Each of the MCQ is out of 3 marks
The model Answer: b d d c e d

1. The output F of the circuit in Figure 1 is

a) implemented as Product of Sum.
b) $A + CD + (A + D')(C' + D)$.
c) all of the above.
d) $A' + C'D + (A + D')(C' + D)$.
e) $A' + CD' + (A + D')(C' + D)$.

2. In Figure 1, F can be minimized using K-Map to

a) $A'C'D + A'CD'$.
b) $A + A'C'D' + A'CD$.
c) $C'D' + CD + AC'D + ACD'$.
d) $A + CD + C'D'$.
e) $C'D' + CD + AC' + AC$.

3. What is/are the missing statement(s) in the following Verilog code that models the circuit in Figure 1?

```
module CircuitInFigure(A, B, C, D, F)
    input   A, B, C, D;
    output  F;
    wire    j, k, l, m, n, Cp, Dp;
    not     (Cp, C);
    not     (Dp, D);
    and     (j, C, D);
    or      (k, A, Dp);
    or      (l, Cp, D);
    or      (m, A, j)
      ⋮
    or      (F, m, n);
endmodule
```

a) **and** (Cp, k, l);
b) **and** (F, k, l);
c) **or** (F, k, l);
d) **and** (n, k, l);
e) All of the above.

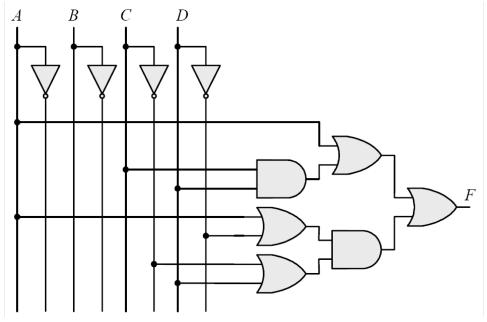

Figure 1

4. A circuit with one output, G, and 4 inputs, w x y z, generates 1 when the number of 1s in the input are **more than or equal** to the number of 0s. The output, $G =$

a) $\prod(0, 1, 2, 4, 8)$.
b) $\Sigma(3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15)$.
c) all of the above.
d) $\Sigma(7, 11, 13, 14, 15)$.
e) $\Sigma(0, 1, 2, 4, 8)$.

5. Now, assume that the inputs of the circuit in Question 4 will never take the values 0010 or 1000. Then, the best minimization leads to $G =$

a) $wx + yz + xz + xy + wz + wy$.
b) $w'x'yz' + wx'y'z'$.
c) $w'y'z' + w'x'y'$.
d) $x + z + wy + w'y'$.
e) $w + y + xz$.

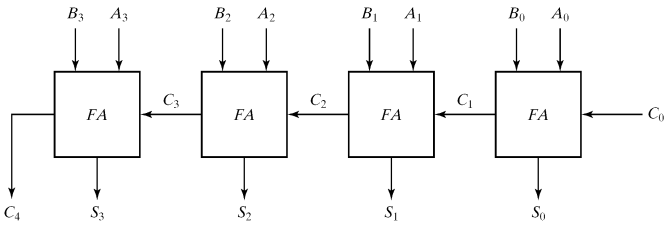

Figure 2. Each FA is a 1-bit Full Adder

6. In Figure 2, if $A = 1110$, $B = 0111$, and $c_0 = 0$ then

a) $c_3 = 0$ and $s_2 = 0$.
b) $c_3 = 0$ and $s_2 = 1$.
c) $c_3 = 1$ and $s_2 = 0$.
d) $c_3 = 1$ and $s_2 = 1$.
e) c_3 and s_2 depend on the implementation of each FA.

7. In Figure 3

a) F_1 is a synchronous circuit.
b) $F_2 = A'B'C' + A'BC$.
c) $F_3 = m_4 + m_5 + m_6$.
d) the decoder output $m_6 = 0$.
e) all of the above.

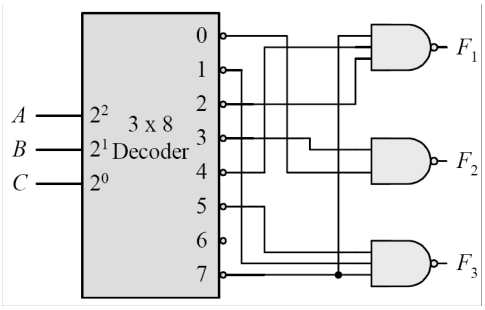

Figure 3

The following question is out of 10

8. Using an 8×1 MUX, implement the function: $F(w, x, y, z) = \sum(3, 5, 11, 14)$.