Group – A
(Multiple Choice Type Question)

1. Chose the correct alternatives for the following:

i) A 3-bit synchronous counter uses flip-flops with propagation delay time of 20 ns each. The maximum possible time required for change of state will be

 a) 60 ns   b) 40 ns   ✓c) 20 ns   d) none of these

ii) BCD subtraction is performed by using which complement representation?

 a) 1's   b) 2's   c) 10's   ✓d) 9's

iii) The SOP form of logical expression is most suitable for designing logic circuits using only

 a) XOR gates   b) NOR gates   ✓c) NAND gates   d) OR gates

iv) The dual of a Boolean function is obtained by
 a) interchanging all 0s and 1s only
 b) changing 0s to 1s only
 c) changing 1s to 0s only
 ✓d) interchanging all 0s and 1s and '+' and '.' signs

v) When representing in the following code the consecutive decimal number differ only in one bit

 a) Excess -3   ✓b) Gray   c) BCD   d) Hexadecimal

vi) In a J-K flip -flop when J = 1 and K =1 and clock =1 the output will be.

 ✓a) toggle   b) 1   c) 0   d) recalls previous output

vii) $(AB + A'B + A'B')$ is equal to

 a) $A+B'$ ✓b) $A'+B$ c) $A+B$ d) 1

viii) 2's complement of 1010101 is

 ✓a) 0101011   b) 10101010   c) 1100000   d) 1000001

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ix) The basic fuse technologies used in PROM are

  a) metal links   b) silicon links   c) p-n junctions   ✓d) all of these

x) In general, a boolean expression of (n+1) variable can be implemented using a multiplexer with

  ✓a) 2^{n+1} inputs   b) 2^{n-1} inputs   c) 2^n inputs   d) None of these

Group – B
(Short Answer Type Questions)

2. Draw the neat diagram of 3- bits Bi-directional Shift Register using mode control (M). When M is logic zero then left shift and right shift for M is logic one.
See Topic: RESISTER & COUNTER, Long Answer Type Question No. 6.

3. Design 2-bit Gray-Binary converter using basic logic gates with proper truth table.
See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 8.

4. Draw the logic diagram and truth table of J – K F/F. Why is J- K F/F much more versatile that S-R F/F?
See Topic: FLIP-FLOP, Long Answer Type Question No. 10.

5. What is a full subtractor? Explain its basic structure with proper logic diagrams & truth table.
See Topic: ARITHMATIC CIRCUIT, Long Answer Type Question No. 3.

6. Realize the function $f(A, B, C) = \Sigma m (1,3, 5, 6)$ by a multiplexer. Discuss the operation logic.
See Topic: LOGIC GATES, Short Answer Type Question No. 4.

Group – C
(Long Answer Type Questions)

7. a) Using K -map method minimize the following expression:
$F(w, x, y, z) = m \Sigma (1, 5, 6, 12, 13, 14) + d \Sigma (2, 4)$.
b) Implement Ex-OR gate using NAND Gate and NAND gate using NOR gate.
a) See Topic: KARNAUGH MAP, Short Answer Type Question No. 6.
b) See Topic: LOGIC GATES, Short Answer Type Question No. 4.

8. a) Design and implement Mod-6 synchronous counter considering lock out problem. Is the counter self-starting?
b) Explain the difference between Ring and Johnson Counter with proper state diagram and circuit diagram.
See Topic: RESISTER & COUNTER, Long Answer Type Question No. 7.

9. a) Explain the concept of parity checking.
b) Discuss about the design of an odd parity generator.
a) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 8(a).
b) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 4.

c) What is biased ....Representation (FPR)?
d) Represent .... for a 32- bit CPU.

10. What do you mean by race condition in flip- flop? Design a j –k flip - flop and discuss its operation. Design and explain the functioning of the 4-bit adder-subtractor circuit.
See Topic: FLIP-FLOP, Long Answer Type Question No. 11.
See Topic: ARITHMATIC CIRCUIT, Short Answer Type Question No. 2.

11. Write short notes on any three of the following:
    a) Universal gates
    b) Decoder
    c) Shift Register
    d) Flip -flop excitation table
    e) Ripple counter

a) See Topic: LOGIC GATES, Long Answer Type Question No. 4(b).
b) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 14(f).
c) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 10(a).
d) See Topic: FLIP-FLOP, Long Answer Type Question No. 13(a).
e) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 10(e).