

## Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course: B.Tech (ECE)  
Semester: IIIrd  
Name of the Paper: *Digital System Design*  
Paper Code: **TEC 302**  
Time: **1.5 hour**

**Maximum Marks: 50**

**Note:**

- (i) Answer all the questions by choosing any one of the sub-questions
- (ii) Each question carries 10 marks.

- Q1. (10 Marks)
- a. i. Convert the decimal number 756 into binary, octal, and hexadecimal.  
ii. Convert the binary number  $(1101101.101)_2$  into decimal, octal, and hexadecimal  
iii. Convert the hexadecimal number  $(3AF.C)_{16}$  into binary, decimal and octal. (CO1)

OR

- b. Encode the decimal number 5924 using BCD, Excess-3, and Gray code. (CO1)

- Q2. (10 Marks)
- a. Perform  $(-45) + (-38)$  using 2's complement method using 8 bits. (CO1)
- OR
- b. What is error detection? Explain the need for error detection and correction with example. (CO1)

- Q3. (10 Marks)
- a. Using Boolean algebra theorems, simplify:  
 $F(A,B,C,D) = A B' C + A B C' + A C' D + B C$ . Give the minimal SOP and an equivalent gate realization. (CO2)

OR

- b. Minimize the expression using Boolean theorems:  
 $F = (A+B)(A'+C)(B+C)$ . Provide both minimal SOP and minimal POS forms and indicate any applied theorems. (CO2)

- Q4. (10 Marks)
- a. Derive the dual and complement of the expression:  $F = A + BC$ . (CO2)
- OR
- b. Using a 5-variable K-map, minimize  
 $F(A,B,C,D,E) = \sum m(0,1,2,5,7,8,9,10,14,18,20,21,23,25,31)$ .  
Give the minimal SOP. (CO2)

- Q5. (10 Marks)
- a. Apply the Quine–McCluskey method to minimize  
 $F(A,B,C,D) = \sum m(0,1,2,5,6,7,8,9,10,14)$ .  
List all prime implicants, identify essential ones, and present the final minimal expression. (CO2)
- OR
- b. Realize the following Boolean expression using only NAND and NOR gates:  
 $F(A,B,C) = A + B'C$  (CO2)