

Roll No.

TEC-201

**B. TECH. (SECOND SEMESTER)
MID SEMESTER EXAMINATION, 2019**

(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) P type semiconductor is formed by adding acceptor impurity in an intrinsic semiconductor. (True/False)

(b) Electrons are the majority charge carriers in P type semiconductor. (True/False)

(c) $(4EA)_{16} = (?)_8$

(2)

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(d) Value of knee voltage for Ge diode is

(e) 2's complement of 1110011 is

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

(a) Find the conductivity of intrinsic Si at 300 K. It is given that intrinsic concentration is $1.5 \times 10^{10}/\text{cm}^3$. Mobility of electrons and holes in Si are $1300 \text{ cm}^2/\text{V-s}$ and $500 \text{ cm}^2/\text{V}$ respectively.

(b) 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. Given that $V_T = 0.02586 \text{ V}$.

(c) Define mobility and conductivity along with their mathematical expressions.

(d) For the function $F(A, B, C) = \Sigma(0, 1, 4, 6)$, write the canonical POS and SOP expression.

(e) $(4BA)_{16} + (2CE)_{16} = (?)_{16} = (?)_8$

(f) Simplify the given function using Boolean rules :

$$BC + (\bar{B} + \bar{C})D + BC$$

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Section-B

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

(a) Explain biasing of p-n junction diode in brief.

(b) Calculate the current produced in a Ge semiconductor of area 2 cm^2 and length 0.4 mm, if concentration of free electron is $2 \times 10^{19}/\text{m}^3$ and a battery of 2 volts is applied across its length. Given that mobility of free electrons and holes is $0.36 \text{ m}^2/\text{V-sec}$ and $0.17 \text{ m}^2/\text{V-sec}$.

(c) Define mass action law of semiconductors. Explain charge densities in semiconductors.

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

(a) State and prove De-Morgan's law with the help of truth table.

(b) Solve the following expression using K-map :

$$F(A, B, C, D) = \Sigma m(0, 1, 4, 5, 7, 8, 11, 13, 15) + d(6, 9, 10)$$

(c) Realize EX-OR gate and OR gate with the help of NAND gates only.

P. T. O.

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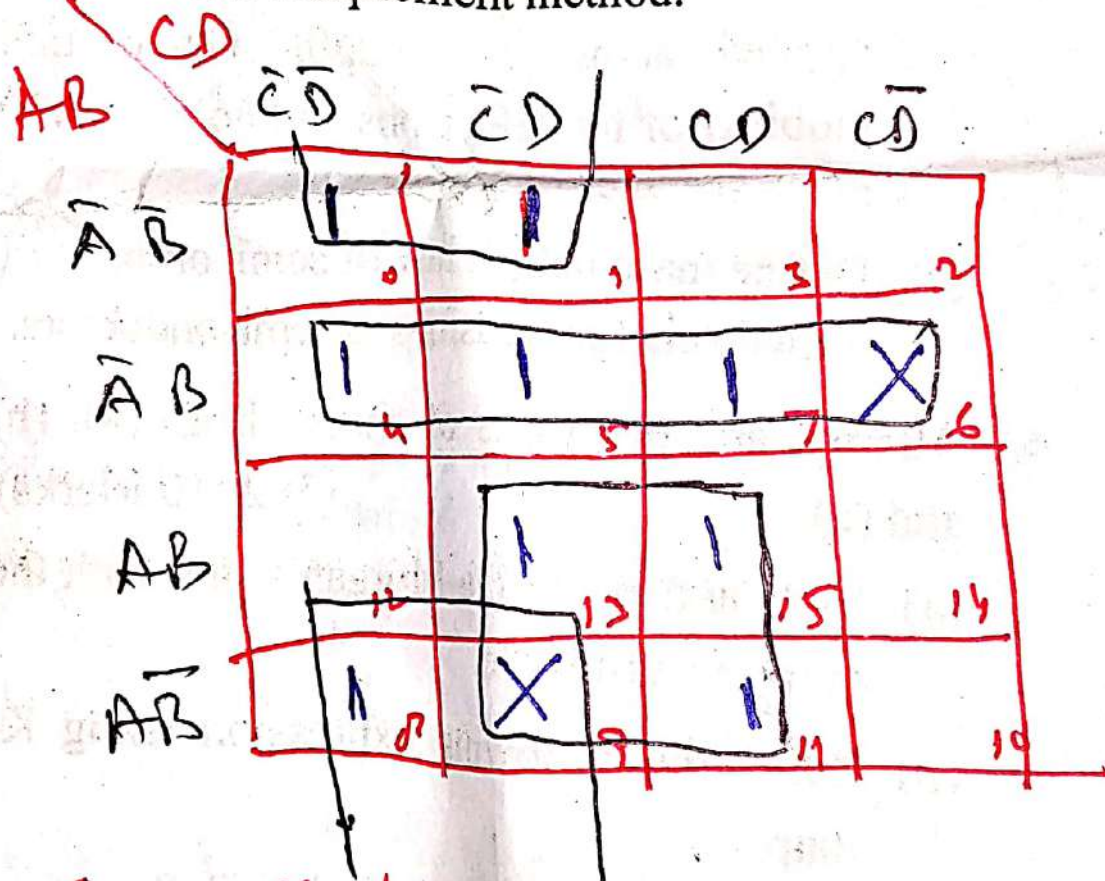
(4)

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

(a) Differentiate conductors, semiconductors and insulators on the basis of energy band diagram.

(b) If $F = AB + BC' + A'C'$, then prove that $F + F' = 1$ and $F.F' = 0$.

(c) Subtract $(11110010)_2 - (10011111)_2$ by 2's complement method.



Gaurav Bhanderi