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Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U3402

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Third Semester

Electronics and Communication Engineering

21UEC302 – DIGITAL ELECTRONICS AND DESIGN

(Regulation 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The Boolean function Y=AB+CD is to be realized using only 2-input NAND gates. The minimum number of gates required is CO1- U

   (a) 2 (b) 3 (c) 4 (d) 5

2. In a combinational circuit, the output at any time depends only on the _____ at that time. CO1- U

   (a) Voltage (b) Intermediate values (c) Input values (d) Clock pulses

3. The truth table for an S-R flip-flop has how many VALID entries? CO1- U

   (a) 1 (b) 2 (c) 3 (d) 4

4. The behavior of a synchronous sequential circuit can be predicted by defining the signals at _____. CO1- U

   (a) discrete instants of time (b) continuous instants of time

   (c) sampling instants of time (d) at any instant of time

5. Which one of the following has capability to store data in extremely high densities? CO1- U

   (a) Register (b) Capacitor (c) Semiconductor (d) Flip-Flop

PART – B (5 x 3= 15 Marks)

6. Perform the following code conversions: $(AB2)_{16} \rightarrow (?)_2 \rightarrow (?)_8 \rightarrow (?)_{10}$. CO2- App

7. Compare encoder and decoder. CO1- U

8. Distinguish between synchronous counter and asynchronous counter. CO1- U

9. How to differentiate fundamental mode from pulsed mode asynchronous sequential circuit. CO1- U

10. How many programmable gates are needed for PROM? CO1- U

PART – C (5 x 16= 80Marks)

11. (a) Find a minimal sum–of–products for the Boolean expression $f(w,x,y,z) = \sum m(1,2,3,7,8,9,10,11,14,15)$ using tabulation method. CO2- App (16)

Or

(b) Find a minimal sum–of–products for the Boolean expression $f(A,B,C,D) = \sum (1,3,4,5,9,10,11) + \sum \varphi(6,8)$ using the tabulation method. CO2- App (16)

12. (a) Design a 4-bit parallel adder/subtractor and explain the operation with a logic diagram. CO2-App (16)

Or

(b) Implement the Boolean function using 8:1 multiplexer $f(A,B,C,D) = \sum m(1,3,4,11,12,13,14,15)$. CO2- App (16)

13. (a) Design shift register counters using flip flops CO2- App (16)

Or

(b) Design PISO and PIPO shift register using D flip flop. CO2- App (16)

14. (a) Analyze fundamental mode with pulse mode circuits and justify it CO3-Ana (16)

Or

(b) Design a serial binary adder using D flip flops and T flip flop for the numbers 1011 and 0110 and also justify your answer. CO3-Ana (16)

15. (a) Analyze simplification of Boolean function using PROM, PLA and PAL. CO3-Ana (16)

Or

(b) Analyze the combinational circuit given below, using PLA and PAL. CO3-Ana (16)

F1(A,B,C) = Σ (0,1,2,4) ; F2(A,B,C) = Σ (0,5,6,7) .