The Superior University, Lahore

(A GOVERNMENT CHARTERED UNIVERSITY)

Serial No: 135776

Student's Name: Ayesha Urooj

Roll No: 107 (su92-bscsm-f22-107)

Program: BSCS (Bachelors in Computer Science)

Subject: Applied Physics

Section: 1C (BSCS-1C)

Semester: 1st (first)

Date: 19th Jan, 2023

Invigilator's Signature:

Total Number of Continuation Sheet:

Questions	1	2	3	4	5	6	7	8	9	10
Marks Obtained										

Examiner's Signature:

Please start to write from here

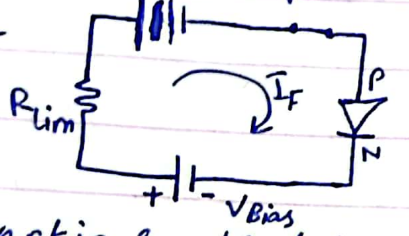
SUBJECTIVE TYPE

Question no :- 1

(A)

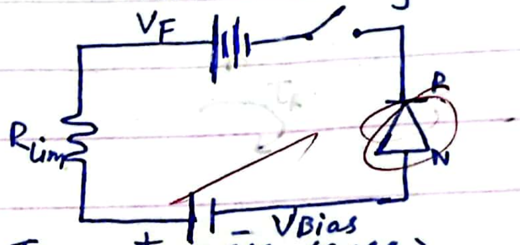
Practical Diode:-

Forward Biasing:- $V_F = 0.7V$ (In case of silicon)



In practical Model; In the case of forward biasing we always use switch on circuit. R_{Lim} shows liminited resistance. V_F shows forward Voltage.

Reverse Biasing:-



In reverse (case) biasing, we always uses switch off circuit. No current is produced in reverse. (Current is not produce

	V_F	$r'd$	$r'F$
Practical Model	✓	✗	✗
Complete Model	✓	✓	✓

Formula :-

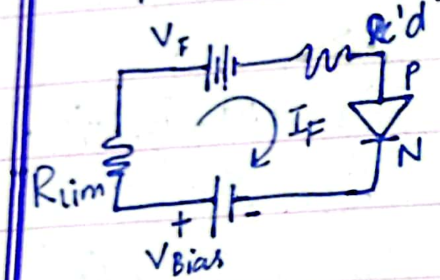
$$I_F = \frac{V_{Bias} - V_F(0.7)}{R_{Lim}}$$

∴ ⇒ $V_F = 0.7V$ in case of
∴ Silicon & In case of
Germanium It is 0.3v

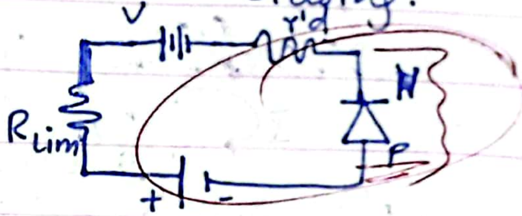
V_{Bias} ⇒ Biased Voltage
V_F ⇒ Forward Voltage
R_{Lim} ⇒ limited resistance.

Complete Model

Forward Biasing



Reverse Biasing.



In forward biasing case of complete circuit a resistor is added. r'd shows dynamic resistance.

In reverse biasing case of complete circuit. A resistor is added that show dynamic resistance. Battery shows Voltage

Formula:-

$$I_F = \frac{V_{Bias} - V_F\ (0.7v \text{ in silicon Case})}{R_{lim} - R'_d}$$

$R'_d \Rightarrow$ Dynamic Resistance

$R_{lim} \Rightarrow$ Limited Resistance

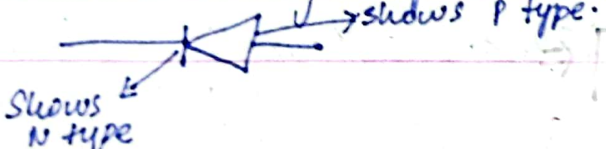
(B)

5/

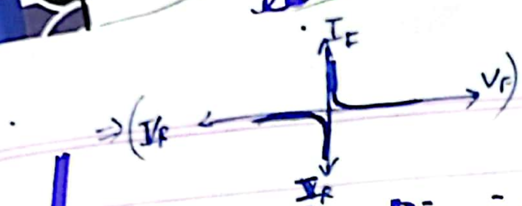
Working of Diode:-

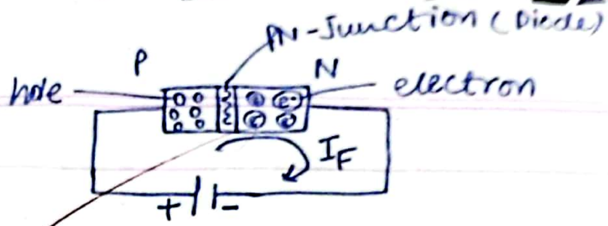
A diode is formed in PN-Junction. In PN- Junction, a barrier is formed/ produced by the flow of free electron. Free electron formed a barrier between the P type & N type which is known as potential barrier (Diode).

