

ANALOG AND DIGITAL ELECTRONICS
(Effective from the academic year 2018 -2019)
SEMESTER – III

Course Code	18CS33	CIE Marks	40
Number of Contact Hours/Week	3:0:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	03

CREDITS –3

Course Learning Objectives: This course (18CS33) will enable students to:

- Explain the use of photoelectronics devices, 555 timer IC, Regulator ICs and uA741 opamp IC
- Make use of simplifying techniques in the design of combinational circuits.
- Illustrate combinational and sequential digital circuits
- Demonstrate the use of flipflops and apply for registers
- Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques.

Module 1

**Contact
Hours**

Photodiodes, Light Emitting Diodes and Optocouplers ,BJT Biasing :Fixed bias ,Collector to base Bias , voltage divider bias, Operational Amplifier Application Circuits: Multivibrators using IC-555, Peak Detector, Schmitt trigger, Active Filters, Non-Linear Amplifier, Relaxation Oscillator, Current-to-Voltage and Voltage-to-Current Converter , Regulated Power Supply Parameters, adjustable voltage regulator ,D to A and A to D converter.

Text Book 1 :Part A:Chapter 2(Section 2.9,2.10,2.11), Chapter 4(Section 4.2 ,4.3,4.4),Chapter 7 (section (7.2,7.3.1,7.4,7.6 to 7.11), Chapter 8 (section (8.1,8.5), Chapter 9

RBT: L1, L2

08

Module 2

Karnaugh maps: minimum forms of switching functions, two and three variable Karnaugh maps, four variable karnaugh maps, determination of minimum expressions using essential prime implicants, Quine-McClusky Method: determination of prime implicants, The prime implicant chart, petricks method, simplification of incompletely specified functions, simplification using map-entered variables

Text book 1:Part B: Chapter 5 (Sections 5.1 to 5.4) Chapter 6(Sections 6.1 to 6.5)

RBT: L1, L2

08

Module 3

Combinational circuit design and simulation using gates: Review of Combinational circuit design, design of circuits with limited Gate Fan-in ,Gate delays and Timing diagrams, Hazards in combinational Logic, simulation and testing of logic circuits

Multiplexers, Decoders and Programmable Logic Devices: Multiplexers, three state buffers, decoders and encoders, Programmable Logic devices, Programmable Logic Arrays, Programmable Array Logic.

Text book 1:Part B: Chapter 8,Chapter 9 (Sections 9.1 to 9.6)

RBT: L1, L2

08

Module 4

Introduction to VHDL: VHDL description of combinational circuits, VHDL Models for multiplexers, VHDL Modules.

Latches and Flip-Flops: Set Reset Latch, Gated Latches, Edge-Triggered D Flip Flop 3,SR Flip Flop, J K Flip Flop, T Flip Flop, Flip Flop with additional inputs, Asynchronous Sequential Circuits

Text book 1:Part B: Chapter 10(Sections 10.1 to 10.3),Chapter 11 (Sections 11.1 to 11.9)

RBT: L1, L2

08

Module 5	
Registers and Counters: Registers and Register Transfers, Parallel Adder with accumulator, shift registers, design of Binary counters, counters for other sequences, counter design using SR and J K Flip Flops, sequential parity checker, state tables and graphs Text book 1:Part B: Chapter 12(Sections 12.1 to 12.5),Chapter 13(Sections 13.1,13.3) RBT: L1, L2	08
Course Outcomes: The student will be able to :	
<ul style="list-style-type: none"> Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp. Explain the basic principles of A/D and D/A conversion circuits and develop the same. Simplify digital circuits using Karnaugh Map , and Quine-McClusky Methods Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types. Develop simple HDL programs 	
Question Paper Pattern:	
<ul style="list-style-type: none"> The question paper will have ten questions. Each full Question consisting of 20 marks There will be 2 full questions (with a maximum of four sub questions) from each module. Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module. 	
Textbooks:	
1. Charles H Roth and Larry L Kinney, Analog and Digital Electronics, Cengage Learning,2019	
Reference Books:	
1. Anil K Maini, Varsha Agarwal, Electronic Devices and Circuits, Wiley, 2012. 2. Donald P Leach, Albert Paul Malvino & Goutam Saha, Digital Principles and Applications, 8 th Edition, Tata McGraw Hill, 2015. 3. M. Morris Mani, Digital Design, 4 th Edition, Pearson Prentice Hall, 2008. 4. David A. Bell, Electronic Devices and Circuits, 5 th Edition, Oxford University Press, 2008	

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