H Roll No. .....

TEC–201

B. TECH. (SECOND SEMESTER)

MID SEMESTER

EXAMINATION, 2021-22

BASIC ELECTRONICS ENGINEERING

Time : 1½ Hours

Maximum Marks : 50

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

(ii) Each sub-question carries 10 marks.

1. (a) Why NAND and NOR gates are called universal gates ? Realize NOR, OR, AND gates using NOR gates only. (CO1)

OR

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

(i) $(21.3)_{10} = (?)_2$

P. T. O.

(ii) $(C1A)_{16} = (?)_2$

(iii) $(11.1)_2 = (?)_{10}$

(iv) $(74)_{10} = (?)_8$

(v) $(101001)_2 = (?)_8$

2. (a) Write and explain the laws of Boolean algebra. (CO1)

OR

(b) (i) Minimize using Boolean algebra : (CO1)

$$f(A, B, C) = A'B'C' + A'BC' + AB'C' + ABC'$$

(ii) Minimize using K-map :

$$f(A, B, C, D) = \Sigma m\ (3, 5, 7, 11, 13, 15)$$

3. (a) (i) Express $f\ (A, B, C) = AB + BC'$ in canonical SOP form. (CO1)

(ii) Express $f\ (A, B, C) = (A' + C').(A + B')$ in canonical POS form.

OR

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

(i) $(14)_{10} - (9)_{10}$ using 1's complement

(ii) $(10)_{10} - (4)_{10}$ using 2's complement

4. (a) Write short notes on the following : (CO2)

   (i) Mobility

   (ii) Conductivity

   (iii) Current density

OR

   (b) Draw and discuss the V-I characteristics of P-N junction diode. What do you mean by the breakdown voltage of diode ? (CO2)

5. (a) What do you mean by the depletion layer of a P-N junction diode ? Explain how the diode can be forward and reverse biased. (CO2)

OR

   (b) Consider a semiconductor doped with $7 \times 10^{17}/cm^3$ donor atom concentration. If mobility of electron is 800 $cm^2/V\text{-}s$ and that of hole is 200 $cm^2/V\text{-}s$, calculate the majority and minority carrier concentrations and the final conductivity. (Given : Intrinsic carrier concentration $= 1.5 \times 10^{10}/cm^3$). (CO2)