	25	30	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. no.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Discrete Mathematics	D. S. Malik & M. K. Sen	Cengage Learning ISBN:978-8131518663	2012	1st Edition
2	Discrete Mathematics and its applications	K. H. Rosen	Tata McGraw-Hill ISBN:978-0073383095	2012	7th Edition
3	Graph Theory with applications to engineering and computer Science	Narsinh Deo :	Prentice-Hall Inc.	2005	
4	Discrete Mathematics & Graph Theory	B. Satyanarayan, K.S.Prasad	PHI	2009	
5	Discrete Mathematical structure with application to computer science	R.Manohar, Trembly J.P.	TMH	1999.	
6	Introduction to Graph Theory	Wilson R.J.	Longmann	1984	3rd Edition
7	Algorithmic Graph Thoery.	Gibbons A.	Cambridge University Press	1984	
8	Grah Theory,	Harry F.	Narosa Publiation	1995	
9	Discrete Mathematics	Richard J.	Pearson Educations, Asia.	2001	

Course Outcomes:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Create a foundation of basic mathematical concepts of Set Theory	20
CO-2	Create a foundation of basic mathematical concepts of Propositional, Predicate Logic and Integers and Algorithms	25
CO-3	To develop basic concept of Graph Theory	20
CO-4	To learn Trees and Fundamental Circuits	15
CO-5	To develop logical sequence in design and analysis of algorithm, computability theory, software engineering and computer system.	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13
CO-1	3	1	1	1	2	0	1	0	1	0	1	2	1
CO-2	3	1	1	1	2	0	1	0	1	0	1	2	1
CO-3	3	1	1	1	2	0	1	0	1	0	1	2	1
CO-4	3	1	1	1	2	0	1	0	1	0	1	2	**1**
CO-5	3	1	1	1	2	0	1	0	1	0	1	2	**1**
Rationale*													

Rationale*: Explaining why it is matching this particular program outcome