A-0864

Total Pages : 5 **Roll No. ----------**

MIT (CS)-302

Introduction to Digital Systems

(MSCCS)

3rd Semester Examination 2024(Dec.)

Time: 2:00 hrs Max. Marks: 70

Note : This paper is of Seventy (70) marks divided into Two (02) Section 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.

P.T.O.

Section-A (Long-Answer-Type Questions)

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.

[2x19=38]

Q.1. Discuss the relationship between Huntington postulates and the properties of Boolean algebra, such as commutativity, associativity, and distributivity. Provide examples to illustrate your answer.

Q.2. Determine the prime implicants and essential prime implicants for the following Boolean expression, taking into account the dont't care conditions.

$$F(A, B, C, D) = A'B'C'D + AB'C'D + ABC'D + ABCD + d(0, 2, 4, 6)$$

Q.3. Explain the concept of a demultiplexer and its importance in digital electronics. Discuss the advantages and disadvantages of using demultiplexers in digital systems.

Q.4. Describe the different types of shift registers, including SISO, SIPO, PISO, and PIPO. Explain the operation of each type and provide examples of their use.

Q.5. Design a 4-bit ring counter using D flip-flops. Explain the working of the counter and provide a timing diagram to illustrate its operation.

Section-B (Short-Answer-Type Questions)

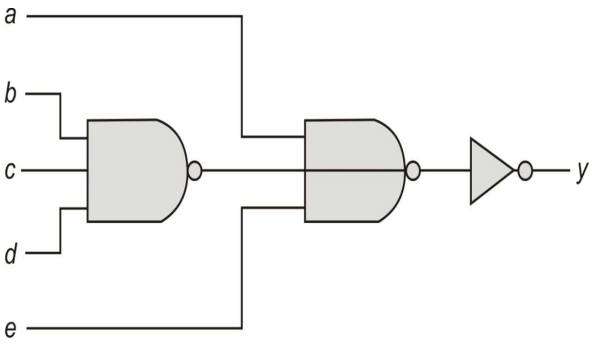
Note : Section 'B' contains Eight (08) short-answer-type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only.

[4x8=32]

Q.1. Convert the hexadecimal number 68BE to binary, and then convert it from binary to octal.

P.T.O.

Q.2. Write Boolean expressions and construct the truth tables describing the outputs of the circuits described by following logic diagrams.



Q.3. Describe the architecture and operation of a flash memory? Explain how data is stored in a flash memory and how it is accessed by the processor. Discuss the advantages and disadvantages of using flash memory in computing systems.

Q.4. Write a short note on the importance of master-slave flip-flops in digital electronics.

Q.5. Design a full adder using logic gates. Explain the operation of the full adder and provide a truth table to illustrate its operation.

Q.6. What is the difference between serial and parallel transfer? Which transfer is a faster one? Explain how to convert serial data to parallel and parallel data to serial. What type of register is needed?

Q.7. Implement the following Boolean expression with three half adders

F= ABC' + (A' + B')C

Q.8. List the state table for the JK flip-flop, using Q as the present and next state and J and K as inputs. Also, design the sequential circuit specified by the state table.

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