

IT/CS 304 DIGITAL CIRCUITS AND LOGIC DESIGN

Time: 3 Hours

Max. Marks: 100

- I a) Encode the following decimal numbers to Gray code and Excess - 3 Code (6)
(i) 46 (ii) 327.89 (iii) 20.305
- b) Convert the following expressions to sum of product form (4)
(i) $(X+Y)(\bar{Y}+Z)(\bar{X}+Z)$
(ii) $(X+Z)(X\bar{Y}+XZ)(\bar{X}Z+\bar{Y})$ (5)
- OR
- II a) State and prove Demorgan's theorems as applied to two variable Boolean expressions. (6)
b) Add the following numbers using 2's complement method. (9)
(i) -18 and -20 (ii) +128 and -130 (iii) -25 and +17
- III a) Simplify the following using a k-map and realize using NAND gates only (7)
 $f(A,B,C,D) = \sum m(4,5,6,12,13) + \phi(2,9,15)$
b) Design a combination circuit to convert 4 bit binary into corresponding Gray code. (8)
- OR
- IV a) Draw a 4 bit binary parallel adder and explain its working. (8)
b) Perform the following binary arithmetic. (7)
(i) Multiply 10111 by 101
(ii) Divide 1111000 by 100
- V a) Compare the TTL, ECL and CMOS logic families with respect to their i) speed
2) power dissipation 3) Noise margin (6)
b) Draw the circuit diagram of a CMOS NAND gate and explain its working. (9)
- OR
- VI a) Explain how a TTL gate can be used to drive N CMOS gates. (8)
b) Draw and explain the input profile and output profile of a TTL inverter. (7)
- VII a) Explain the different methods of triggering flip-flops. (5)
b) Design a sequence generator to generate the following sequence.....101000.... (10)
- OR
- VIII a) Explain the working of a Master-slave J.k flip-flop. (7)
b) Describe the working of a decade counter with the help of logic diagram. (8)
- IX a) Draw a static MOS RAM cell and explain its working. (7)
b) Design an octal to binary encoder. (8)
- OR
- X a) Design a BCD to 7 segment decoder for common cathode display. (15)
- XI Write short notes on any 5 of the following. (5x5)
1. Ring counter
 2. Decoders
 3. Shift register
 4. Error detecting codes
 5. ASCII code
 6. Combinational and sequential systems
 7. Tristate logic
 8. Logic families.

