

Roll No.

TEC-101

B. TECH. (FIRST SEMESTER)

MID SEMESTER EXAMINATION, 2018

(All Branches)

BASIC ELECTRONICS ENGINEERING

Time : 1:30 Hours

Maximum Marks : 50

Note :(i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks : (1×5=5 Marks)

(a) Atomic number of Germanium is

(b) N-type impurity is also known as

(c) Value of η for Si diode is

(d) $(1100101)_2 - (1011010)_2 = (?)_2$.

(e) $A + A'B = ?$

2. Attempt any *five* parts : (3×5=15 Marks)

(a) What is doping ? Give the minimum *three* examples of each type of impurities.

- (b) Explain mass action law.
- (c) A Si diode has reverse saturation current of $2.5 \mu\text{A}$ at 300 K . Find forward voltage for a forward current of 10 mA .
- (d) Prove De-Morgan's Theorem.
- (e) $(238)_{10} = (?)_2 = (?)_8 = (?)_{16}$.
- (f) What do you understand by universal gates? Draw its symbol and write the truth table of universal gates.

Section—B

- 3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
 - (a) Differentiate conductor, semiconductor and insulator based on energy band diagram.
 - (b) The intrinsic carrier concentration for silicon at room temperature is 1.5×10^{10} per cm^3 . If the mobility of electrons and holes are $1300 \text{ cm}^2/\text{V-s}$ and $450 \text{ cm}^2/\text{V-s}$ respectively. What is the conductivity of intrinsic silicon? If silicon is doped with 10^{18} boron atoms per cm^3 , what is its conductivity?
 - (c) Explain intrinsic and extrinsic semiconductors.

- 4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
 - (a) Explain PN junction diode and its V-I characteristics in forward and reverse bias.
 - (b) What is Boolean Algebra? Explain Boolean Algebra laws with suitable diagrams.
 - (c) Write short notes on the topics given below :
 - (i) Drift current in semiconductors
 - (ii) Canonical form of logic expression.
- 5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
 - (a) Solve the following expression using K-Map :

$$F(A, B, C, D) = \sum m(0, 2, 4, 6, 7, 8, 10) + \sum d(12, 14, 15)$$
 - (b) Realize logic circuit of EXOR gate using NAND gate.
 - (c) Simplify the given Boolean expression :

$$Y = AB + A(B + C) + B(B + C)$$