

ANALOG AND DIGITAL ELECTRONICS

III Semester: CSE / IT								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECB05	Core	L	T	P	C	CIA	SEE	Total
		3	1	0	4	30	70	100
Contact Classes: 45		Tutorial Classes: 15		Practical Classes: Nil			Total Classes: 60	
<p>COURSE OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> 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. <p>COURSE OUTCOMES (COs):</p> <p>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.</p> <p>CO 2: Utilize operational principles of bipolar to derive appropriate small-signal models and use them for the analysis of basic circuits.</p> <p>CO 3: Understand the basic concept of number systems, Boolean algebra principles and minimization techniques for Boolean algebra</p> <p>CO 4: Analyze Combination logic circuit such as multiplexers, adders, decoders</p> <p>CO 5: Understand about synchronous and asynchronous sequential logic circuits.</p> <p>COURSE LEARNING OUTCOMES(CLOs):</p> <ol style="list-style-type: none"> 1. The students should enable to: 2. Explain half wave rectifier for the given specifications. 3. Design full wave rectifier for the given specifications 4. Design rectifier with capacitive filter for the given specifications 5. Understand the different parameters of transistors such as depletion width and channel width for understanding the functioning and design of this component. 6. Estimate the performance of BJT on the basis of their operation and working. 7. Explain the operation of Operating Point and Load Line Analysis 8. Explain the operation of CB,CE,CC I/O Characteristics 9. Understand the importance of h-parameter model 10. Understand the basic concept of number systems, Binary addition and subtraction for digital systems. 11. Explain the complements of Binary & Decimal number systems 12. Discuss about digital logic gates, error detecting and Correcting codes for digital systems. 13. Illustrate the switching algebra theorems and apply them for reduction of Boolean function. 14. Identify the importance of SOP and POS canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits. 								

<p>15. Evaluate functions using various types of minimizing algorithms like Karnaugh map or tabulation method</p> <p>16. Design Gate level minimization using KMaps and realize the Boolean function using logic gates.</p> <p>17. Analyze the design procedures of Combinational logic circuits like adders,Subtractors.</p> <p>18. Analyze the design of decoder, demultiplexer, and comparator using combinational logic circuit.</p> <p>19. Understand bi-stable elements like latches flip-flop and Illustrate the excitation tables of different flip flops</p> <p>20. Understand the concept of Shift Registers and implement the bidirectional and universal shift registers.</p> <p>21. Implement the synchronous& asynchronous counters using design procedure of sequential circuit and excitation tables of flip – flops.</p>		
MODULE-I	DIODE AND APPLICATIONS	Classes: 09
<p>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>		
MODULE-II	BIPOLAR JUNCTION TRANSISTOR (BJT)	Classes: 09
<p>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.</p>		
MODULE-III	NUMBER SYSTEMS	Classes: 09
<p>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>		
MODULE-IV	MINIMIZATION OF BOOLEAN FUNCTIONS	Classes: 09
<p>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>		
MODULE-V	SEQUENTIAL CIRCUITS FUNDAMENTALS	Classes: 09
<p>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> <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.</p>		
Text Books:		
<ol style="list-style-type: none"> 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. 		

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.

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>

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](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