

# Digital Electronics [DE]

S.E. Sem. III [INST]

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## EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	2 Hrs.	50
Oral Exam	–	–
Term Work	–	25

## SYLLABUS

### 1. Introduction

Number systems, binary, octal, hexadecimal and others. Conversion from one system to another. Arithmetic, binary BCD and hexadecimal.

### 2. Binary codes

Weighted, reflective, sequential, gray, error detecting codes, odd, even parity, hamming codes, alphanumeric, Morse teletypewriter ASCII, EBCDIC codes, converting binary to gray and gray to binary and XS3.

### 3. Boolean Algebra Logic Gates

AND, OR, NOT, XOR, XNOR, operations NAND, NOR use of universal gates for performing different operations. Laws of Boolean Algebra, De–Morgan’s theorems. Relating a truth table to a Boolean expression. Multi level circuit.

### 4. Combinational Circuits

K–Maps and their use in simplifying Boolean expressions, minterm, maxterm SOP and POS implementation. Implementing a logic function using universal gates. Variable entered maps for five and six variable functions: Quine McClusky tabular techniques.

### 5. Combination Logic Circuit Design

Designing code converter circuits e.g. binary to gray, BCD to seven segment parity generator. Binary arithmetic circuits:– Adders, subtractors (half and full), BCD adder–subtractor, carry look head adder, serial adder, multiplier magnitude comparator, arithmetic logic units.

### 6. Use of Multiplexers in logic design

Multiplexer (ULM) shannon’s theorem, ULM trees, de Multiplexers, designing using ROMs and ULMs. Hazards in combinational circuits.

### 7. Sequential Logic Circuits

Comparison of combinational and sequential circuits, multivibrators (astable, monostable and bistable), flip–flops, SR, T, D, JK. converting one flip–flop into another, use of debounce switch, counters modulus of a counter, ripple counters, up/down counter, designing sequential counters using gate IC and counter by drawing state transition diagram and state transition table. Ring counter, Johnson counter, twisted ring counter, pseudo random number generator, unused states and locked conditions.

### 8. Registers

Serial input serial output serial input parallel output, left shift, right shift register, use of register ICs for sequence generator and counters.

### 9. Memories

RAM, ROM the basic cell IC bipolar, CMOS, RAM dynamic RAM cell. Magnetic core NVRAM, bubble memory, CCD, PAL, PLA. Introduction to PLD’s.

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## 10. Logic Families

Basics of digital integrated circuits, basic operational characteristics and parameters. TTL, schottky clamped TTL, tristate gate ECL, IIL, MOS devices CMOS comparison of logic families. PMOS and NMOS and E<sup>2</sup>CMOS. Introduction to FPGA.

### Reference :

1. Modern Digital Electronics (*Jain R.P.*) Tata McGraw Hill, 1984.
2. Digital Principles and Applications (*Malvino Leach*) Tata McGraw Hill, 1991.
3. Digital Fundamentals (*Floyd Thomas L.*) Belland Howell Company, 1993.
4. Digital Design (*Morris Mano M.*) Prentice Hall International, 1984.
5. Electronic Logic Systems (*Almaini A.E.*) PHI, 1986 (2<sup>nd</sup> Edition).
6. Digital Electronics (*Malvino*) Tata McGraw Hill, 1997.
7. Digital Systems (*Tocci*) PHI, 2000.
8. Logic Circuits (*Dr. Jog Nandini K.*) Nandu Publishers and Printers Pvt. Ltd., 1998 (2<sup>nd</sup> Edition).

