BASIC ELECTRONICS MID TERM QUESTION 2021 (ODD SEMESTER)

Q1. In aPN junction diode, the current in reverse bias may be

Options are:

The junction current is due to minority carriers only

The junction current at equilibrium is zero as equal but opposite carriers are crossing the junction

The junction current reduces with rise in temperature

The junction current at equilibrium is zero as charges do not cross the junction

Q2. In a PN junction when the applied voltage overcomes the ..... potential, the diode current is large, which is known as .....

Options are:

Depletion, negative bias

Reverse, reverse bias

Resistance, reverse bias

Barrier, forward bias

Q3. Mobile electrons of P-side of the PN junction diode constitute

Options are:

Minority current carriers

Majority current carriers

Depending upon voltage they may be either majority or minority current carriers

None of the above

Q4. Barrier potential in a PN junction is caused by

Options are:

Flow of drift current

Diffusion of majority carriers across the junction

Migration of minority carriers across the junction

Thermally-generated electrons and holes

Q5. Which of the following expression represent the correct formulae for calculating the exact position of the Fermi level for p-type material?

Options are:

$E_F = E_V + kT\ln(N_D / N_A)$

$E_F = -E_V + kT\ln(N_D / N_A)$

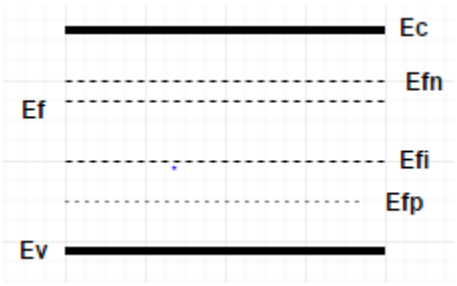
$E_F = E_V - kT\ln(N_D / N_A)$

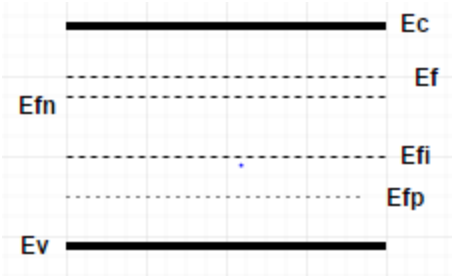
$E_F = -E_V - kT\ln(N_D / N_A)$

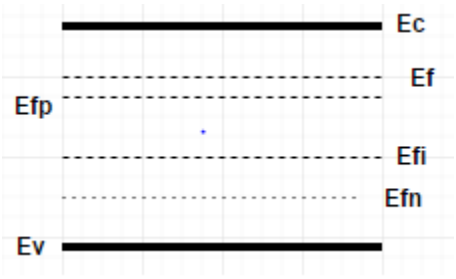
Q6. If the excess carriers are created in the semiconductor, then identify the correct energy level diagram.

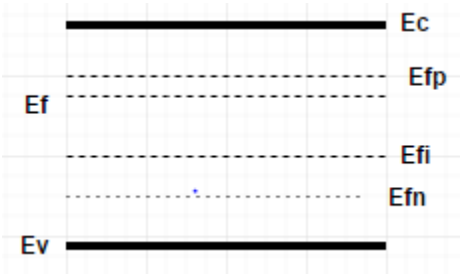
Options are:

(correct answer is 1st one)









Q7. The thermal equilibrium concentration of the electrons in the conduction band and the holes in the valence band depends upon?

Options are:

Effective density of states

Fermi energy level

Both A and B

Neither A nor B

Q8. Which of the following is true regarding the position of Fermi level?

Options are:

Lies exactly in the middle between the bottom of the conduction bandand top of the valance band in an intrinsic semiconductor.

Nearer to the conduction band in N-type semiconductor.

Nearer to the valance band in P-type semiconductor.

All of the options.

None of the options.

Q9. The density of states gives

Options are:

The number of unoccupied energy states in a given interval of energy.

The number of energy levels in a given interval of energy.

The number of occupied energy levels in a given interval of energy.

None of these.

All of these.

Q10. Identify the correct condition for a semiconductor to be electrically neutral

Options are:

$N_d+p=N_a+n$

$N_d-p=N_a+n$

$N_d+p=N_a-n$

$N_d+n=N_a+p$

Q11. If Ef>Efi, then what is the type of the semiconductor?

Options are:

n-type

p-type

elemental

compound

Q12. Formation of a junction between a sample of P-type and N-type material causes _____ action

Options are:

Rectifying

Conducting

Insulating

None of the above

Q13. The reverse saturation current in a Silicon Diode is _____ than that of Germanium Diode

Options are:

Equal

Higher

Lower

Depends on temperature

Q14. A semiconductor has …… temperature coefficient of resistance.

Options are:

Positive

Zero

Negative

None of the above

Q15. The random motion of holes and free electrons due to thermal agitation is called …….

