

QUESTION 2010

Group - A

(Multiple Choice Type Question)

1. Choose the correct alternatives for any ten of the following:

i) In which of the following base systems is 789 a valid number?

- a) Base 5 ✓ b) Base 16 c) Base 8 d) Base 3

ii) Storage of 1 kB means the what number of bytes?

- a) 1000 b) 964 ✓ c) 1024 d) 1064

iii) Pick out the correct statement:

- ✓ a) In a positional number system, each symbol represents the same value irrespective of its position.
b) The highest symbol in a position number system is a value equal to the number of symbols in the system.
c) It is not always possible to find the exact binary.
d) Each hexadecimal digit can be represented as a sequence of three binary symbols.

iv) The binary code of $(21.125)_{10}$ is

- ✓ a) 10101.001 b) 10100.001 c) 10101.010 d) 10100.111

v) Race condition is avoided by

- a) J-K flip-flop b) S-R flip-flop
✓ c) master-slave flip-flop d) none of these

vi) Which one is sequential circuit?

- a) multiplexer b) decoder c) priority encoder ✓ d) counter

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vii) Which is correct?

- a) $A + \bar{A}B = A + B$ ✓b) $A + 1 = A$ c) $A + \bar{A} = A$ d) $\bar{A} \cdot A = A$

viii) Decimal digits can be converted to binary code using

- ✓a) Decoder b) Encoder c) Mux d) DeMux

ix) Carry of a full adder is a

- a) dual function ✓b) self dual function
c) non-symmetric function d) none of these

x) Every flip-flop is defined by

- a) characteristic equation b) excitation table ✓c) both of these d) none of these

xi) Immediate Access Storage Device is the name of

- ✓a) primary memory b) secondary memory
c) hard disk d) pen drive

xii) Control unit does not process data.

- a) False ✓b) True c) Unpredictable d) None of these

xiii) If there are three inputs then the number of input combinations will be

- a) four ✓b) eight c) six d) two

xiv) Hexadecimal equivalent of $(26.25)_{10}$ is

- ✓a) A6.4 b) 1A.4 c) FA.4 d) 1A.25

Group – B

(Short Answer Type Questions)

2. Implement XOR operation using four 2-input NAND gates. Verify the output for different combinations of inputs.

See Topic: LOGIC GATES, Short Answer Type Question No. 5.

3. Write down the BCD code of $(9612)_{10}$. Add two numbers $(6952)_{10}$ and $(1589)_{10}$ using BCD codes and obtain the result also in BCD.

See Topic: CODES, Short Answer Type Question No. 3.

4. a) Find out the dual and the complement of the following Boolean function:

$$F = ABC + \bar{A}\bar{B}C + \bar{A}BC + ABC$$

b) Simplify the following Boolean expression: $(X + Y)(\bar{X} + Y + Z)(\bar{X} + Y + \bar{Z})$ to minimum number of literals using algebraic method.

See Topic: BOOLEAN ALGEBRA, Short Answer Type Question No. 5.

5. a) Prove that the multiplexer is a universal logic module.

b) Use 4-to-1 MUX and other necessary logic gate to design a full-subtractor.

See Topic: COMBINATIONAL CIRCUIT, Short Answer Type Question No. 3 & 4.

6. a) What is the advantage of JK flip-flop over SR flip-flop?
 b) Write the Maxterm form of the following function: $F = XY + \bar{X}Z$
 a) See Topic: FLIP-FLOP, Short Answer Type Question No. 4.
 b) See Topic: KARNAUGH MAP, Short Answer Type Question No. 7.

