INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

DIGITAL ELECTRONICS FOR ENGINEERING								
VII Semester: ECE								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AECD58	**Open Elective**	3	-	-	3	40	60	100
Contact Classes: 48	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 48**		
Prerequisite: Electronic Devices and circuits								

I. COURSE OVERVIEW:

This course intended to logic gates, various logic families. Design of digital circuits using logic gates, combinational circuits and sequential circuits. Classification and characteristics of memories such as Read-only memory, Random access memory and programmable logic devices such as programmable logic array and programmable array logic

II. COURSES OBJECTIVES:

The students will try to learn

I. The number systems, Boolean algebra and representation of switching functions using Boolean expressions and their minimization techniques.
II. The combinational and sequential logic circuits to design various complex switching devices, and their realizations.
III. The programmable logic devices, Semiconductor memories and their use in realization of switching functions.
IV. The Analog to Digital and Digital to Analog converters applicable in the field of microprocessors, microcontrollers and VLSI

III. COURSE OUTCOMES:

At the end of the course students should be able to:

CO1 Understand the different forms of number representations and binary codes in digital logic circuits
CO2 Make use of Boolean postulates, theorems and k-map for obtaining minimized Boolean expressions
CO3 Construct the synchronous and asynchronous modules using flip-flops used for memory storing applications
CO4 Utilize the functionality and characteristics of flip-flops and latches for designing sequential circuits
CO5 Choose an appropriate Field Programmable Gate Array for signal processing applications.
CO6 Extend the knowledge of memories and programmable logic devices for understanding the architectural blocks of FPGA.

IV. COURSE CONTENT:

MODULE-I: FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES (09)

Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital lCs.

Logic Families: Introduction to digital logic family such as RTL, DTL, TTL, ECL, CMOS etc., their comparative study, Basic circuit, performance

MODULE-II: COMBINATIONAL DIGITAL CIRCUITS (09)

Standard representation for logic functions, K-map representation, and simplification of logic functions using Kmap, minimization of logical functions. Don't care conditions.

Multiplexer, De-Multiplexer, Decoders, Adders, Subtractors, BCD arithmetic, Parallel prefix adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator

MODULE-III: SEQUENTIAL CIRCUITS AND SYSTEMS (09)

1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, Register, Shift register, Universal shift register, Linear feedback shift registers, applications of shift registers.

Serial to parallel converter, Parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

MODULE-IV: SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES (09)

Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

MODULE-V: VLSI DESIGN FLOW (09)

Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

V. TEXT BOOKS:

1. P Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M M Mano, "Digital logic and Computer design", Pearson Education India, 2016.

VI. REFERENCE BOOKS:

1. A Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

VII. ELECTRONICS RESOURCES:

1. NPTEL :: NOC : Digital Electronic Circuit
   https://www.youtube.com/playlist?list=PLbRMhDVUMnge4gDT0vBWjCb3Lz0HnYKkX

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics
4. Open end experiments
5. Definitions and terminology

6. Assignments
7. Model question paper – I
8. Model question paper - II
9. Lecture notes
10. E-learning readiness videos (ELRV)
11. Power point presentation