ANALOG AND DIGITAL ELECTRONICS

III Semester: CSE / IT

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

I. COURSE OVERVIEW:

This course provides the basic knowledge over the construction and functionality of the basic electronic devices such as diodes and transistors. It also provides the information about the uncontrollable and controllable electronic switches and the flow of current through these switches in different biasing conditions and also will make them to 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.

II. OBJECTIVES:

The course should enable the students to:
- I.   Introduce components such as diodes, BJTs and FETs.
- II.   Know the applications of components.
- III.   Understand common forms of number representation in logic circuits.
- IV.   Learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- V.   Understand the concepts of combinational logic circuits and sequential circuits.

III. COURSE OUTCOMES (COs):

COs	Course Outcome
CO 1	Acquire knowledge of electrical characteristics of ideal and practical diodes under forward and reverse bias to analyze and design diode application circuits such as rectifiers.
CO 2	Utilize operational principles of bipolar to derive appropriate small-signal models and use them for the analysis of basic circuits.
CO 3	Understand the basic concept of number systems, Boolean algebra principles and minimization techniques for Boolean algebra
CO 4	Analyze Combination logic circuit such as multiplexers, adders, decoders
CO 5	Understand about synchronous and asynchronous sequential logic circuits.

IV. SYLLABUS:

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, Determination of 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 Hamming code.

Boolean Algebra: Basic Theorems and Properties, Switching Functions- Canonical and Standard Form, Algebraic Simplification, Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/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 Asynchronous and Synchronous Counters.

V. 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 - Zvi Kohavi & Niraj K. Jha, 3rd Edition, Cambridge, 2010.
4. Modern Digital Electronics – R. P. Jain, 3rd Edition, Tata McGraw-Hill, 2007.

VI. 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, A Vallvaraj, 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 & Sons Inc.

VII. 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/BASIC ELECTRONICS/home_page.htm

4. mcsbzu.blogspot.com
5. http://books.askvenkat.com
6. http://worldclassprogramme.com

VIII. 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