Group - C

(Long Answer Type Questions)

7. a) Draw the truth table for a three input adder. Explain clearly the meaning of the input and the output symbols in the truth table. Write the Boolean expressions for the sum and carry.
 b) Use a Karnaugh map to find the minimum sum of products for the expression:

$$X = A'B'C + AB'C + A'BC + ABC'$$

- c) Simplify the following expressions using Boolean algebra:

i) $AB + A(B+C) + B(B+C)$

ii) $A'BC + B'CD + AC + A'B'CD'$

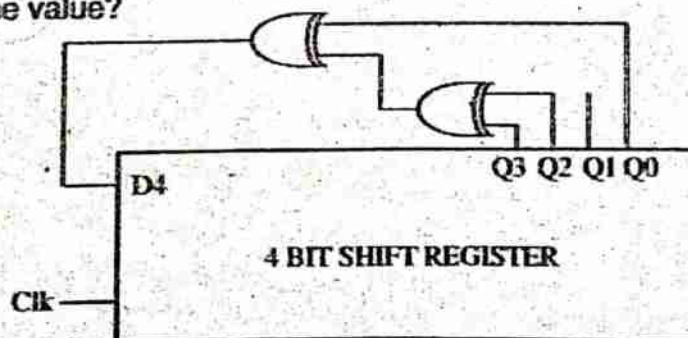
- a) See Topic: ARITHMETIC CIRCUIT, Short Answer Type Question No. 3.
 b) See Topic: KARNAUGH MAP Short Answer Type Question No. 8.
 c) See Topic: BOOLEAN ALGEBRA, Short Answer Type Question No. 6.

8. a) State the main differences between sequential and combinational circuits.
 b) Draw the truth table and logic circuit of a Full Subtractor. Using Karnaugh map find out the expression for difference (D) and borrow (B).
 c) Implement the Boolean function $F(A, B, C, D) = \sum(0, 1, 3, 4, 8, 9, 15)$ using 8×1 multiplexer with A, B and D connected to select lines s_2, s_1, s_0 respectively.

- a) See Topic: COMBINATIONAL CIRCUIT Short Answer Type Question No. 5.
 b) See Topic: ARITHMETIC CIRCUIT Short Answer Type Question No. 4.
 c) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 10.

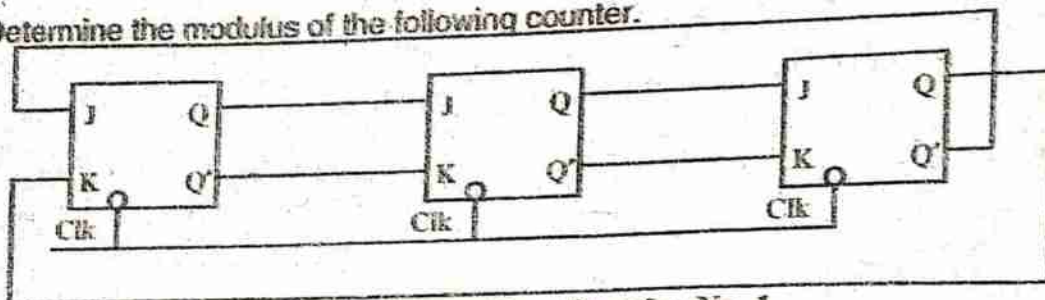
9. a) Define flip-flop and its propagation delay.
 b) Using the logic diagram convert a J-K flip-flop to a D flip-flop and T flip-flop.
 c) Design a J-K master-slave flip-flop with circuit diagram and give the truth table.
 See Topic: FLIP-FLOP, Long Answer Type Question No. 12.

10. a) What is the usefulness of excitation table of the flip-flop?
 b) The 4-bit shift register is initialised to 001. After how many clock pulses is the register re-initialised to same value?



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c) Determine the modulus of the following counter.



a) See Topic: FLIP-FLOP, Short Answer Type Question No. 1.

b) & c) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 8.

11. a) Write short notes on any three of the following:

- a) Decoder
- b) Shift register
- c) PROM
- d) Priority Checker
- e) Ring counter.

a) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 14(f).

b) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 10(a).

c) See Topic: MEMORY DEVICE, Long Answer Type Question No. 3(a).

d) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 14(c).

e) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 10(b).