ANALOG AND DIGITAL ELECTRONICS
Adichunchanagiri University
(Effective from the Academic Year 2019 -20)
SEMESTER – III

Subject Code	18CS32	**CIE Marks**	40
Number of Contact Hours/Week	4	**SEE Marks**	60
Total Number of Contact Hours	50	**Exam Hours**	3 Hrs

CREDITS –4

Course Learning Objectives: This course (18CS32) will enable students to:

- Explain the use of photo electronics devices, 555timer IC, Regulator ICs and uA741 opamap IC.
- Make use of simplifying techniques in the design of combinational circuits.
- Illustrate combinational and sequential digitalcircuits
- Demonstrate the use of flip-flops and apply for registers
- Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques.

Module 1	**Contact Hours**
Optoelectronic Devices: Photodiodes, Phototransistors, Light Emitting Diodes, Liquid Crystal Displays, and Optocouplers. **Wave Shaping Circuits:** Integrated Circuit Multi vibrators **Linear Power Supplies:** Linear IC Voltage, Regulated Power Suppy Parameters **Operational Amplifier Application Circuits**: Inverting Amplifier, Non-inverting amplifier, Voltage Follower, Summing Amplifier, Difference Amplifier, Averagor, Integrator, Differentiator, Peak Detector, Absolute Value Circuit, Comparotor, Instrumentation Amplifier, Relaxation Oscillator, Current-to-Voltage and Voltage-to-CurrentConverter **Textbook 1: Chapter7 – 7.4, 7.5, 7.10, 7.11, 7.14; Chapter13 – 13.10;** **Chapter14 – 14.6, 14.7;** **Chapter17 – 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.12, 17.13, 17.14, 17.17, 17.19, 17.20, 17.21** **RBT: L1, L2**	10
Module 2	
Combinational Logic Circuits: Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don't-care Conditions, Product-of-sums Method, Product-of-sums simplifications, Simplification by Quine-McCluskyMethod Introduction to HDL, HDL Implementation Models. **Text book 2: Chapter2 – 2.5; Chapter3 – 3.2 to 3.9, 3.11.** **RBT: L1, L2**	10
Module 3	
Data-Processing Circuits: Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD to Decimal Decoders, Seven Segment Decoders, Encoders, Exclusive-OR Gates, Parity Generators and Checkers, Magnitude Comparator, Programmable Array Logic, Programmable Logic Arrays, HDL Implementation of Data Processing Circuits. **Text book 2: Chapter4 – 4.1 to 4.9, 4.11, 4.12, 4.14.**	10

RBT: L1, L2, L3	
Module 4	
Flip- Flops: RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS FLIP-FLOP, Edge-triggered D FLIP-FLOPs, Edge-triggered JK FLIP-FLOPs, FLIP-FLOP Timing, JK Master-slave FLIP-FLOP, HDL Implementation ofFLIP-FLOP. **Registers:** Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In - Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers. **Text book 2: Chapter8 – 8.1 to 8.7, 8.12; Chapter9: 9.1 to 9.6** **RBT: L1, L2, L3**	10
Module 5	
Counters: Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, Counter Design using HDL. **D/A Conversion and A/D Conversion:** Variable, Resistor Networks, Binary Ladders, D/A Converters, D/A Accuracy and Resolution, A/D Converter-Simultaneous Conversion, A/D Converter-Counter Method, Continuous A/D Conversion **Text book 2:- Chapter10 – 10.1 to 10.5, 10.9; Ch 12: 12.1 to 12.7** **RBT: L1, L2, L3**	10

Course Outcomes: The student will be able to :

- Design and analyze application analog circuits using photo devices, timer IC, power supply and regulator IC and opamp.
- Simplify digital circuits using Karnaugh Map , POS and Quine-McClusky Methods
- Explain Gates and flipflops and make us in designing different data processing circuits, registers and counters and compare the types.
- Develop simple HDLprograms
- Explain the basic principles of A/D and D/A conversion circuits and develop thesame.

Question Paper Pattern:

- The question paper will have tenquestions.
- Each full Question consisting of 20marks
- There will be 2 full questions (with a maximum of four sub questions) from eachmodule.
- Each full question will have sub questions covering all the topics under amodule.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

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, 8th Edition, Tata McGraw Hill,2015.

Reference Books:

1. M. Morris Mani, Digital Design, 4th Edition, Pearson Prentice Hall, 2008.
2. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press,2008