

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

Time: 3 Hours

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

- (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:

- (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.



3. Attempt any *one* part of the following:

- (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.

10x3=30

242.32

 $2 \ge 10 = 20$

Total Marks: 100

10x1=10

4. Attempt any one part of the following:

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

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

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

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

- Explain Decoder with neat diagram. Implement the logic expression $Y = \Sigma m(2, 4, 6, 7)$ (a) using decoder as ROM.
- end in the state interior interin (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.

Attempt any one part of the following: 7.

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

10x1 = 10