

H

Roll No. 2194 026

## TEC-101

**B. TECH. (FIRST SEMESTER)**  
**MID SEMESTER EXAMINATION, 2021**  
**(All Branches)**

**BASIC ELECTRONICS ENGINEERING**

**Time : 1 : 30 Hours**

**Maximum Marks : 50**

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each question carries 10 marks.

1. (a) State and prove the De Morgan's theorem. Also, explain the duality principle of Boolean algebra. (CO1)

OR

- (b) Perform the following number system conversions : (CO1)

(i)  $(13.5)_{10} = (?)_2$

(ii)  $(76)_{10} = (?)_8$

(iii)  $(101110010)_2 = (?)_8$

**P. T. O.**

$$(iv) (B1.3A)_{16} = (?)_2$$

$$(v) (110111)_2 = (?)_{10}$$

2. (a) Explain the canonical SOP and POS forms of Boolean functions using suitable examples. (CO1)

OR

- (b) Minimize the following functions using the K-Map : (CO1)

$$(i) f(A, B, C, D) = \sum m(0, 2, 3, 4, 6, 10, 12, 14)$$

$$(ii) f(A, B, C) = \sum m(0, 2, 3, 4, 6, 7)$$

3. (a) Realize OR, NOT, AND, XOR, XNOR gates using NAND gates only. (CO1)

OR

- (b) Perform the following in binary : (CO1)

$$(i) (32)_{10} - (15)_{10} \text{ using 1's complement}$$

$$(ii) (26)_{10} - (18)_{10} \text{ using 2's complement}$$

4. (a) Distinguish among conductors, semiconductors and insulators on the basis of energy band diagram. (CO2)

(3)

OR

- (b) What is the difference between intrinsic and extrinsic semiconductors ? Explain the formation of P and N type semiconductors.

(CO2)

5. (a) Discuss the biasing of a P-N junction diode. Draw and discuss the V-I characteristics of P-N junction diode.

(CO2)

OR

- (b) (i) Explain the mass action law for semiconductors.

(CO2)

- (ii) A semiconductor with intrinsic carrier concentration of  $10^{12}/\text{cm}^3$  is doped with donor atom concentration of  $10^{15}/\text{cm}^3$ . Determine the majority and minority carrier concentration. (CO2)