

Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Electronics and Telecommunication Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
ETR3C2 DIGITAL ELECTRONICS	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

- Provide student the knowledge of different number systems and conversion among them.
- Familiarize students with different logic families and characteristics of Digital ICs
- Familiarize students with different Combinational ICs.
- Develop skills to design various Combinational circuits
- Familiarize students with different Counter ICs
- Develop skills to design various Sequential circuits
- Develop ability to implement digital circuits in various practical applications.

Prerequisites:

Knowledge of Transistor, Diodes, Switching property, Boolean algebra.

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

Unit-III

Combinational & Sequential Circuits: Combinational circuit design for Adder, Subtractor, Comparator, Multiplier , various Code converters
Latches and Flip-Flop- SR, D, T, JK, Master-slave , Flip- Flop conversions.

Unit-IV

Counter and Registers: Synchronous counter, Asynchronous counter, Up-Down Counter, Shift

Registers -serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out,
Universal Shift Register

Unit-V

Digital to Analog Conversion Technique as Binary Weighted DAC, R-2R Ladder, DAC808 IC
Analog to Digital Conversions as Flash type, Counter type, Successive Approximations type A/D
converter, Specifications of A/D converters, ADC 804 and 808 IC, Schmitt trigger, Monostable
& Astable Multivibrator using IC555.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand driving capacity of a gate and voltage-current parameters.
- Implement digital circuit for arithmetic operations.
- Implement digital circuit with optimized hardware.
- Design and Analyse any combinational digital circuit
- Design and Analyse any sequential circuit
- Using analog to digital and digital to analog IC's for data conversion.
- Design circuit to generate clock and pulses of desired frequency.

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,NewDelhi.,2001
- [4] William I. Fletcher, "*An Engineering Approach to Digital Design*", Pearson Education

List of Practical Assignments:

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

1. To implement various gates using universal NAND/NOR ICs.
2. To Design and Implement various combinational circuits using gate ICs.
3. To Design and Implement various combinational circuits using Mux, D-Mux, Encoder, Decoder ICs.
4. To learn and analyze different Flip-Flops.
5. To Design and Implement various sequential circuits using Flip-Flop.
6. To learn and analyse Counter IC's.
7. To Design and Implement various sequential circuits.
8. To Design and Implement circuit to generate clock waveform of desired frequency using IC555.
9. Learn to use ADC and DAC IC's for data conversion.