

MASTER OF COMPUTER APPLICATION  
FIRST SEMESTER  
DIGITAL SYSTEM  
MCA – 102

Duration: 3 Hrs.

Marks: 70

Part : A (Objective) = 20

Part : B (Descriptive) = 50

[ PART-B : Descriptive ]

Duration: 2 Hrs. 40 Mins.

Marks: 50

[ Answer question no. One (1) & any four (4) from the rest ]

1. Describe AND, OR, NOT, NOR, NAND, XOR, XNOR gates with their truth tables and logic gates 10
  
2. Simplify using Boolean theorems 3+3+4  
=10  
$$B = \overline{X}Y + XY + X\overline{Y} + \overline{X}\overline{Y}$$
$$Z = A\overline{B}\overline{C} + A\overline{B}C + A\overline{B}C + A\overline{B}C$$
$$Y = XY + \overline{X}Y + XYZ$$
  
3. Find the answer for the following Boolean expression 10
  - i.  $11001.1011 + 10011.011$
  - ii. Convert  $(234.79)_{10}$  to binary equivalent
  - iii.  $1001.1 \times 101.1$
  - iv.  $100.100 / 11$
  - v.  $1101 - 1001$  (using 1's complement)
  
4. Simplify using K-Map 3+3+4  
=10  
$$F(X, Y, Z) = (2, 3, 4, 5)$$
$$W = \overline{X}YZ + \overline{X}YZ + XYZ + X\overline{Y}Z + \overline{X}Y\overline{Z}$$
$$F(A, B, C, D) = (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$$
  
5. Explain four different types shift registers. Design a negative edge triggered 3-bit ripple down counter. Give its logic diagram. 4+3+3  
=10



6. Describe full adder with truth table and logic diagram. Define multiplexer. Draw diagram and write the function table for 4:1 multiplexer. 4+2+4  
=10
7. What is Flip Flop. Differentiate synchronous and asynchronous sequential circuit. Explain RS, JK Flip Flop with truth table and diagram. 10
8. Describe different types of semi conductor memory. Write about the instruction execution process 6+4=10

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[ PART-A : Objective ]

Choose the correct answer from the following :

1×20=20

1. A combinational circuit that selects one from many inputs
  - a. Encoder
  - b. Decoder
  - c. MUX
  - d. DEMUX
2. Full adder performs addition on
  - a. 2 bits
  - b. 3 bits
  - c. 4 bits
  - d. 5 bits
3. Which of the following gates are added to the input of OR gate to convert it to the NAND gate
  - a. NOT
  - b. OR
  - c. AND
  - d. XOR
4.  $x+x'y=$ 
  - a. X
  - b. Y
  - c. X+Y
  - d. X-Y
5. The XNOR gate is equivalent to which gate followed by an inverter?
  - a. OR
  - b. AND
  - c. NAND
  - d. XOR
6. One that is not postulate of Boolean Algebra
  - a. Commutative
  - b. Duality
  - c. Associative
  - d. Identity element
7.  $2^3$  would have
  - a. 3 values
  - b. 4 values
  - c. 6 values
  - d. 8 values
8. A 1-to 4 line de-multiplexer is to be implemented using a memory. How many bits must each word have?
  - a. 1
  - b. 2
  - c. 4
  - d. 8
9. The sum of two n-bit binary numbers can be done
  - a. Serially
  - b. Parallel
  - c. Sequentially
  - d. Both A and B
10. Product of 1011 and 101
  - a. 110111
  - b. 110011
  - c. 111011
  - d. 111100
11. Digital number is said to be of base or radix
  - a. 8
  - b. 10
  - c. 2
  - d. 0
12. Full adder performs addition on
  - a. 2 bits
  - b. 3 bits
  - c. 4 bits
  - d. 5 bits
13. The minterms in a K-map are marked with a
  - a. X
  - b. Y
  - c. 0
  - d. 1



