## Module 1

0 I:
1. What are binary numbers?
2. How do you convert between different bases (binary, octal, hexadecimal)?
3. What are complements and how are they used in digital systems?
4. What is the difference between signed and unsigned binary numbers?
5. What is binary storage and how are registers used in digital systems?
6. What is Boolean algebra and how is it used in digital logic?
7. What are the basic theorems and properties of Boolean algebra?
8. What are logic gates and how do they operate?
9. How can you minimize logic gates using Karnaugh maps and Quine McCluskey Technique?0 I
1. What are binary numbers and how are they used in digital systems? (MODULE I)
2. Explain the concept of compliments in binary numbers and their operations. (MODULE I)
3. What are signed binary numbers? How are they different from regular binary numbers? (MODULE I)
4. What is boolean algebra and how is it used in digital logic gates? (MODULE I)
5. Explain the Karnaugh map and its use in gate level minimisation. (MODULE I)0 1:
- What is the axiomatic definition of Boolean algebra? (1)
- How do you perform base conversions in digital systems? (1)
- What is the Quine McCluskey technique used for? (1)
- Explain how binary storage and registers work. (1)
- What are the signed binary numbers and how are they used in binary systems? (1)0 I:
1. What is the difference between binary, octal, and hexadecimal numbers?
2. How are binary codes used in digital systems?
3. What is the purpose of binary storage and registers?
4. Define Boolean algebra and list some of its basic theorems.
5. How do logic gates operate in digital circuits?
6. What is gate level minimization and how is it achieved?
7. Explain the Quine McCluskey Technique for simplification.0 I:

1) What are binary numbers and how are they used in digital systems?
2) Explain the concept of base conversion and how it is used in digital systems.
3) Define octal and hexadecimal numbers and describe their use in digital systems.
4) What are compliments and how are they used in digital systems?
5) Discuss the operations of compliments and their significance in digital systems.
6) Explain the concept of signed binary numbers and their purpose in digital systems.
7) Define binary codes and how they are used for binary storage and registers.
8) Discuss the fundamental principles of Boolean algebra and logic gates.
9) Explain the axiomatic definition of Boolean algebra and its basic theorems and properties.
10) Define Boolean functions and discuss their relationship to canonical and standard forms.
11) Describe logic operations and the different types of digital logic gates.
12) Discuss gate level minimization and the Karnaugh map.
13) Explain how two, three, four, and five variable maps are used for Product of Sums and Sum of Products simplification.
14) Define Don't care conditions and how they are used in NAND and NOR implementation.
15) Describe the Exclusive OR function and the Quine McCluskey technique for simplification.

## Module 2

1 II:
1. What are combinational circuits and how do you analyze and design them?
2. What is the purpose of binary adders and how do they work?
3. What is a binary multiplier and how does it differ from an adder?
4. What is a magnitude comparator and how is it used in digital systems?
5. What are decoders, encoders, multiplexers, and demultiplexers used for?
6. What are synchronous sequential circuits and how do you analyze and design them?1 II
1. What are combinational logic circuits and how do we analyze them? (MODULE II)
2. How do we design binary adders and multipliers? (MODULE II)
3. What are decoders, encoders, multiplexers, and demultiplexers and how do we use them in digital systems? (MODULE II)
4. What are synchronous sequential circuits and how do we analyze them? (MODULE II)
5. What is state reduction and assignment in synchronous sequential circuits? (MODULE II)1 2:
- How do you design combinational circuits? (2)
- What is the analysis procedure for synchronous sequential circuits? (2)
- Explain the purpose and function of encoders and decoders in digital systems. (2)
- How can you use multiplexers and demultiplexers to simplify logic circuitry? (2)
- Describe the different types of adders, multipliers and comparators in digital systems. (2)1 II:
1. What is the difference between combinational and sequential circuits?
2. How do you analyze and design combinational circuits?
3. What is the purpose of a binary adder-subtractor and how does it work?
4. Describe the process of state reduction and assignment in sequential circuits.
5. What are the various types of counters and registers used in digital systems?
6. Discuss the analysis procedure for asynchronous sequential circuits.1 II:

1) Define combinational logic and its role in digital systems.

