

Syllabus for Integrated B.Sc. -M.Sc. (Mathematics) I Semester

CourseCode:	Couse Title	L-T-P	Credits
UMAT00028T	Mathematical Logic	3-1-0	4
Objective: The aim of this course is to teach the students C-programming.			
CO 01	Understand the fundamentals of set theory		
CO 02	Learn the different form of logic		
CO 03	Learn about PoSET, ToSET and Boolean alegebra		
CO 04	Demonstrate the difference between syntax, semantics and power of mathematical languages		
CO 05	Understanding of Predicate logic syntax, language and semantics		
CourseContents			
After pursuing this course, the student shall be able to:			
UNIT-I			
Fundamentals - Sets and subsets, Venn Diagrams, Operations on sets, Laws of Set Theory, Power Sets and Products, Product sets and Partition of sets, definition and examples of different type of sets, like Ordered and partially ordered sets, Well ordered sets and the well ordering principle, Zorn's Lemma, Ordinal numbers, Cardinal numbers. The Principle of Inclusion-Exclusion.			
UNIT-II			
Logical operations, Truth tables, Equivalence, Implications, Laws of Logic, Normal forms, Predicates and quantifiers, Mathematical Induction, Syntax and semantics of Propositional Logic, First order languages, First order structures. Examples and Formal proofs, Soundness and Completeness of Predicate Logic.			
UNIT-III			
Linearly ordered sets, partially ordered set, total ordered set, Hasse Diagrams, Lattice, Homomorphism, Boolean algebras as complemented distributive lattices; Glossary of boolean algebras: atoms and coatoms; Homomorphism and isomorphism between boolean algebras			
UNIT-IV			
Introduction to logic; Propositional logic syntax: language and formulas, Propositional logic semantics, valuations, logical equivalence of formulas, CNF and DNF, connectives, Satisfiable formulas, logical/semantic consequence relation.			
UNIT-V			
Predicate logic syntax, language and meta-language, terms, formulas, Predicate language semantics, structures, interpretation/value of a term, truth of a formula, logical/semantic consequence relation, structure homomorphisms.			
Recommended Books:			
1. Goldrei, Derek; Propositional and Predicate Calculus: A Model of Argument; Springer London, 2005.			
2. Cori, René, Lascar, Daniel; Mathematical logic, A course with exercises, Oxford			

Shalabh

A. Prasad

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