

A-0808

Total Pages : 3

Roll No.

MIT (CS)-302

INTRODUCTION TO DIGITAL SYSTEM

(MSCCS)

Examination, June 2025

Time : 2:00 Hrs.

Max. Marks : 70

Note :- This paper is of Seventy (70) marks divided into Two (02) Sections 'A' and 'B'. Attempt the questions contained in these sections according to the detailed instructions given therein. *Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.*

Section-A

Long Answer Type Questions 2×19=38

Note :- Section 'A' contains Five (05) Long-answer type questions of Nineteen (19) marks each. Learners are required to answer any two (02) questions only.

1. Compare the asynchronous (ripple) counter with a synchronous counter. Explain the advantages and disadvantages of each type of counter. Provide examples of applications where each type of counter is preferred.
2. Design a digital circuit using logic gates to implement the following Boolean expression: $F = A'B'C + AB'C'$. Explain the working of the circuit and provide a truth table to illustrate its operation.
3. Design a decade counter (MOD 10 counter) using JK flip-flops. Explain the working of the counter and provide a timing diagram to illustrate its operation.
4. Compare and contrast SRAM and DRAM in terms of their architecture, operation, and performance. Discuss the advantages and disadvantages of each type of memory.
5. Describe the Binary Coded Decimal (BCD) system and explain how it is used to represent decimal numbers in digital systems. Provide examples of BCD codes for the decimal numbers 0-9.

Section–B

Short Answer Type Questions 4×8=32

Note :– Section ‘B’ contains Eight (08) Short-answer type questions of Eight (08) marks each. Learners are required to answer any *four* (04) questions only.

1. Minimize the following Boolean expression using the Quine-McCluskey technique,
$$F(A, B, C, D) = \Sigma(1, 3, 5, 7, 9, 11) + \Sigma(0, 2, 4, 6, 8, 10)$$
2. What is the Quine-McClusky method used for ? Explain the principle of the Quine-McClusky method.
3. What is a JK flip-flop ? Explain the truth table of a JK flip-flop.
4. Explain the concept of shift registers and their importance in digital electronics. Describe the basic components of a shift register and how they operate.
5. Explain the concept of a demultiplexer and its importance in digital electronics. Discuss the advantages and disadvantages of using demultiplexers in digital systems.
6. Construct a four-variable Karnaugh map for the Boolean function $F(A, B, C, D) = A'B'C'D + AB'C'D$. Simplify the function using the Karnaugh map and provide the resulting logic circuit
7. Convert the decimal number -456 to binary using 2's complement representation.
8. Design a logic circuit to realize the XOR operation using only AND, OR, and NOT gates.
