

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

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- (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
 $F(A, B, C, D, E) = \sum m(0, 1, 2, 3, 16, 17, 18, 19)$
 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
 $Y(A, B, C, D) = \sum m(0, 2, 3, 6, 8, 9, 12, 14)$
6. What are the different characteristics of digital ICs ? Explain in detail. 10

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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 :
$$F(A, B, C, D) = \sum m(0, 2, 8, 9, 12, 13, 15)$$
- (iv) What is Decoder Circuit ? Explain.
- (v) What is Shift Register ? Explain Universal Shift registers. <https://www.hptuonline.com>
- (vi) Explain Programmable Logic Arrays.
- (vii) Write a short note on charged coupled device memory. **5+5+5+5=20**