Name :- M. Musa

Sub :- Applied Physics

Instructor :- Sir Khalid

Id :- 14531

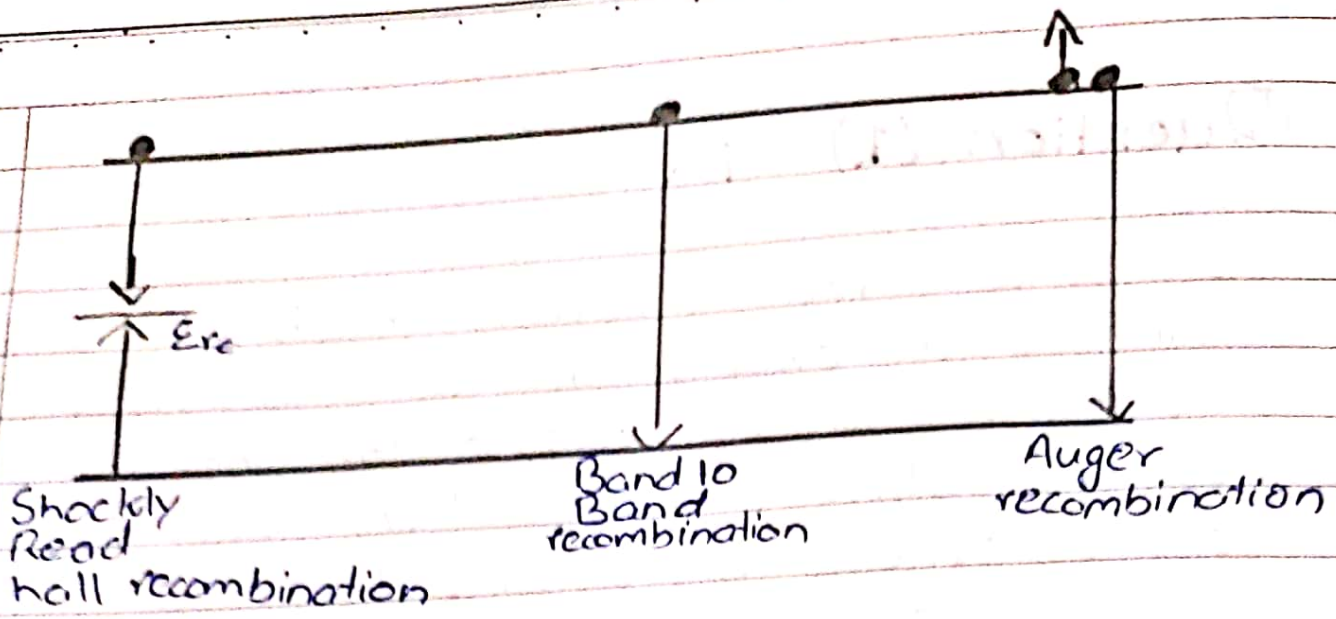
Question (1) - i :-

Answer:-

When a free electron inhabits the conduction band, it exists in a metal-stable state. Therefore to componsate for the unfavourable energy state the electron will move into an empty state, characterized as an electron hole. The movement of electron into an empty state can occur in one or more steps through the band gap. The difference in energies between the non-stable and the final state of the electron is then released so to allow the electron to occupy its final state. The process of electron and hole annihilation is known as recombin-ation. If the energy released through recombination is in the form of a photon, the process is known as ~~recombination~~ radiative-recombination. and is most common for electrons moving fully from the conduction to the valance band. Non-radiative recombination is often the result of material defects and intermediate energy levels in the band gap. Non-radiative recombination can be categori-zed as either auger or defect level drive recombination.

. . . . . .

Date:



Question 1 (ii):-

Answer:-

As the temperature increases, the value of the potential barrier is decreasing. The potential barrier has the heighest value when the temperature is 300 k. At temperature 600 k the potential barrier has the lowest value. The temperature affects the kinetic Energy of the carriers.

Date:

Question N.o 2(a):-

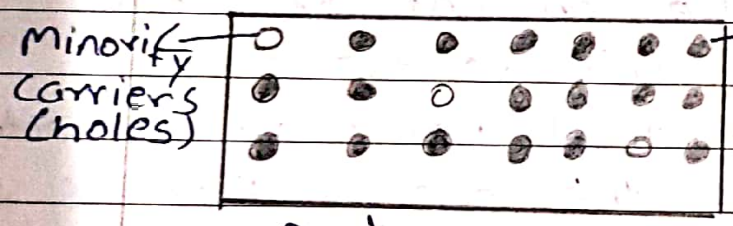
Answer:-

The more abundant charge carriers are called majority carriers, which are primarily responsible for current transport in a piece of semi conductor.

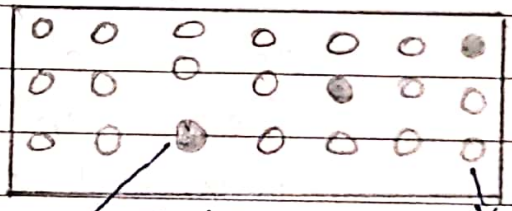
The less abundant charge carriers are called minority carriers; in n-type semi conductor they are holes, while in p-type semi conductor they are electrons.

n-type Semiconductor, the electron are the majority carriers whereas, the holes are minority carriers.

In P-type semiconductor materials, the holes are majority carriers where as the electrons are the minority carriers.



n-type



P-type.

Minority carriers (electron)

Majority carriers (holes)

Date:

Question N.o 2(b):-

Answer:-

The reverse current in a diode is normally very small. If the external bias voltage is increased so on, the reverse current increases drastically at a particular value of the reverse bias voltage. This particular value of the reverse bias voltage is known as breakdown voltage.

Question N.o (3)-a:-

Answer:-

The basic difference between electric potential and electric potential energy is that electric potenial at a point in a electric field is the amount of work done to bring the unit positive charge from infinity to that point. while electric potential energy is the energy that is needed to move a charge against the electvic field.

Date:

Question 3(b)..

Answer:-

In an uniform electric field the equation to calculate the electric potential difference is

$$V = \mathcal{E}d$$

In this equation V is the potential difference in volts, $\mathcal{E}$ is the electric field strength (in newtons per columb) and d is the difference b/w 2 points in meter.