Roll No. | | | | | | | |

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TEC–101

B. Tech. (First Semester)

Mid Semester EXAMINATION, 2017

(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) The number 29 is not a valid octal number. (True/False)

(b) The forbidden energy gap of semiconductors is more than that of insulators. (True/False)

(c) An intrinsic semiconductor acts as an insulator at zero Kelvin temperature. (True/False)

(d) The 2's complement of $(1001110)_2$ is ..... .

(e) If X is a Boolean variable, then $X.X' =$ ..... .

P. T. O.

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

(a) What do you mean by the Base of a number system ?

(b) If A, B and C are Boolean variables, then using laws of Boolean Algebra, show that $AB + A'B + A'B' = A' + B$.

(c) What do you mean by universal gates ? Give their truth tables.

(d) Discuss Extrinsic Semiconductors with examples.

(e) What do you mean by mobility of charge carriers ?

(f) Compare the properties of metals and semiconductors.

Section—B

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

(a) Derive the continuity equation for semiconductors.

(b) Consider a P type semiconductor doped with $10^{17}/cm^3$ acceptor atom concentration only. Determine the majority and minority carrier concentration if the intrinsic concentration is $1.5 \times 10^{10}/cm^3$.

(c) State and explain the mass action law for semiconductors.

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

(a) What do you mean by current density ? Obtain an expression of drift current density for a semiconductor in terms of conductivity and applied electric field.

(b) Write the truth table of XOR gate. Realize XOR gate using :

(i) NAND gate only

(ii) NOR gate only

(c) Perform the following number system conversions :

(i) $(45.2)_8 = (?)_{10}$

(ii) $(11001010)_2 = (?)_{16}$

(iii) $(789)_{10} = (?)_{BCD}$

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

(a) State and prove De Morgan's laws of Boolean Algebra.

(b) Realize the following Boolean functions using basic gates :

(i) $A + BC$

(ii) $B'C + A'B$

(iii) $(A + B)C'$

(c) Perform the following :

(i) $(33)_{10} - (13)_{10}$ in Binary using 1's complement.

(ii) $(12)_{10} - (20)_{10}$ in Binary using 2's complement.