KU3VACMAT202: MATHEMATICAL LOGIC

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
III	VAC	200-299	KU3VACMAT202	3	45

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3		1	25	50	75	1.5

Course Description

This course provides a foundational introduction to the concepts of set theory and formal logic, essential for higher-level mathematics, computer science, and analytical thinking. Topics include basic set operations and an introduction to propositional logic.

Course Prerequisite

Basic high school Algebra.

Course Outcomes

CO No.	Expected Outcome	Learning Domains
1	Understand the basic operations and properties of sets, including union, intersection, complement, Cartesian products, and power sets	Understand
2	Analyze and construct formal logical arguments using propositional and predicate logic	Analyze
3	Translate between natural language statements and formal logic expressions	Understand
4	Determine the validity of logical statements and use truth tables, tautologies, and logical equivalences effectively.	Understand

Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	✓	✓					
CO 2	✓	✓					

CO 3	✓	✓					
CO 4	✓	✓					

COURSE CONTENTS

Contents for Classroom Transaction

MODULE	UNIT	DESCRIPTION	HOURS
I		**Sets and Basic Operations on Sets**	**11**
	1	(a) Sets and elements	
		(b) Universal set, Empty set	
		(c) Subsets	
		(d) Venn diagrams	
		(e) Set operations	
		(f) Algebra of sets	
II		**Logic and Propositional Calculus I**	**12**
	1	(a) Propositions and Compound propositions	
		(b) Basic Logical operations	
		(c) Propositions and Truth tables	
		(d) Tautologies and Contradictions	
III		**Logic and Propositional Calculus II**	**11**
	1	(a) Logical equivalence	
		(b) Algebra of propositions	
		(c) Conditional and Biconditional statements	
		(d) Arguments	
IV		**Logic and Propositional Calculus III**	**11**
	1	(a) Logical implication	
		(b) Propositional functions, Quantifiers	
		(c) Negation of Quantified statements	

Essential Readings

1. Seymour Lipschitz, Set theory and related topics, 2nd ed., Schaum's Outline series, Tata McGraw Hill, 1998.

Reference Distribution

Module	Unit	Reference No.	Sections	Remarks
I	1	1	Sections 1.1, 1.2, 1.3, 1.4, 1.4, 1.5, 1.6, 1.7	
II	1	1	Sections 10.1, 10.2, 10.3, 10.4, 10.5	
III	1	1	Sections 10.6, 10.7, 10.8, 10.9	
IV	1	1	Sections 10.10, 10.11, 10.12	

Suggested Readings

1. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 8th ed., McGraw Hill
2. Daniel J. Velleman, How to Prove It: A Structured Approach, 2nd ed (2006), Cambridge University Press
3. Douglas Smith, Maurice Eggen, Richard St. Andre, A Transition to Advanced Mathematics, Cengage Learning, 8th ed. (2006)
4. Richard Johnsonbaugh, Discrete Mathematics, Pearson Education, 7th ed.

Assessment Rubrics

Evaluation Type		Marks
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	Test Paper *	10
b)	Assignment	10
c)	Seminar, Viva-Voce	5
Total		**75**

* A student has to appear for at least two written tests. Average mark of best two tests is to be considered for internal mark.