

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2024

B.Tech-I Semester (CSE/IT/ECE/CE)

COURSE CODE(CREDITS): 18B11EC312 (4)

MAX. MARKS: 15

COURSE NAME: DIGITAL ELECTRONICS AND LOGIC DESIGN

COURSE INSTRUCTORS: Dr. HARSH SOHAL

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Q1. [CO2]

(a) Express the following numbers into decimal: [1 +1]

i) $(10001.101)_2$ ii) $(67AC.B)_{16}$

(b) Obtain 1's complement and 2's complement of the following binary number. [1]

11001101

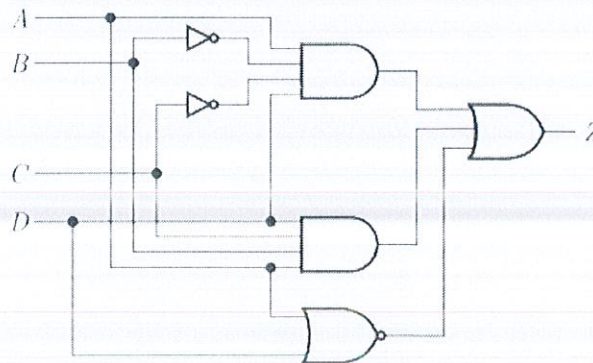
Q2. [CO1]

(a) Implement the given Boolean function $F(A, B, C) = A + \bar{A}\bar{B} + \bar{A}\bar{B}C$ using basic logic gates.

[1]

(b) Minimize the Boolean function given in (a) and find the minimum number of NAND gates required to implement the minimized expression. [1]

(c) In the following circuit find the Boolean expression for output Z in terms of A, B, C and D. [1]



Q3. [CO1] Match List-I (Boolean Expression) with List-II (Boolean variable values/conditions) and write the correct answer using the codes given in the lists. [2]

List - I

- a. $A \oplus B = 0$
- b. $\overline{A+B} = 0$
- c. $\overline{A} \cdot B = 0$
- d. $A \oplus B = 1$

List - II

- 1. $A \neq B$
- 2. $A = B$
- 3. $A = 1$ or $B = 1$
- 4. $A = 1$ or $B = 0$

Q4. [CO1]

(a) Reduce the following Boolean expression to a minimum number of literals using Boolean algebra postulates and theorems. [1+1]

i) $(yz' + x'w)(xy' + zw')$ ii) $xyz + x'y + xyz'$

(b) Minimize the Boolean expressions given below using K-Map method. [1.5+1.5]

i) $F_1(A, B, C) = \Sigma(3, 4, 6, 7)$

ii) $F_2(A, B, C) = A'C + A'B + AB'C + BC$

Q5. [CO2] Calculate the following arithmetic expressions given in decimal numbers using 2's complement method. [Convert the numbers to binary then apply 2's complement method for calculation, detailed step by step procedure execution only shall fetch the marks. “ - ” is for minus sign] [1+1]

a) $15 - 6$

b) $-15 - 6$