

Subject Code: 1ET4030404	Subject Title: Digital Electronics & Digital Instruments
Pre-Requisite	--

RATIONALE:

Digital electronics has invaded all branches of engineering and electrical engineering in particular. Hence it is essential that the diploma electrical engineer have a sound understanding of the basic fundamentals of digital electronics. Similarly digital instruments are replacing the analog instruments. Therefore, this course has been designed so that basic skills to operate and maintain the basic digital circuits and digital instruments are developed in the students.

COURSE OBJECTIVE:

The course content should be taught and implemented with an aim to develop different skills

1. Use different digital number system & codes.
2. Use digital integrated circuit logic family chips.
3. Perform computational and measurement activities using digital techniques.
4. Build sequential and combinational logic circuits.
5. Analyses working of A/D and D/A converters.
6. Use display devices for digital circuits.
7. Use digital meters for measurements.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
4	-	2	5	60	40	20	30

DETAILS OF COURSE CONTENTS:

Sr No	Topics and Sub-topics	Total Hours	% Weightage
1	NUMBER SYSTEMS 1.1 Types of number system, inter conversion 1.2 Basic mathematical operations – 1's complement, 2's complement, 9s complement and 10's complement 1.3 Binary addition, subtraction, multiplication and division. 1.4 Introductions to codes – Binary, weighted, non weighted codes, Excess code, Grey code, BCD code, Hamming code (only introduction)	10	20

2	LOGIC GATES AND WAVE SHAPING CIRCUITS 2.1 Diode and transistor as a switch. 2.2 Diode as a clipper 2.3 Positive logic and negative logic levels 2.4 Different types of logic gates, symbol and truth table 2.5 Universal gates - NAND and NOR 2.6 Logic family RTL, DTL 2.7 NMOS, PMOS and CMOS	10	20
3	BOOLEAN ALGEBRA AND COMBINATIONAL CIRCUITS 3.1 Laws of Boolean algebra. 3.2 Demorgan's theorems. 3.3 Boolean expression and logic diagram and vice versa 3.4 Simplification of given Boolean equation. 3.5 Combinational circuits: Half and Full Adder, half and full Subtractor, Multiplexer and Demultiplexer Encoder and Decoder	12	20
4	SEQUENTIAL CIRCUITS 4.1 Flip-Flop (FF) circuits: R-S, D, J-K and master slave J-K. 4.2 Shift register: series, parallel left and right 4.3 Asynchronous and Synchronous counter using 7493 and 7490 4.4 Introduction of Semiconductor memory	10	15
5	A TO D AND D TO A CONVERTORS AND DISPLAY DEVICES 5.1 Digital to Analog conversion. • Weighted Resistor Network type • Binary Ladder Network type 5.2 Analog to Digital conversion • Parallel Comparator type • Successive approximation type • Counter OR Staircase type 5.3 Display devices • Mechanical Drum or Disc type • Light Emitting Diode type • Liquid Crystal Display	08	15
6	DIGITAL INSTRUMENTS 6.1 Comparison of digital instrument with analog instrument. 6.2 Basic building blocks of -digital instruments. 6.3 Digital volt-meter - Ramp and Staircase type	06	10

	6.4 Digital frequency meter, multi meter, Digital watt meter, Digital energy meter		
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COURSE OUTCOME:

The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:

1. Understand the of concept of Digital Number System
2. Understand digital integrated circuit logic family chips.
3. Understand sequential and combinational logic circuits.
4. Understand working of A/D and D/A converters.
5. Understand display devices for digital circuits.
6. Understand digital meters for measurements.

LIST OF PRACTICAL:

- 1 To study & verify the truth tables of digital logic gates.
- 2 To study and perform the functionality of nand as universal gate.
- 3 To study and perform the functionality of nor as universal gate.
- 4 Build & test various diode positive clipper circuits.
- 5 Build & test various diode negative clipper circuits.
- 6 Study about clamping circuits.
- 7 To study and verify various theorems of boolean algebra.
- 8 Study and verify de-morgan's laws.
- 9 Draw logic circuit for given boolean expression.
- 10 Simplify given boolean expression & draw its logic circuit.
- 11 To develop half adder and verify its operation.
- 12 To develop full adder and verify its operation.
- 13 To develop half subtractor and verify its operation.
- 14 To develop full subtractor and verify its operation.
- 15 To study and verify the truth table of r-s type flip-flop.
- 16 To study and verify the truth table of d type flip-flop.
- 17 To study and verify the truth table of j-k type flip-flop.
- 18 To study and perform 4 bit parallel access shift register using ic 7495.
- 19 To verify the operation of decade counter using ic – 7490.
- 20 To verify the operation of decoder.
 - 1) 2 to 4 line decoder
 - 2) 3 to 8 line decoder using ic-74138

LIST OF REFERENCES:

1. Dr. B.R.Gupta & V.Singhal ,Digital Electronics
2. Pratima Manhas Shaveta Thakral,Digital Electronics (for Polytechnics)

3. R P Jain, Morden Digital Electronics
4. www.kpsec.freeuk.com
5. www.google.com