

B. TECH
(SEM-III) THEORY EXAMINATION 2022-23
DIGITAL SYSTEM DESIGN

*Time: 3 Hours**Total Marks: 100***Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 10 = 20**

- (a) Explain Minterm and Maxterm with example.
- (b) Design and draw State Diagram for a 2 bit up/down counter
- (c) Convert $(454.523)_{10}$ to an Hexadecimal number
- (d) Draw a full adder using two half adders
- (e) What do you mean by race around condition in JK Flip Flop?
- (f) Describe figure of merit & noise immunity of TTL & CMOS ICs
- (g) What is the basic concept of switched capacitors.
- (h) Explain FAN-IN and FAN-OUT.
- (i) What are the advantages and disadvantages of flash type ADC
- (j) What is the difference between Multiplexer and Encoder

SECTION B**2. Attempt any three of the following: 10x3=30**

- (a) What is magnitude comparator? Design a Single-bit comparator circuit using logic gates.
- (b) Give the general procedure for converting a multilevel AND-OR diagram into an all NAND diagram. Implement the following Boolean function with NAND gates only.
$$F(x, y, z) = \sum(1,2,3,4,5,7)$$
- (c) With neat diagram explain the operation of R-2R DAC
- (d) Design a universal shift register that performs HOLD, SHIFT RIGHT, SHIFT LEFT, & LOAD operations.
- (e) Draw and Explain a NAND gate in Totem Pole TTL Configuration.

SECTION C**3. Attempt any one part of the following: 10x1=10**

- (a) Simplify the logic function using K-map
$$Y = \sum m(0, 2, 3, 4, 6, 7, 9, 11, 16, 18, 19, 20, 22, 23, 25, 27)$$
- (b) Implement the function $F = \sum m(0, 1, 3, 4, 7, 8, 9, 11, 14, 15)$ using 8:1 mux.

4. Attempt any *one* part of the following: 10x1=10

- (a) Design a 3 bit up/down ripple counter
- (b) Draw and explain the dual slope analog to digital convertor.

5. Attempt any *one* part of the following: 10x1=10

- (a) Minimize $y = \sum m(0,1,2,3,5,6,7,8,14,15) + d(4,11,13)$ using tabular method.
- (b) Explain a Weighted Resistor digital to analog convertor.

6. Attempt any *one* part of the following: 10x1=10

- (a) Explain Decoder with neat diagram. Implement the logic expression $Y = \sum m(2, 4, 6, 7)$ using decoder as ROM.
- (b) Design a sequential circuit with two Flip Flops, A & B and one input x. When $x=0$, the State of the circuit remains the same when $x=1$ the circuit passes through the state transitions from 00 to 01 to 11 to 10 back to 00 & repeat.

7. Attempt any *one* part of the following: 10x1=10

- (a) Draw CMOS inverter circuit and explain its working.
- (b) Define PLD's. Implement the following function using PLA
 $F1 = \sum m(0,3,4,7)$
 $F2 = \sum m(1,2,5,7)$