H 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/True/False : (1×5=5 Marks)

(a) 1001 is a valid BCD number. (True/False)

(b) In N type semiconductor, majority carriers are holes. (True/False)

(c) The conductivity of a semiconductor decrease with increase in temperature. (True/False)

(d) The 1's complement of $(1110)_2$ is .....

(e) If A is a Boolean variable, then XOR operation of A with its complement A' will produce .....

2. Attempt any *five* parts : (3×5=15 Marks)
   (a) Discuss the octal number system.
   (b) Write commutative, associative and distribution laws of Boolean algebra.
   (c) Realize AND, OR and NOT gates using NOR gates only.
   (d) What is the difference between acceptor and donor impurities ? Explain with examples.
   (e) Define drift current density.
   (f) Discuss the mass action law.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
   (a) Distinguish between conductors, insulators and semiconductors on the basis of energy band diagram.
   (b) State and prove the continuity equation of semiconductors.
   (c) An intrinsic semiconductor with intrinsic concentration of $1.5 \times 10^{10}/cm^3$ is doped with acceptor atom concentration $N_A = 6 \times 10^{14}/cm^2$ and donor atom concentration $N_D = 10^{16}/cm^3$. Determine majority and minority carrier concentration.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
   (a) Write short notes on the following :
      (i) Mobility
      (ii) Conductivity
   (b) Discuss the Duality principle and De Morgan's theorem of Boolean algebra.
   (c) Perform the following number system conversions :
      (i) $(562)_{10} = (?)_8$
      (ii) $(AF1)_{16} = (?)_{10}$
      (iii) $(11101)_2 = (?)_{10}$

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)
   (a) Realize XOR and XNOR gates using NAND gates only.
   (b) Add the following in BCD system :
      (i) $(86)_{10} + (75)_{10}$
      (ii) $(97)_{10} + (59)_{10}$
   (c) Perform the following in Binary using 2's complement :
      (i) $(15)_{10} - (10)_{10}$
      (ii) $(9)_{10} - (13)_{10}$