Roll No. | | | | | | | | H

TEC–201

B. Tech. (Second Semester)
Mid Semester EXAMINATION, 2017
(All Braches)
BASE 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) In a Zener diode, P and N materials are heavily doped. (True/False)
   (b) Holes are as mobile as electrons. (True/False)
   (c) In BCD code 1010 is not a valid number. (True/False)
   (d) Conversion from decimal to ..... needs repeated division by 8.
   (e) The knee voltage for silicon P-N junction diode is ..... volt.
2. Attempt any *five* parts : (3×5=15 Marks)
   (a) Draw V-I characteristics of P-N junction diode.

(b) Explain mass action law.

(c) Implement AND, OR, NOT gates using NAND gates only.

(d) Explain Duality principle in context of Boolean Algebra.

(e) Define diffusion current density.

(f) Add $(110111)_2$ and $(101111)_2$

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Differentiate between conductors, insulators and semiconductors in detail with examples.

(b) Derive that in an N type semiconductor the electron drift current density is given by $J_n = n\mu_n qE$ where n , μ_n, q and E represent concentration of electrons, mobility of electrons, electronic charge and applied electric field respectively.

(c) Consider an N type semiconductor doped with $10^{15}/cm^3$ donor atom concentration. If mobility of electron is 1350 $cm^2/V\text{-}s$, Calculate conductivity due to majority carriers, and drift current density if the applied electric field is 200 V/cm.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Write and explain the laws of Boolean Algebra.

(b) Perform the following number system conversion :

(i) $(68.5)_{10} = (?)_2$

(ii) $(101110)_2 = (?)_8$

(iii) $(A9)_{16} = (?)_2$

(c) Perform the following operations :

(i) $(14)_{10} - (10)_{10}$ in binary using 1's complement.

(ii) $(95)_{10} + (47)_{10}$ in BCD system.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Explain the working of photodiode with neat diagram.

(b) Discuss static and dynamic resistance of a diode.

(c) The reverse saturation current at 300 K of a P-N junction Ge diode is 5 μA. Find voltage to be applied across the junction to obtain a forward current of 5 mA.

370