Digital Logic

Tutorial 5 (MSI and LSI Components)   **Deadline: 2080/11/02**

1. What id decoder? Design a 4 to16 line decoder using two 3 to 8 line decoders and explain it.

2. Design and explain combinational circuit which converts BCD to Excess 3 code using 4-bit binary parallel adder.

3. Design the full subtractor circuit using decoder and an external OR gate.

4. Implement the following using decoder.

   (a) $F (W\ X\ Y\ Z) = \Sigma (0,1,3,4,8,9,10)$ (b) $F (W\ X\ Y\ Z) = \Sigma (1,3,5,6,11,13,14)$

5. Design a combinational circuit with three inputs, x, y, and z, and three outputs, A, B, and C. When the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is one less than the input.

6. Design a 4 to 16 line decoder using 2 to 4 decoders with all necessary explanation.

7. Design a combinational circuit with three inputs and six outputs. The output binary number should be the square of the input binary number.

8. Define encoder: Draw logic diagram and truth table of octal - to - binary encoder

9. Construct 8:1 MUX using two 4:1 MUX and an external OR gate.

10. Design the combination circuit for 4 bit gray code to binary conversion.

11. Define Priority encoder. Design 4:2 priority encoder with its block diagram, truth table, circuit diagram and mathematical expression.

12. Design a combinational circuit with four inputs and one output. The output is equal to 1 when (i) all the inputs are equal to 1 or (ii) none of the inputs are equal to 1 or (iii) an odd number of inputs are equal to 1.

13. Design a combinational circuit whose input is a four-bit number and output is 2's complement of the input number.

14. Design a code converter that converts a decimal digit from 8 4 -2 -1 code to BCD 23. Design a combinational circuit that accepts a 3-bit number and generates an output equal to the sum of the inputs?

15. Construct 4*16 Decoder using 3*8 Decoder with all the necessary explanation.

16. Explain about the Encoder. Derive the Decimal to BCD encoder.

17. Implement the following Boolean functions:

        i) $F(x, y, z) = x + y'z$ ii) $F(A, B, C) = A(B' + C')$

        a) Using decoder

b) Using DEMUX

c) Using MUX

18. Use ROM and PLA to implement:

a) Full Subtractor   b) $F_1(A,B,C)= \sum(4,5,7)$ and $F_2(A, B, C)= \sum(3, 5, 7)$