

Term Evaluation (Odd) Semester Examination September 2025

Roll no.....

Name of the Course: B.Tech (ECE)

Semester: II/Ird

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 hexadecimaliii. 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

 $F(A,B,C,D,E) = \Sigma m(0,1,2,5,7,8,9,10,14,18,20,21,23,25,31)$.

Give the minimal SOP. (CO2)

Q5.

(10 Marks)

a. Apply the Quine–McCluskey method to minimize

 $F(A,B,C,D) = \Sigma m(0,1,2,5,6,7,8,9,10,14)$.

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)