QUESTION 2013

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following:

i) Excess-3 code representation of decimal 984 is

a) 1011 1010 1101
✓b) 1100 1011 0111
c) 1110 1001 1010
d) 1101 1111 0111

ii) Hexadecimal equivalent of $(1586)_{10}$ is

✓a) $(362)_{16}$ b) $(623)_{16}$ c) $(632)_{16}$ d) $(263)_{16}$

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iii) 2's compliment of 1010111 is

✓a) 0101001 b) 0110110 c) 0101100 d) 0101101

iv) A function of three variables $F(A,B,C) = \sum (1,3,5,6)$ is given by

a) an 8-to-1 multiplexer b) two 4-to-1 multiplexer

c) one 4-to-1 multiplexer ✓d) none of these

v) Multiplexer is also known as

✓a) data selector b) data distributor c) multiplexer d) encoder

vi) Parallel Binary Adders are

a) combinational logic circuit b) sequential logic circuit

✓c) both (a) and (b) d) none of these

vii) A Half Adder adds ..... bits.

a) 16 b) 10 c) 8 ✓d) 2

viii) Control Unit does not process data.

✓a) true b) false c) unpredictable d) none of these

ix) $(ABC + A\bar{B}C + AB\bar{C})$ is equal to

✓a) $A(B+C)$ b) $\bar{A}(B+C)$ c) $A(B+\bar{C})$ d) $A(\bar{B}+C)$

x) Race Condition is avoided by

a) J-K flip-flop ✓b) Master-slave flip-flop

c) D flip-flop d) S-R flip-flop

Group – B
(Short Answer Type Questions)

2. Draw the logic symbol, Boolean expression and truth table of NOR and NAND gates.
See Topic: LOGIC GATES, Short Answer Type Question No. 6.

3. State and prove De Morgan's theorem in Boolean algebra.
See Topic: LOGIC GATES, Short Answer Type Question No. 7.

4. Represent the decimal number '27' in
a) Binary code
b) BCD code
c) Octal code
d) Hexadecimal code
e) Gray code.

See Topic: NUMBER SYSTEM, Short Answer Type Question No. 8.

5. Prove the following logical equation using Boolean algebra: $(A+BC).(B+A\bar{C}) = BC + A\bar{C}$
See Topic: BOOLEAN ALGEBRA, Short Answer Type Question No. 3.

6. Realize the EX-OR logic operation using either NAND gate or NOR gate.
See Topic: LOGIC GATES, Short Answer Type Question No. 4.

7. Discuss the function of T-type flip-flop with the help of graphic symbol and characteristic table.
See Topic: FLIP-FLOP, Short Answer Type Question No. 6.

Group – C
(Long Answer Type Questions)

8. a) Write down the truth table and logic symbol of a 3-input OR gate.
b) Using NOR gates, design Full Adder and describe with diagram.
c) Explain Universal Gate.
d) Express the function $Y = A + \bar{B}C$ in a canonical SOP form.
a) & b) See Topic: LOGIC GATES, Long Answer Type Question No. 4(a) & (b).
c) See Topic: LOGIC GATES, Long Answer Type Question No. 3(b).
d) See Topic: LOGIC GATES, Long Answer Type Question No. 4(d).

9. a) Using K-map method simplify the following Boolean function and obtain minimal SOP expression: $Y = \sum_m (0,2,3,6,7) + \sum_d (8,10,11,15)$.
b) Implement the Boolean function $F = (A, B, C, D) = \sum_m (0,1,3,8,9,15)$ using two 4-to-1 multiplexer and one OR gate.
c) Describe the application of Data Distributor.
d) What is Decoder?
a) See Topic: KARNAUGH MAP, Long Answer Type Question No. 2.
b) See Topic: COMBINATIONAL CIRCUIT Long Answer Type Question No. 11.
c) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 3(a).
d) See Topic: COMBINATIONAL CIRCUIT Long Answer Type Question No. 14(f).

10. a) Explain the concept of parity checking.
b) Write down the 4-bit gray code in the ascending order of its decimal value.
c) Design a synchronous Mod-12 down-counter using J-K flip-flops.
a) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 8(a).
b) See Topic: NUMBER SYSTEM, Long Answer Type Question No. 2(b).
c) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 11.

11. a) Design and implement Mod-6 synchronous counter considering lock-out problem. Is the counter self-starting?
b) Using the logic diagram convert a J-K flip-flop to a D flip-flop and T flip-flop.
c) Explain the difference between Ring and Johnson counter with proper state and a circuit diagram.
a) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 7(a).
b) See Topic: FLIP-FLOP, Long Answer Type Question No. 12(b).
c) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 9(b).

12. a) What do you mean by race condition in flip-flop?
b) Design a Master-Slave flip-flop and discuss its operation.
c) Design and explain 4 bit Parallel Adder/Subtractor.

a) See Topic: FLIP-FLOP, Long Answer Type Question No. 11.
b) See Topic: FLIP-FLOP, Long Answer Type Question No. 6(b).
c) See Topic: ARITHMATIC CIRCUIT, Short Answer Type Question No. 2.