UNDERGRADUATE PROGRAMME IN INSTRUMENTATION

ELI - 6 **Digital Electronics**

48 Periods

UNIT 1

Number System and Codes: Decimal, Binary, Hexadecimal, Octal, BCD, conversion of one code to another, Complements (one's and two's), Signed and Unsigned numbers, Addition, Subtraction, Multiplication. Gray and Hamming Codes.

Logic Gates and Boolean algebra: Truth Tables, OR, AND, NOT, XOR, XNOR, Universal (NOR and NAND) Gates, Boolean Theorems, DeMorgan's Theorems, Principle of duality.

Digital Logic families: Fan-in, Fan out, Noise Margin, Power Dissipation, Figure of merit, Speed power product, Current and Voltage parameters. TTL, MOS and CMOS families.

12 Periods

UNIT 2

Combinational Logic Analysis and Design: Standard representation of logic functions (SOP and POS), Karnaugh map minimization. Encoder and Decoder. Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, half Adder, full Adder and subtractor.4-bit parallel adder.

12 Periods

UNIT 3

Sequential logic design: Latch, Flip flop (FF), S-R FF, J-K FF, T and D type FFs, Clocked FFs, Registers, Counters (ripple, synchronous and asynchronous, ring and modulo-N), State Table, State Diagrams.

15 Periods

UNIT 4

Programmable Logic Devices: Introduction to Programmable circuits, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), PLD

Memories: General Memory Operation, ROM, RAM (Static and Dynamic), PROM, EPROM, EEPROM, EAPROM, Bubble memory, Basic operation of CD ROM, FLASH memory.

9 Periods

Essential Books:

UNIT 1

Chapter1, 2- M. Morris Mano, Michael D. Ciletti, Digital Design, Third Edition, Pearson Education Asia, (2007)

Chapter13- Malvino and Leach, Digital Principles & Applications, Fifth edition, Tata McGraw-Hill

UNIT 2

Chapter 3, 4- M. Morris Mano, Michael D. Ciletti, Digital Design, Third Edition, Pearson Education Asia, (2007)

UNIT3

Chapter 5, 6- M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education Asia, (2007)

Chapter 9, 10 - Malvino and Leach, Digital Principles & Applications, Fiftth edition, Tata McGraw- Hill

UNIT 4

Chapter 7- M. Morris Mano, Michael D. Ciletti, Digital Design, Third Edition, Pearson Education Asia, (2007)

Chapter12- Malvino and Leach, Digital Principles & Applications, Fiftth edition, Tata McGraw-Hill

Suggested Books:

1. W. H. Gothman, Digital Electronics: An Introduction To Theory And Practice, Prentice Hall of India (2000).
2. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994).
2. Thomas L. Floyd, Digital Fundamentals, Pearson Education Asia (1994).
3. A.P Godse, D. A Godse, Didital Electronics-Digital Logic Design, Technical Publications
4. R.P Jain, Modern Digital Electronics, Tata McGraw Hill

Practical (based on ELI-6)

1. To verify and design AND, OR, NOT and XOR gates using NAND gates.
2. To convert a Boolean expression into logic gate circuit and assemble it using logic gate ICs.
3. Design a Half and Full Adder.
4. Design a Half and Full Subtractor.
5. Design a seven segment display driver.
6. Design a 4 X 1 Multiplexer using gates.
7. To build a Flip- Flop Circuits using elementary gates.(RS, Clocked RS, D-type).
8. Design a counter using D/T/JK Flip-Flop.
9. Design a shift register and study Serial and Parallel shifting of data.
10. Binary to Gray Code conversion.