Diode is usually represented as:-



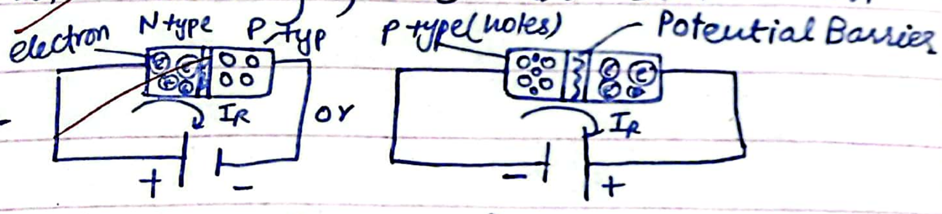
(Page Turn Over)





Forward Biasing:-

In forward Biasing, "P Type" is connected with the "positive terminal" of the battery and "N type" is connected with the "negative terminal" of the battery. "P type" contains "Majority of holes & "minority of electrons". Some of the free electrons flow & produced "Forward Current" (represented by I_F). In forward biasing, we use switch on circuit. $\Rightarrow V_F > V_{Bias}$



Reverse Biasing:-

In reverse biasing, "P type semi conductor is connected with the negative terminal" of battery & "N type semi conductor is connected with the positive terminal" of the battery. Potential Barrier separated P type from N type. A little bit Reverse Current is produced in it. Current Increases Abrupty at Breakdown point.

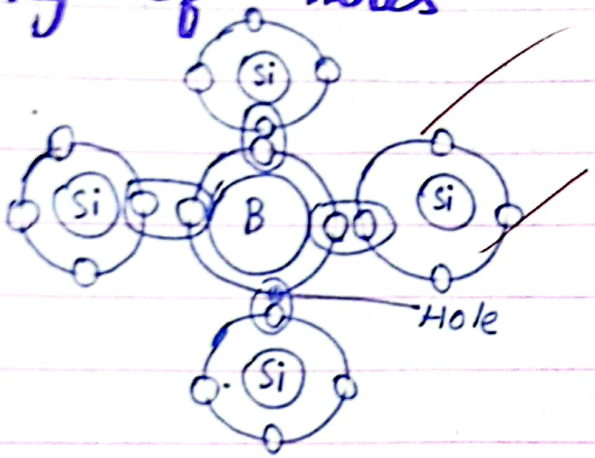
(C)

N type Semiconductors:-

(In N type semi-conductors) a pentavalent impurity is added in pure semi conductor to made it Extrinsic Semi-conductor. A tri-valent impurity is added in the pure semi-Conductor.

N- type Semi-conductors Contain:-

Majority of Electrons
Minority of holes

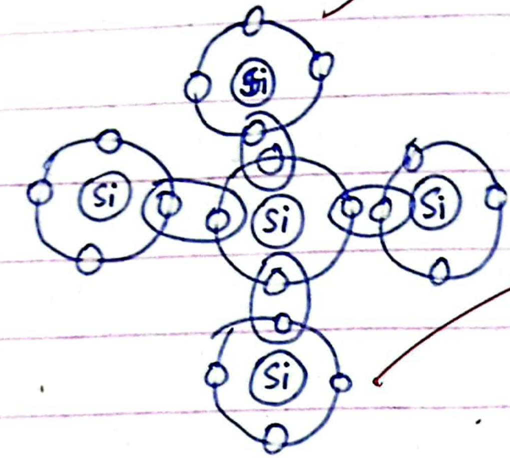


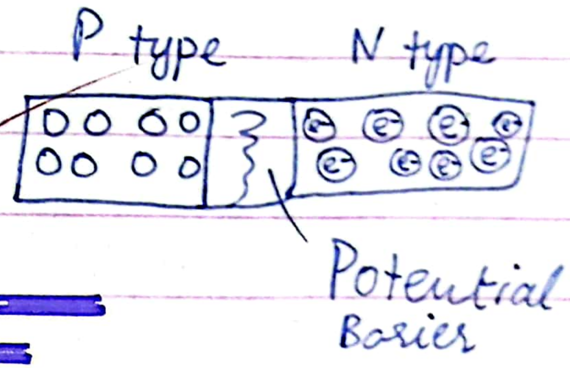
P- Type :-

In P type Semi-Conductor a pentavalent impurity is added in the pure form of Semi conductor. P type contains holes (mostly). Holes are positively charged carriers.

