

DIGITAL LOGIC DESIGN

(Common to IT and CSE)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Determine the value of base 'X' if $(225)_x = (341)_8$.
 - Find the complement of the function, $F = x(y'z' + yz)$ by taking their duals and complementing each literal.
 - Define don't care condition with an example.
 - Implement EX-OR gate using only NAND gates.
 - Define priority encoder.
 - Give the design procedure for the design of a combinational circuit.
 - What is race around condition? How can we eliminate the race around condition?
 - Define shift registers.
 - What are the differences between PLA and PAL?
 - Define fan out of a logic gate.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

- 2 (a) Convert the following $(3456)_8$ to base 3 and base 7.
 (b) Using 2's complement, perform $(42)_{10} - (68)_{10}$

OR

- 3 (a) Simplify the following three variable expression using Boolean algebra: $Y = \sum m(1, 3, 5, 7)$.
 (b) Convert the given expression in standard POS form: $Y = A.(A + B + C)$

UNIT - II

- 4 (a) Minimize the following function using Karnaugh map method.
 $f(w,x,y,z) = \sum m(0,7,8,9,10,12) + \sum d(2,5,13)$
 (b) Implement the following function in NAND-NAND two level forms and draw the circuits.
 $Y = AC + ABC + A'BC + AB + D$

OR

- 5 Minimize the following function using tabular method.
 $f(A,B,C,D) = \sum m(0,1,9,15,24,29,30) + \sum d(8,11,31)$

UNIT - III

- 6 (a) Design and draw a full adder circuit.
 (b) Implement the following Boolean function using 4 x 1 MUX.
 $F(a,b,c) = \sum m(1,3,5,6)$

OR

- 7 Design 2 bit magnitude comparator and draw its logic circuit diagram.

UNIT - IV

- 8 (a) Draw and explain the operation of RS flip-flop.
 (b) Design and draw the 3 bit up-down synchronous counter.

OR

- 9 What are the different types of shift registers? Explain any one type of shift register.

UNIT - V

- 10 Implement the following functions using PLA.

$$A(x,y,z) = \sum m(1,2,4,6)$$

$$B(x,y,z) = \sum m(0,1,6,7)$$

$$C(x,y,z) = \sum m(2,6)$$

OR

- 11 (a) Differentiate between RAM and ROM.
 (b) Draw and explain the operation of 2 input TTL NAND gate with totem pole output.
