

Department of Mathematics
Faculty of Mathematics & Computer Science
M.Sc. (Applied Mathematics), 3rd Semester

Course Code	AM 304(c)
Course Title	Boolean Algebra and Switching Circuits
Course Credits	04

Course objectives:

To help students acquire a range of mathematical skills

To make mathematics relevant to the experiences of the students, therefore recognizing mathematical principles in his environment.

To apply mathematical knowledge to the solution of problems.

To present a unit in the area of Boolean Algebra that is important to the understanding of circuits and how they work.

Minimum pre-requisites:

Basic Algebra

Course structure:

Partially ordered set, totally ordered set, minimum element, maximal element, chain, boundedness, isomorphism, dual, principle of duality, lattices, Cartesian product of lattices, inequalities(modular, distributive, cyclic), Jordan Dedekind condition, complemented lattices, sub lattices, semi lattices, partition and blocks, ideals(dual, principle, prime)

Modular lattices, properties and theorems of modular lattices, distributive lattices, properties and theorems,

Boolean lattices and Boolean algebra, Generalities, direct product dual and complement of Boolean algebra, sub algebra, convexity, congruence relation and quotient lattices, Fundamental Theorems of Boolean Algebra, Boolean functions, Existence and the Oneness of the Boolean Functions, disjunctive normal form (D.N.F), conjunctive normal form(C.N.F).

Representing Logical Functions and Arithmetic Operations by Logical Gates: Binary Switches, Implementing Logical Functions

Truth Tables and Canonical Forms of Boolean Functions, Representation Forms of Boolean Functions: Generalities, main Properties of Boolean Functions, Boolean Functions of Two Variables.

Elementary Forms and Terms for Boolean Functions: Elementary Forms, Logical Basic Operations, Symmetrical and Unsymmetrical Boolean Functions, Several Times Running, Sequential Functions

Switches, Series and parallel connected switches, circuit, Definition of Integrated Circuits, truth table and designing of circuits, Steps in Integrated Circuits Design, bridge circuits, composite circuits, wyes circuit, delta circuit, Integrating Arithmetic and Logic.

Reading suggestions:

- Thomas Donnellan, Lattice Theory, Elsevier Science & Technology, Jan 1, 1968.
- Steven Givant and Paul Halmos, Introduction to Boolean Algebras, Springer Science+Business Media, LLC 2009.
- J. Eldon Whitesitt, Boolean Algebra and its Applications, Addison-Wesley Publishing Company, Inc. U.S.A., 1962.

Evaluation and weightage:

- 10% 1st Test
- 20% Assignment
- 20% Mid Sem Exam
- 10% 2nd Test
- 40% End Sem Exam