Majority of Holes

Minority of Electrons





Question no:- 2

(B)

Given:- $R_1 = 220\,\Omega$, $R_2 = 470\,\Omega$, $R_3 = 470\,\Omega$

$I_T = 4mA$

To find:- $I_1 = ?$, $I_2 = ?$, $I_3 = ?$

Sol:- using CDR

$$I_x = \left(\frac{R_t}{R_x}\right) I_T$$

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad \because \text{Parallel circuit.}$$

$$\frac{1}{R_t} = \frac{1}{220} + \frac{1}{470} + \frac{1}{470} = 8.8\times10^{-3}\,\Omega^{-1}$$

$$R_t = \frac{1}{8.8\times10^{-3}} \approx 113.63\,\Omega$$

$R_t = 113.63\,\Omega$

$I_1 = \left(\frac{113.63}{220}\right)(4\times10^{-3}) = 2.066\,mA = 2.066\times10^{-3}A$

$I_2 = \left(\frac{113.63}{470}\right)(4\times10^{-3}) = 9.67\times10^{-4}A = 0.96\times10^{-3}A$

$\Rightarrow I_2 = 0.967\,mA \approx 0.97\,mA$

$I_3 = \left(\frac{113.63}{470}\right)(4\times10^{-3}) = 0.967\times10^{-3}A$

$\Rightarrow I_3 = 0.97\,mA$

So,

$I_1 = 2.06\,mA$

$I_2 = 0.97\,mA$

$I_3 = 0.97\,mA$

(A)

Given:-

$R_1 = 560\,\Omega$, $R_2 = 330\,\Omega$, $R_3 = 330\,\Omega$, $R_4 = 560\,\Omega$

$V = 48\,V$ ∴ In parallel circuit voltage is sa

To find:- $I_1 = ?$, $I_2 = ?$, $I_3 = ?$, $I_4 = ?$

Solution:-

$V = IR$ ∴ Ohm's law general formula ⇒ $V=I$

$\frac{V}{R_1} = I_1$ 5 ⁄ 4

$I_1 = \frac{48}{560}$ ⇒ $= 0.085714$

$I_1 \approx 0.09\,A$

$I_2 = \frac{V}{R_2}$

$I_2 = \frac{48}{330}$

$= 0.1454545455$

$I_2 \approx 0.15\,A$

$I_3 = \frac{V}{R_3} = \frac{48}{330} \Rightarrow I_3 = 0.15\ A$

$I_4 = \frac{V}{R_4} = \frac{48}{560} \Rightarrow I_4 = 0.09\ A$

(C)

Given:- $P_2 = 0.75\ W$, $P_T = 2W$

$V_s \Rightarrow ?$, $R_1 = ?$, $R_2 = ?$

$I_1 = ?$, $I_2 = ?$, $I_T = 200\ mA$

Sol:- $P = VI$

Circuit is a parallel circuit ⇒ Votage is same in para

$P_T = V_s I_T$

$P_2 = VI$

$\frac{P_T}{I_T} = V_s$

$\frac{P_2}{I}$

$\Rightarrow \frac{2}{200\times10^{-3}} = V_s \Rightarrow \boxed{V_s = 10\ V}$

Voltage is 10 V.

$P_2 = VI_2$

$\frac{P_2}{I_2} = V \Rightarrow \frac{P_2}{V} = I_2$

$\boxed{I_2 = \frac{0.75}{10} = 0.075A}$

$V = I_2R_2 \Rightarrow \frac{V}{I_2} = R_2$

$\boxed{R_2 = \frac{10}{0.075} = 133.3\,\Omega}$

$P_T = P_1 + P_2 \Rightarrow P_T - P_2 = P_1 \Rightarrow \boxed{P_1 = 1.25\,W}$

$P_1 = VI_1$

$I_1 = \frac{P_1}{V} = \frac{1.25}{10} \Rightarrow I_1 = 0.125A$

$V = I_1R_1 \Rightarrow \frac{V}{I_1} = R_1 \Rightarrow \boxed{R_1 = \frac{10}{0.125} = 80\,\Omega}$

5