

A-1283

Total Pages : 4

Roll No.

MIT (CS)-302

(MSCCS)

Introduction to Digital Systems

Examination February, 2026

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.

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(1)

P.T.O.

1. (a) Explain different number system conversions (decimal \leftrightarrow binary, binary \leftrightarrow octal, binary \leftrightarrow hexadecimal) with examples. (10)
- (b) Represent the following negative numbers using 1's complement and 2's complement (8-bit format) :
- (i) -14
- (ii) -57 (9)
2. (a) What are error detection and error correcting codes? Explain parity, Hamming code, and concept of Hamming distance. (10)
- (b) Write short notes on the following :
- (i) Binary Coded Decimal (BCD)
- (ii) Alphanumeric Codes (9)
3. (a) Explain Boolean Algebra, basic theorems, and laws. Prove any *two* Boolean algebra theorems using truth tables. (10)
- (b) Minimize the following Boolean function using algebraic method : (9)

$$F(A, B, C) = A'B + AB' + AC$$

4. (a) Explain POS and SOP forms of Boolean functions. Convert the following function to canonical SOP and POS : (10)
- $$F(A, B, C) = A + B'C$$
- (b) What are minterms and maxterms ? Draw the logic circuit for the expression derived from minterms $M(1, 3, 5)$. (9)
5. (a) Explain the working of SR, JK, D, and T flip-flops with truth tables. (10)
- (b) Write the excitation table for JK flip-flop and design a JK-based T flip-flop. (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. Simplify the following Boolean expression using a 3-variable K-Map :

$$F(A, B, C) = \Sigma(0, 2, 3, 6)$$

2. Describe the Quine-McCluskey method and explain any two steps in detail.

3. Draw logic symbols and truth tables for :
 - (a) XOR gate
 - (β) XNOR gate
4. Write short notes on the following :
 - (a) Encoder
 - (b) Decoder
5. Differentiate between Combinational and Sequential Circuits with examples.
6. Explain the working of PISO and SIPO shift registers.
7. What is a Synchronous Counter ? Explain the working of a 3-bit synchronous counter.
8. Write short notes on the following :
 - (a) ROM
 - (a) Flash Memory
