J-FB-22-00237

B. Tech. EXAMINATION, 2022

Semester III (CBCS)

DIGITAL ELECTRONICS (ECE, EE, EEE, CSE, IT)

EC-302

Time : 3 Hours   *Maximum Marks : 60*

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt *Five* questions in all, selecting *one* question from each Sections A, B, C and D. Q. No. 9 is compulsory.

Section A

1. (a) (i) Multiply the binary number $(10011011)_2$ by $(100)_2$.   **3**

   (ii) Subtract the binary number $(110111)_2$ from $(110001)_2$.   **3**

(b) Let two decimal numbers be M = 316 and N = 132. Perform the operation M–N and N–M using 1's complement method. **2**

(c) Explain and prove De-Morgan's law. **2**

2. (a) Write a short note on Buffers and Trans-receivers and compare. **5**

(b) Explain Tri-state logic gates and Schmitt gates with suitable example and make comparison. **5**

Section B

3. Solve the 05 variables k map : **10**

$F(A, B, C, D, E) = \Sigma m(0, 1, 2, 3, 16, 17, 18, 19)$

and implement the output using NAND gate only.

4. Implement CMOS NAND gate and explain the characteristics of CMOS. **10**

Section C

5. What is Multiplexer ? Explain. Implement the following expression using a single 8 : 1 Mux : **10**

$Y(A, B, C, D) = \Sigma m(0, 2, 3, 6, 8, 9, 12, 14)$

6. What are the different characteristics of digital ICs ? Explain in detail. **10**

Section D

7. Write down the characteristic table of SR, D, T and JK flip-flop. Explain the mechanism of triggering of flip-flop with a suitable neat and clean diagram. **10**

8. Explain the working principle and design of asynchronous mode-8, 3 bit up ripple counter. **10**

(Compulsory Question)

9. Attempt any *four* questions :

(i) What are universal gates, implement OR, AND gate using Universal gates ?

(ii) Convert a binary number $(110001011)_2$ to its gray code.

(iii) Solve the k-map :

$F(A, B, C, D) = \Sigma m(0, 2, 8, 9, 12, 13, 15)$

(iv) What is Decoder Circuit ? Explain.

(v) What is Shift Register ? Explain Universal Shift registers.

(vi) Explain Programmable Logic Arrays.

(vii) Write a short note on charged coupled device memory. **5+5+5+5=20**