DIGITAL ELECTRONICS

III Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECB03	Open Elective	3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

OBJECTIVES:

The students will try to learn:

I The Fundamentals of 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 Analog to Digital and Digital to Analog converters applicable in the field of microprocessors, microcontrollers and VLSI.

COURSE OUTCOMES:

After successful completion of the course, Students will be able to

CO 1 **Compute** arithmetic and logic operations using binary, decimal, octal and hexadecimal number systems.

CO 2 **Make use of** hamming code techniques for error detection and correctionin digital systems.

CO 3 **Summarize** various digital logic family such as TTL, ECL and CMOSforenhancing the design skills of digital integrated circuits.

CO 4 **Apply** Boolean postulates and theorems K-map and tabular methods for obtaining minimized Boolean expressions.

CO 5 **Build** combinatorial circuits such as adders, subtractors, multiplexers, demultiplexers, encoders and decoders using logic gates.

CO 6 **Utilize** the functionality and characteristics of flip-flops and latches for designing sequential circuits

CO 7 **Construct** bidirectional and universal shift registers for organization ofdata.

CO 8 **Develop** asynchronous and synchronous sequential circuitsusing flip-flops.

CO 9 **Choose** appropriate analog to digital and digital to analog converters for data conversion

CO 10 **Illustrate** the operation of memory circuits such as Random-access memory,Read only memory.

CO 11 **Design** combinational logic circuits, flip flops using programmable logic devices such as programmable logic array, programmable array logic.

MODULE -I	FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGICFAMILIES	Classes: 08

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, ones 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, DeMultiplexer, 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: 10**
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).		
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.		
Reference Books:		
1. A Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.		
Web References:		
1. http://www.nptel.ac.in/downloads/106108100/ 2. http://www.iare.ac.in		
E-Text Books:		
1. https://books.google.co.in/books 2. http://www.www.jntubook.com 3. http://www.ebooklibrary.org/articles/mpmc		