2) Explain the analysis and design procedures used for combinational circuits.
3) Describe the binary adder-subtractor and fast adders used in digital systems.
4) Define the decimal adder and binary multiplier and discuss their function.
5) Explain the purpose of a magnitude comparator.
6) Define decoders, encoders, multiplexers and demultiplexers and describe their function.
7) Discuss synchronous sequential circuits and their components.
8) Explain the role of storage elements such as latches and flip-flops in sequential circuits.
9) Describe the analysis of clocked sequential circuits and the state reduction and assignment procedures used in design.

## Module 3

2 III:
1. What are registers and how are shift registers used in digital systems?
2. What are counters and how are they used in digital systems?
3. What are asynchronous sequential circuits and how do you analyze and design them?2 III
1. Explain the concept of registers and counters in digital systems. (MODULE III)
2. What are ripple counters, synchronous counters, and Johnson counters? (MODULE III)
3. How do we analyze asynchronous sequential circuits and circuits with latches? (MODULE III)2 3:
- What are the different types of counters and registers used in digital systems? (3)
- How can you reduce hazards in asynchronous sequential circuits? (3)
- Explain how storage elements like latches and flip-flops work in synchronous sequential circuits. (3)
- How can you use state reduction and assignment to optimize clocked sequential circuits? (3)2 III:
1. What is the purpose of registers and shift registers in digital systems?
2. How do ripple counters and synchronous counters work?
3. What is a Johnson counter and how is it used?
4. What are the hazards that can occur in asynchronous sequential circuits?
5. How is state reduction and assignment achieved in sequential circuits with latches?2 III:

1) Define registers and explain their function in digital systems.
2) Describe the role of shift registers in digital systems.
3) Define ripple counters and synchronous counters and describe their function and application.
4) Discuss the counter with unused states and the ring counter.
5) Define the Johnson counter and how it differs from other counters.
6) Discuss the analysis procedure used for asynchronous sequential circuits.
7) Explain the use of latches and hazards in asynchronous sequential circuits.

## Module 4

3 IV:
1. How does Random Access Memory (RAM) work and how is it decoded?
2. What is Read Only Memory (ROM) and how is it different from RAM?
3. What are programmable logic devices and how are they used in digital systems?
4. What are the different types of digital logic families and what are their characteristics?
5. What are RTL and DTL circuits and how are they used in digital systems?3 IV
1. What is random access memory and how is it used in digital systems? (MODULE IV)
2. Explain the concept of programmable logic arrays and programmable array logic. (MODULE IV)
3. What are some common digital logic families and their characteristics? (MODULE IV)
4. How do we analyze RTL and DTL circuits, emitter-coupled logic, and CMOS logic? (MODULE IV)3 4:
- What is the purpose of error detection and correction in digital memory systems? (4)
- How do you decode memory in digital systems? (4)
- Explain the function and use of programmable logic arrays and sequential programmable devices. (4)
- What are the different types of digital logic families and their characteristics? (4)
- How do different transistor logic technologies like RTL, DTL, ECL, and CMOS work in digital circuits? (4)3 IV:
1. What is the purpose of Random Access Memory and how is it used in digital systems?
2. Describe the process of memory decoding and error detection and correction.
3. What are the different types of programmable logic and how are they used?
4. Discuss the characteristics of IC digital logic families.
5. How are RTL and DTL circuits used in digital systems?
6. What are the differences between Emitter coupled Logic and CMOS Logic circuits?3 IV:

1) Define random access memory and explain the concept of memory decoding.
2) Discuss the use of error detection and correction in digital systems.
3) Define Read Only Memory and how it is used in digital systems.
4) Describe Programmable Logic Array and Programmable Array Logic.
5) Explain the use of sequential programmable devices in digital systems.
6) Define digital logic families and their characteristics such as fan out, power dissipation, propagation delay, and noise margin.
7) Discuss the different types of digital logic circuits, including RTL, DTL, Transistor Transistor Logic, Emitter coupled Logic, and CMOS Logic.
8) Explain the use of CMOS transmission gate circuits.