Options are:

Diffusion

Pressure

Ionisation

None of the above

Q16. When the temperature of an extrinsic semiconductor is increased, the pronounced effect is on……

Options are:

Junction capacitance

Minority carriers

Majority carriers

None of the above

Q17. If the temperature of a crystal diode increases, then leakage current …….

Options are:

remains the same

decreases

increases

becomes zero

Q18. If the doping level of a crystal diode is increased, the breakdown voltage…….

Options are:

remains the same

is increased

is decreased

none of the above

Q19. The knee voltage of a crystal diode is approximately equal to …….

Options are:

applied voltage

breakdown voltage

forward voltage

barrier potential

Q20. If the doping level in a crystal diode is increased, the width of depletion layer…….

Options are:

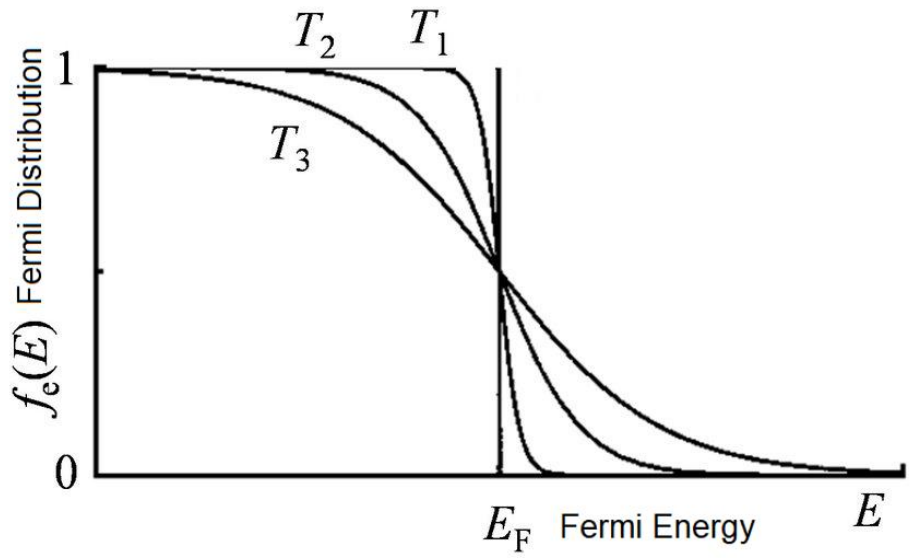
remains the same

is decreased

in increased

none of the above

Q21. What is the relationship between T1, T2 and T3?



Options are:

T1 > T2> T3

T1 < T2< T3

T1 = T2 = T3

Insufficient Information

Q22. When a little amount of Arsenic is doped with pure Silicon metal, what does one get?

Options are:

Intrinsic semiconductor

Insulator

N-type semiconductor

P-type semiconductor

Q23. In a PN junction the potential barrier is due to the charges on either side of the junction, these charges are

Options are:

Majority carriers

Minority carriers

Both (a) and (b)

Fixed donor and acceptor ions

Q24. A PN junction

Options are:

Has low resistance in forward as well as reverse directions

Has high resistance in forward as well as reverse directions

Conducts in forward direction only

Conducts in reverse direction only

Q25. In a p-type semiconductor, germanium is doped with which of the following?

Options are:

Gallium

Copper

Phosphorous

Nitrogen

Q26. Determine the probability that an energy level is filled of an electron if the state is above the Fermi level by 2kT?

Options are:

11 x 10 ^-2

55 x 10 ^ -5

22 x 10 ^ -6

33 x 10 ^-4

Q27. Assume an ideal PN junction with the doping density in P-side is higher compared to that in n-side. Which of the following comments is correct regarding the spread of the depletion region in n and p sides?

Options are:

Depletion region is extended more inside p-doped region compared to n-doped region.

Depletion region is extended more inside n-doped region compared to p-doped region.

Depletion region is extended equally inside n and p doped regions.

Depletion widths inside both n and p doped regions become zero at thermal equilibrium.

Q28. The magnitude of the current through a practical PN junction diode, which is subjected to a low reverse bias, is observed to increase slowly with the increase in applied voltage in the reverse direction. Which one of the following is the most possible reason for this non-ideal behavior?

Options are:

Recombination of electron-hole pairs in the depletion region.

Impact of series resistance.

High level injection of minority carriers that surpass the background doping concentration.

Generation of electron-hole pairs in the depletion region.

Q29. According to Fermi-Dirac statistics, at temperatures more than 0 K, the probability of occupation at Fermi energy (E_F) is:

Options are:

0.5

0

0.75

1

Q30. Calculate the forward bias current of a Si diode at 300 K when forward bias voltage of 0.4V is applied, the reverse saturation current is 1.17×10-9A and Ƞ (ideality factor) =1.

Options are:

6.969 mA

8.23 mA

1.256 mA

5.689 mA