Semester - III

Minor-3 (Theory): Linear and Digital Integrated Devices

ELSCOR303T/ELSMIN303T (Credit: 3, Full Marks: 50, 45 Lecture-Hour)

Number System & Codes, Logic Gates and Boolean Algebra, Digital Logic Families 6 Lectures

Number System and Codes: Decimal, Binary, Hexadecimal and Octal number systems - Base conversions, BCD representation, Arithmetic signed and complement representation, Addition and Subtraction using Complement method, BCD addition.

Logic Gates and Boolean algebra: Basic postulates and fundamental theorems of Boolean algebra, Switching equivalents of Basic gates, Circuit representation using Universal gates.

Combinational Logic Analysis and Design 12 Lectures

Standard representation of logic functions (SOP and POS), Karnaugh map, Encoder and Decoder, Multiplexers and Demultiplexers, Implementing logic functions with multiplexer, Binary Adder (Half and Full), Binary subtractor (Half and Full), Parallel adder/subtractor.

Multiplexer - Cascading and as a function generator, Demultiplexer.

Decoder - Cascading and as a function generator.

Comparator – 1 bit only.

Sequential Logic Design, Programmable Logic devices and Memory 15 Lectures

Sequential Circuits: SR, D, and JK Flip-Flops, Clocked (Level and Edge Triggered) Flip-Flops, Preset and Clear operations, Race-around conditions in JK Flip-Flop, Master-slave JK Flip-Flop.

Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only up to 4 bits).

Counters (4 bits): Ring Counter, Asynchronous counters, Decade Counter, Synchronous Counter.

Programmable Logic Devices: Basic concepts - ROM, PLA, PAL.

Memory: Types of memory - Volatile & non-volatile, ROM, PROM, EPROM, EEPROM, Flash memory, Concept of Primary, Secondary and Cache memory.

Conversion Techniques between Analog and Digital Signals 6 Lectures

Parameters of conversion - Accuracy and Resolution, D-A Techniques – 4-bit binary weighted resistor and R-2R, A-D conversion – Ramp type, Successive approximation.

Linear Integrated Devices 6 Lectures

555 timer: Structure and use in monostable and astable mode.
Applications: use as oscillator, VCO, Schmitt Trigger

Recommended Books

1. M. Morris Mano: Digital System Design, Pearson Education Asia, (Fourth Edition)
2. Thomas L. Flyod: Digital Fundamentals, Pearson Education Asia (1994)
3. D. Roychowdhury: Digital Circuits Vol 1&2, Platinum Publishers
4. Anand Kumar: Fundamentals of Digital Circuits, 4th ed. PHI
5. S. Salivahanan & S. Pravin Kumar: Digital Circuits and Design, Vikas Publishing
6. D. Roychowdhury: Linear Integrated Circuits, New Age

Minor-3 (Practical): ELSCOR303P/ELSMIN303P

1. a. To verify theorems of Boolean Algebra using Logic Gates
   b. Verify NAND & NOR gate as Universal gates.
   c. Implement 4 input NAND/NOR gate from two input gates
2. To convert Boolean expression into logic circuit & design it using logic gate ICs.
3. To implement Half Adder and Full Adder using
   a. Basic Gates
   b.NAND/NOR gates
   c. Full Adder using two half adders
4. To implement Half Subtractor and Full Subtractor using
   a. Basic Gates
   b.NAND/NOR gates
5. 4 bit binary a. Adder and b. Adder-Subtractor using Full adder IC.
6. Implement 2:1 Multiplexer using basic gates
7. Realization of Boolean expression using 8:1 multiplexer.
8. Realization of Boolean expression using Decoder IC
9. To build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates.
10. To build JK Master-slave flip-flop using Flip-Flop ICs
11. To build a Counter using D-type/JK Flip-Flop ICs and study timing diagram.