

## ANALOG AND DIGITAL ELECTRONICS

<b>III Semester: CSE / IT / CSIT / CSE (AI&amp;ML) / CSE (CS)</b>								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECC08	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	30	70	100
<b>Contact Classes: 45</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: Nil</b>		<b>Total Classes: 45</b>		
<b>Prerequisites: No Prerequisites</b>								
<p><b>I. COURSE OVERVIEW:</b>                      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 specified relationship between signals at the input and output terminals. They will be able to design combinational and sequential circuits detail. Starting from a problem statement they will learn to design circuits of logic gates that have a. They will learn to design counters, adders, sequence detectors.</p> <p><b>II. COURSE OBJECTIVES:</b>  <b>The students will try to learn:</b></p> <ol style="list-style-type: none"> <li>I. The Fundamental knowledge of the operational principles and characteristics of semiconductor devices and their applications.</li> <li>II. The basic concept of number systems, boolean algebra and optimized implementation of combinational and sequential circuits.</li> <li>III. The perceive subsequent studies in the area of microprocessors, microcontrollers, VLSI design and embedded systems effectively use of fundamentals of digital electronics.</li> </ol> <p><b>III. SYLLABUS:</b></p> <p><b>MODULE – I: DIODE AND APPLICATIONS</b>                      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.</p> <p><b>MODULE – II: BIPOLAR JUNCTION TRANSISTOR (BJT)</b>                      Principle of Operation and characteristics - Common Emitter, Common Base, Common Collector Configurations, Operating point, DC &amp; AC load lines, Transistor Hybrid parameter model, Determination of h-parameters from transistor characteristics, Conversion of h-parameters.</p> <p><b>MODULE – III: NUMBER SYSTEMS</b>                      Number systems, Complements of Numbers, Codes- Weighted and Non-weighted codes and its Properties, Parity check code and Hamming code.</p> <p>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.</p> <p><b>MODULE - IV: MINIMIZATION OF BOOLEAN FUNCTIONS</b>                      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.</p> <p><b>MODULE – V: SEQUENTIAL CIRCUITS FUNDAMENTALS</b>                      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.</p>								

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.

#### **IV. TEXT BOOKS:**

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

#### **V. REFERENCE BOOKS:**

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

#### **VI. 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](http://nptel.ac.in/courses/Webcourse-contents/IIT-ROORKEE/BASICELECTRONICS/home_page.htm)
4. [mcsbzu.blogspot.com](http://mcsbzu.blogspot.com)
5. <http://books.askvenkat.com>
6. <http://worldclassprogramme.com>

#### **VII. WEB REFERENCES:**

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](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](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](https://www.researchgate.net/.../295616521_Switching_Theory_and_Logic_Design)