

# CENTURION UNIVERSITY OF TECHNOLOGY & MANAGEMENT

## SCHOOL OF ENGINEERING & TECHNOLOGY

### VLSI DESIGN

#### Assignment-2

*Date of submission: After Module V completed*

**SEM: CBCS**

#### **Short Questions:-**

1. Write the excitation table for JK F/F.
2. Why both “S” and “R” inputs and a SR latch should never be “1” simultaneously.
3. What will happen if the frequency of the clock signal connected to a F/F is increased to a very high value or decrease to a very low value.
4. Distinguish the functions of decoder, Encoder and multiplexer.
5. What is called as 3-state gate? What is its importance in combinational circuit?
  
6. Implement the full adder circuit using decoder.
7. What is the difference between latch and F/F.
8. What do you mean by sequential logic circuit? Distinguish between synchronous and asynchronous logic circuit.
9. What is called as characteristic equation? Write the characteristic equation for SR and D F/Fs.
10. What is excitation table? Write the excitation table for all F/Fs.
11. Design a BCD to decimal decoder
12. Design a 3-bit GRAY code to Binary converter
13. Design a 3-bit Binary to GRAY code converter
14. Design a circuit for the subtraction of two unsigned binary numbers .explain its operation
15. Realize a full adder using 4:1 MUX.

#### **Long questions:-**

1. How many 32 X 8 RAM chips are needed to provide a memory capacity of 512 K bytes? How many lines of the address must be used to access 512 Kbytes? How many address lines must be decoded for the chip select inputs? Specify the size of the decoder.
2. Design a 4-bit binary synchronous counter with D-F/Fs.

3. Consider a variable X and when X="0", it will count from "000" to "111" and when X="1", it will count from "111" to "000" using suitable F/Fs.
4. Design a synchronous sequential circuit which will detect the sequence "1001" in a binary string. Use D-F/F. Draw the state diagram, state table and design it.
5. Design a four bit magnitude comparator that compares two 4-bit numbers A and B to check if they are equal. The circuit has output f=1 if A=B and f=0 if A ≠ B.
6. Draw the logic diagram of a 2 to 4 line decoder using NOR gates only. Include an enable input.
7. What is a priority encoder? Design a priority encoder having D<sub>0</sub> as the highest priority and D<sub>3</sub> as the lowest priority.
8. Design a combinational circuit that accepts a 3-bit binary number and generates an output equal to the square of the input number.
9. Implement the logic function  $f(A,B,C,D) = \Sigma (1,2,4,5,14,15)$  USING 8 : 1 MUX using an 'A' as an enable line.
10. Design a switching circuit which will light up an LED when fed with input 4-bit pattern for a month having 30 days. Use minimum number of NAND gates.
11. Explain edge triggered JK-F/F .
  - Describe the operation of Master Slave F/F
  - Explain how an edge triggered D F/F can be constructed using SR latch.
12. Implement the following function by using 16:1 mux, 8:1 mux, 4:1 mux and 2:1 mux
  - $F(A, B, C, D) = A'B + CD' + AC'$
  - $F(A,B,, D) = \Sigma (2, 3, 5, 7, 8, 9, 12)$