SOLID STATE ELECTRONIC DEVICES

QUIZ

1. In an n-type semiconductor, the concentration of minority carriers mainly depends on the

(a) number of acceptor atoms

(b) number of donor atoms

(c) extent of doping

(d) temperature of the material

Answer :d

2. The Fermi level for an intrinsic semiconductor lies

(a) near the valence band

(b) near the conduction band

(c) middle of the valence and conduction band

(d) anywhere

Answer :c

3. The forbidden energy gap for Ge is

(a) 0.3 eV

(b) 3.5 eV

(c) 0.7 eV

(d) 1.12 eV

Answer :c

4. Hall voltage is proportional to

(a) velocity

(b) magnetic field

(c) both (a) and (b) and parallel to the velocity

(d) both (a) and (b) and perpendicular to the voltage

Answer :b

5. **Consider two energy levels: E_1, E eV above the Fermi level and E_2, E eV below the Fermi level. P_1 and P_2 are respectively the probabilities of E_1 being occupied by an electron and E_2 being empty. Then**

(a) $P_1 > P_2$

(b) $P_1 < P_2$

(c) $P_1 = P_2$

(d) P_1 and P_2 depend on the number of free electrons

Answer :c

6. The dependence of charge carrier on' temperature for an intrinsic semiconductor is

(a) exponential

(b) parabolic

(c) logarithmic

(d) independent

Answer :a

7. At absolute zero temperature, a semiconductor behaves like

(a) an insulator

(b) a superconductor

(c) a good conductor

(d) a variable resistor

Answer :a

8. Direct band gap semiconductors exhibit

(a) short carrier life time used for lasers

(b) long carrier life time used for lasers

(c) short carrier life time used for BJT

(d) short carrier life time used for BJT

Answer :a

9. Electron affinity depends on the

(a) semiconductor material

(b) doping of the semiconductor

(c) applied potential

(d) none of these

Answer :b

10. In an intrinsic semiconductor, the free electron concentration depends on the

(a) effective mass of electrons only

(b) effective mass of holes only

(c) temperature

(d) width of the forbidden energy gap of the semiconductor.

Answer :c

11. In a regulated power supply using a Zener diode, the unregulated input voltage as compared to the regulated output voltage must be

(a) equal

(b) smaller

(c) larger

(d) larger with opposite polarity

Answer :a

12. Depletion layer width _____ under_____ condition and _____ under _____ condition.

(a) decreases, forward biased, increases, reverse biased.

(b) increases, forward biased, decreases, reverse biased.

(c) decreases, reverse biased, increases, forward biased.

(d) none of these

Answer :a

13. For a tunnel diode, the *I-V* characteristic reveals a region of negative slope when the diode is forward biased. This is due to

(a) avalanche effect

(b) quantum mechanical tunnelling effect

(c) photonic effect

(d) none of these

Answer :b

14. Forward current density in a diode in a diode is _____ proportional to the lifetime of carriers.

(a) not

(b) inversely

(c) decreasing

(d) not affected

Answer :b

15. The maximum electric field strength at the centre of the depletion layer increases with in the reverse voltage.

(a) increase

(b) decrease

(c) change

(d) no effect

Answer :a

16. Donor atoms are_____ carrier providers in p type _____ and carrier providers in n type semiconductor materials.

(a) minority, majority

(b) majority, minority

(c) minority, minority

(d) majority, majority

Answer :a

17. Schottky diodes have no _____ transient and very little _____ transient

(a) turn ON, turn OFF

(b) turn OFF, turn ON

(c) switching, recovery time

(d) recovery time, switching

Answer :a

18. A Schottky diode has _____ forward voltage drop and _____ reverse voltage blocking capacity.

(a) high, low

(b) low, high

(c) low, low

(d) high, high

Answer :c

19. If the barrier potential is increased in a p-n junction then the width of the junction will

(a) remain unaltered

(b) increase proportional to square root of the potential

(c) increase linearly

(d) decrease proportional to square root of the potential

Answer :b

20. Junction barrier offers oppositions only to

(a) holes in the p region

(b) free electrons in the n region

(c) minority carriers in both regions

(d) decrease proportional to square of the potential

Answer :d

21. In a properly biased n-p-n transistor, most of electron from emitter

(a) recombine with the holes in the base

(b) recombine in the emitter itself

(c) pass through the base to the collector

(d) are stopped by the junction barrier

Answer : c

22. The value of the total collector current in a CB

(a) $I_C = \alpha I_E$

(b) $I_C = \alpha I_E + I_{CO}$

(c) $I_C = \alpha I_E - I_{CO}$

(d) $I_C = \beta I_E$

Answer :b

23. In a BJT, the collector cut-off current I_{CBO} reduces by doping the

(a) emitter with a high level of impurity

(b) emitter with a low level of impurity

(c) collector with a high level of impurity

(d) collector with a low level of impurity

Answer :d

24. In the case of a BJT, α is

(a) positive and > 1

(b) positive and < 1

(c) negative and > 1

(d) negative and < 1

Answer : c

25. The EBJ of a given transistor is forward biased and CBJ is reverse biased. If the base current is increased, then its

(a) I_c will increase

(b) V_{CE} will increase

(c) I_C will decrease

(d) V_{CC} will increase

Answer : a

26. When a transistor is fully switched ON, it is said to be in

(a) shorted

(b) saturated

(c) critical

(d) cut-off

Answer : b

27. If a change in base current does not change the collector current, the transistor amplifier is said to be

(a) saturated

(b) cut-off

(c) critical

(d) shorted

Answer : b

28. When an n-p-n transistor is saturated, its V_{CE}

(a) is zero and I_C is zero

(b) is low and I_C is high

(c) equals V_{CC} and I_C is zero

(d) equals V_{CC} and I_C is high

Answer : c

29. When an n-p-n transistor is cut-off, its V_{CE}

(a) equals V_{CC} and I_C is high

(b) equals V_{CC} and I_C is zero

(c) is low and I_c is high

(d) is high and I_c is low

Answer : a

30. In a BJT, the largest current flow occurs

(a) in the emitter

(b) in the collector

(c) in the base

(d) through the CB junction

Answer : b