A–821

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MIT (CS)-302

(MSCCS)

(Introduction to Digital Systems)

3rd Semester Examination, 2024 (June)

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. What is prime implicant ? Simplify the following Boolean function using K-Map and identify them for the expression :

$f(a, b, c, d) = \Sigma m\ (0, 1, 2, 5, 6, 7, 8, 9, 10, 13, 14, 15)$

2. Construct an 16 : 1 MUX using 4 : 1 and 2 : 1 multiplexers using 3 : 8 line decoder, implement the following functions :

$f1(A, B, C, D) = \Sigma m(0, 1, 2, 5, 7, 11, 15)$

$f2(A, B, C, D) = \pi m(1, 3, 4, 11, 13, 14)$

3. What are Shift Registers ? Differentiate between SISO shift registers (Serial Input, Serial Output) and SIPO (Serial input, Parallel output) PISO (Parallel input, Serial Output) and PIPO (Parallel input, Parallel output) shift registers.

4. Write the truth table of the RS, JK, D & T flip-flops. Design a Mod 6 synchronous counter using D flip-flop and T flip-flop.

5. Construct a sequential logic circuit with single input and single output by obtaining the state and excitation table for the given state diagram using JK FF.

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 expression using Quine Mc Clusky Technique :

   $$F(A, B, C, D) = \Sigma m(L, 2, 5, 7, 9, 15) + d(0, 3, 11)$$

2. Differentiate between static RAM and Dynamic RAM.

3. Draw the neat and clean diagram of master slave JK Flip flop and explain its working by giving truth table.

4. Design a 4-bit universal shift register using SR Flip-flop.

5. What are Huntington Postulates of Boolean Algebra ? Discuss in detail.

6. Design a combinational circuit using ROM. The circuit accepts 3-bit number and output binary number equal to the square of the input number.

7. What is a sequential circuit ? Differentiate between synchronous and asynchronous sequential circuit.

8. Realize the X-OR function using only NAND logic and only NOR logic.

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