ANALOG AND DIGITAL ELECTRONICS

III Semester: **CSE**

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECB05	Core	3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes:60		

COURSE OBJECTIVES:

The students will try to learn::

I. The Fundamental knowledge of the operational principles and characteristics of semiconductor devices and their applications.
II. The basic concept of number systems, boolean algebra and optimized implementation of combinational and sequential circuits.
III. The perceive subsequent studies in the area of microprocessors, microcontrollers, VLSI design and embedded systems effectively use of fundamentals of digital electronics.

COURSE OUTCOMES:

CO1 **Recall** the properties of semiconductor materials which form the basis for the formation of PN junction diode.
CO2 **Illustrate** the volt-ampere characteristics of semiconductor devices for finding cut-in voltage, resistance and capacitance.
CO3 **Apply** thePN junctioncharacteristicsforthediodeapplications such as switch and rectifiers.
CO4 **Explain** half wave and full wave rectifier circuits with filter and without filtersfor conversion of alternating current in to direct current.
CO5 **Interpret** DC and AC load line analysis of different amplifiersfor optimal operating level regardless of input, load placed on the device.
CO6 **Analyze** the input and output characteristics of transistor configurations and small signal h-parameter model for determining the input - output resistances, current gain and voltage gain
CO7 **Compare**the binary decimal, octal and hexadecimal number systems in terms of basic arithmetic operations.
CO8 **Identify**the functionality of logic gates, parity code and hamming code techniques for error detection and correction of single bit in digital systems.
CO9 **Apply** Boolean postulates and theorems,k-map and tabular methods for obtaining minimized Boolean expressions.
CO10 **Develop** the gate level combinational circuits to build adders, subtractors, multiplexers, demultiplexers, encoders and decoders.
CO11 **Describe**the operation of Flip-Flops and latches for constructing sequential circuits.
CO12 **Implement** the synchronous& asynchronous counters for memory storing applications.

MODULE-I	DIODE AND APPLICATIONS	Classes: 09

Diode - Static and Dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances, Diode Applications: Switch-Switching times. Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive Filter

MODULE-II	BIPOLAR JUNCTION TRANSISTOR (BJT)	Classes: 09
Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC &AC load lines, Transistor Hybrid parameter model, Determinationof h-Parameters from transistor characteristics, Conversion of h-parameters.		
MODULE-III	**NUMBER SYSTEMS**	**Classes: 09**
Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hammingcode. Boolean Algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, MultilevelNAND/NOR Realizations.		
MODULE-IV	**MINIMIZATION OF BOOLEAN FUNCTIONS**	**Classes: 09**
Karnaugh Map Method - Up to five Variables, Don"t Care Map Entries, Tabular Method,Combinational Logic Circuits: Adders, Subtractors, comparators, Multiplexers, Demultiplexers, Encoders, Decoders and Code converters, Hazards and Hazard Free Relations.		
MODULE-V	**SEQUENTIAL CIRCUITS FUNDAMENTALS**	**Classes: 09**
Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another. Registers and Counters: Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers - Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronousand Synchronous Counters.		

Text Books:

1. Electronic Devices and Circuits - Jacob Millman, McGraw Hill Education,2017
2. Electronic Devices and Circuits theory– Robert L. Boylestead, Louis Nashelsky, 11th Edition, Pearson, 2009.
3. Switching and Finite Automata Theory - ZviKohavi&Niraj K. Jha, 3rd Edition, Cambridge,2010.
4. Modern Digital Electronics – R. P. Jain, 3rd Edition, Tata McGraw-Hill,2007.

Reference Books:

1. Pulse, Digital and Switching Waveforms –J. Millman, H. Taub and Mothiki S. Prakash Rao, 2 Ed., McGraw Hill,2008.
2. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, AVallvaraj, 2nd Edition,TMH.
3. Digital Design- Morris Mano, PHI, 4th Edition,2006
4. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed,John Wiley &SonsInc.

Web References:

1. http://www-mdp.eng.cam.ac.uk/web/library/enginfo/electrical/hong1.pdf
2. https://archive.org/details/ElectronicDevicesCircuits
3. http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASICELECTRONICS/home_page.htm
4. mcsbzu.blogspot.com
5. http://books.askvenkat.com
6. http://worldclassprogramme.com

E-Text Books:

1. http://services.eng.uts.edu.au/pmcl/ec/Downloads/LectureNotes.pdf
2. http://nptel.ac.in/courses/122106025/
3. http://www.freebookcentre.net/electronics-ebooks-download/Electronic-Devices-and-Circuits-(PDF-313p).html
4. https://books.google.co.in/books/about/Switching_Theory_and_Logic_Design
5. https://www.smartzworld.com/notes/switching-theory-and-logic-design-stld
6. https://www.researchgate.net/.../295616521_Switching_Theory_and_Logic_Design