

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Technology)				
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR3C4 Digital Electronics	3	1	2	3	1	1	5
Duration of Theory Paper:3 Hours							

Learning Objectives:

1. To provide knowledge of different data representation systems for digital computers.
2. Familiarize students with different hardware implementation techniques of different logic functions.
3. Develop skills to design and implement various combinational and sequential circuits
4. Develop ability to implement digital circuits in various practical applications.
5. Provide knowledge of data converters and basic understanding of Microprocessors

Pre requisites: Nil

COURSE CONTENTS

UNIT-I

Foundation: Number system, Arithmetic operations using 1's,2's complement, various codes, Review of basic gates, universal gate application, Logic Families: - RTL, DTL, TTL & MOS, CMOS families for NOR/NAND gate, characteristics of Digital IC's-speed of operation, power dissipation, Fan-in, Fan-out, Noise margin, Current and Voltage parameters

UNIT-II

Combinational Circuits: Boolean laws & algebra , Sum Of Product & Product Of Sum expression, K-Map and Tabular method of minimization, Combinational devices like Multiplexer, Demultiplexer, Decoders, Encoders, Tri -state Devices, Combinational circuit design for Adder, Subtractor, Comparator, Code converters

UNIT-III

Sequential Circuits: Latches and Flip-Flops SR, D, T, JK, Master-slave , Flip- Flop conversions, Synchronous counter, Asynchronous counter, Up-Down Counter

UNIT-IV

Registers: Shift Registers, serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out, Universal Shift Register, Sequence Generators, Designing of Synchronous & Asynchronous sequential circuits.

UNIT-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, Conversions as Flash type, Counter type , Successive Approximations type A/D converter, Clock generation through IC555, Memory- Types ROM, RAM, Introduction to Microprocessor, Microprocessor Evaluation, Programming and hardware model of Microprocessor, 8/16/32/64 bit Series of Microprocessors.

Learning Outcomes :

Upon completing the course, students will be able to:

- Understand how to represent data in digital form.
- Understand driving capacity of a gate and voltage-current parameters
- Design and Analyze any combinational and sequential digital circuit
- Using analog to digital and digital to analog IC's for data conversion.
- Understand basics of microprocessors

BOOKS RECOMMENDED:

1. A. Anand Kumar, " Fundamentals of Digital Circuits", Fourth Edition, PHI Learning Private Limited, 2016.
2. Mano M. Morris, "Digital Design", 3rd edition, Pearson Education 2006.
3. William H.Gothmann,*Digital Electronics: An Introduction to Theory and Practice*, Eastern Economy Edition , Prentice-Hall of India Private Limited, New Delhi., 2001
4. William I. Fletcher, *An Engineering Approach to Digital Design*, Pearson Education
5. Ramesh S. Gaonkar, Microprocessor, Architecture, Programming, and Applications with the 8085, Penram International Publication.

List of Practical Assignment:

During the learning of course, students need to do assignments:

- a. To Implement various gates using universal NAND/NOR IC's.
 - b. To Design and Implement various combinational circuits using gate IC's.
 - c. To Design and Implement various combinational circuits using Mux, D Mux, Encoder, Decoder IC's. To learn and analyze different Flip-Flops.
 - d. To Design and Implement various sequential circuits using Flip-Flop.
 - e. To learn and analyse Counter IC's.
 - f. To Design and Implement various sequential circuits.
 - g. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
 - h. Learn to use ADC and DAC IC's for data conversion.
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