DIGITAL ELECTRONICS

III Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECB03	Core	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

I. COURSE OVERVIEW:

The course will make them learn the basic theory of switching circuits and their applications in detail. Starting from a problem statement they will learn to design circuits of logic gates that have a specified relationship between signals at the input and output terminals. They will be able to design combinational and sequential circuits .They will learn to design counters, adders, sequence detectors. This course provides a platform for advanced courses like Computer architecture, Microprocessors & Microcontrollers and VLSI design. Greater Emphasis is placed on the use of programmable logic devices and State machines.

II. OBJECTIVES:

The course should enable the students to:

I. Demonstrate the concept of electrostatic field intensity and electric potential.
II. Illustrate polarization of dielectrics and the behavior of conductors and dielectrics in electric field.
III. Understand the concept of magnetic field intensity and flux density.
IV. Discuss forces in magnetic fields and law of electromagnetic induction.
V. Analyze propagation of electro-magnetic waves.

III. COURSE OUTCOMES (COs):

COs	Course Outcome
CO 1	Understand the basic concept of number systems and integrated circuits.
CO 2	Analyse Combination logic circuit such as multiplexers, adders, decoders
CO 3	Understand about synchronous and asynchronous sequential logic circuits.
CO 4	Analyse analogy to digital and digital to analogy Converters.
CO 5	Understanding of memory organization, ROM, RAM, CPLD, FPGA, and CCD.

IV. SYLLABUS:

MODULE-I	FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES	Classes: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, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

MODULE-II	COMBINATIONAL DIGITAL CIRCUITS	Classes: 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, Sub tractors, BCD arithmetic, carry look ahead adder, serial ladder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders, drivers for display devices, Q-M method of function realization.		
MODULE-III	**SEQUENTIAL CIRCUITS AND SYSTEMS**	**Classes: 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, 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	**A/D AND D/A CONVERTERS**	**Classes: 09**
Digital to analog converters: weighted resistor, converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.		
MODULE-V	**SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES**	**Classes: 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).		

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. Web References:

1. https://www.calvin.edu/~pribeiro/courses/engr315/EMFT_Book.pdf
2. https://www.web.mit.edu/viz/EM/visualizations/coursenotes/modules/guide02.pdf
3. https://www.nptel.ac.in/courses/108106073/
4. https://www.iare.ac.in

VIII. E-Text Books:

1. https://*www.*bookboon.com/en/electromagnetism-for-electronic-engineers
2. https://www.books.google.co.in/books/.../Fundamentals of Electromagnetic Fields
3. https://www.aliexpress.com/item/EBOOK...Electromagnetic-Fields-2