

**CORE COURSE XIII  
DIGITAL ELECTRONICS AND MICROPROCESSOR FUNDAMENTALS**

**Unit I Number Systems and Logic Gates**

Introduction to decimal, binary, octal, hexadecimal number systems – Interconversions – BCD code, Excess – 3 code, Gray code – One’s and two’s complements – Simple binary arithmetic operations – Addition, subtraction, multiplication and division – Binary subtraction using one’s and two’s complements – Positive and negative logic – Basic and derived logic gates, symbols and their truth tables – AND, OR, NOT, NAND, NOR, XOR, and XNOR – Universality of NAND and NOR gates.

**Unit II Boolean Algebra and Simplification of Logic Expressions**

Boolean algebra – Basic laws of Boolean algebra – De-Morgan’s theorems Reducing Boolean expressions using Boolean laws – SOP and POS forms of expressions miniterms and maxterms – Karnaugh map simplification.

**Unit III Combinational digital Systems**

Half and full adders – Binary address – Half and full subtractors – Binary subtractor Two’s complement adder / subtractor circuits – Decoder – Encoder – Multiplexer – Demultiplexer – A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.

**Unit IV Sequential Digital Systems**

Flip flop – RS – clocked RS – T and D flip flops – JK and master slave flip flops – Counters – Four bit asynchronous ripple counter – Mod-10 counter – Ring counter – Synchronous counter – Shift registers – SISO and SIPO shift registers.

**Unit V Microprocessor (8085)**

Introduction to microprocessor – Basic components of a microcomputer – I/O devices – Memory – ROM – RAM – Architecture of 8085 – Address bus – Data bus – Control bus – Pin configuration – Registers Arithmetic and logic unit – Flags – Instruction format – Types of instructions – Addressing modes – Assembly language programming – Programmes for addition, subtraction, biggest and smallest from the given list.

**Books for Study**

Digital Principles and Application, A.P. Malvino, D.P. Leach, IV Edition, McGraw Hill, New Delhi, 1986.

Digital Fundamentals, V.Vijayendran, S.Viswanathan, Printers & Publishers Private Ltd, Chennai, 2004.

Fundamentals of Microprocessor – 8085, V.Vijayendran, S.Viswanathan, Printes & Publishers Private Ltd, Chennai, 2004.

**Books for Reference**

1. Fundamentals of Microprocessor and Microcomputers, B.Ram, Dhanpat Rai Publications, New Delhi, 2006.
2. Digital Electronics, W.H.Gothmann, Prentice Hall of India, Pvt, New Delhi 1996.
3. Fundamentals of Digital Electronics and Microprocessors, Anokh Singh, A.K.Chhabra, S.Chand & Co, New Delhi, 2003