**18PYB103J – Semiconductor Physics**

1. At 0K, the pure semiconductor acts as a perfect insulator, since the \_\_\_\_\_\_\_\_\_ bonds are strong and no free electrons are available.

a. **Covalent**

b. Ionic

C. Metallic

d. Sigma

2. When T = 0K, the Fermi energy (EF) of intrinsic semiconductor is equal to \_\_\_\_\_\_\_\_\_\_\_

a. EV/2

b. EC/2

c. **EV+EC/2**

d. EV-EC/2

3. The electrical conductivity of intrinsic semiconductor is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_

a. **σ = neeμe + nheμh**

b. σ = neeµe/2

c. σ = nheμh/2

d. σ = nie(μe - μh)

4. The Fermi level of n-type semiconductor \_\_\_\_\_\_\_\_\_\_\_\_ with increase in temperature.

a. **Decreases**

b. Increases

c. remains unchanged

d. becomes zero

5. When silicon is mixed with amount of pentavalent impurity elements \_\_\_\_\_\_\_\_\_ semiconductor crystal is formed.

a. Pure

b. p-type

c**. n-type**

d. Dilute magnetic

6. In n-type semiconductor, the donor level is so close to the bottom of the \_\_\_\_\_\_\_\_.

a. Valence band

**b. Conduction band**

c. Bottom of valence band

d. Top of conduction band

7. At relatively low temperatures, the \_\_\_\_\_\_\_\_\_ atoms get ionized taking electrons from valence bond and thus giving to holes in the valence bond for conduction.

a. Donor

b. Divalent

c. **Acceptor**

d. Pentavalent

8. The majority charge carriers in p-type semiconductor is \_\_\_\_\_\_\_\_\_\_

a. Electrons

b. Both electrons and holes

c. Neutrons

**d. Holes**

9. When T = 0K, the Fermi energy (EF) of p-type semiconductor is equal to \_\_\_\_\_\_\_\_\_\_\_

a. EF/2

b. **EV+Ea/2**

c. Ea/2

d. EV/2

10. \_\_\_\_\_\_\_\_\_\_\_ is a processes by which electrons gain energy and move from the valence band to the conduction band, producing two mobile carriers.

a. Carrier recombination

b. Spontaneous emission

c. Stimulated emission

**d. Carrier generation**

11. In \_\_\_\_\_\_\_\_\_\_\_\_\_ generation process, an electron and a hole recombine in a band-to-band transition, but the resulting energy is given off to another electron or hole.

**a. Auger**

b. band to band

c. Impurity to band

d. None of above

12. Impact ionization process is caused by avalanche multiplication in semiconductor diodes under high \_\_\_\_\_\_\_\_\_\_\_\_\_\_ bias.

a. Forward

**b. Reverse**

c. Positive

d. Negative

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

**a. Diffusion**

b. Pressure

c. Ionisation

d. Drift

14.A p-type semiconductor material is doped with …………… impurities whereas a n-type semiconductor material is doped with ………… impurities.  
**a. Acceptor, Donor**  
b. Acceptor, Acceptor  
c. Donor, Donor  
d. Donor, Acceptor

15. Which of the below mentioned statements is false regarding a p-n junction diode?  
a. Diode are uncontrolled devices  
b. Diodes are rectifying devices  
c. Diodes are unidirectional devices  
**d. Diodes have three terminals**

16. When a physical contact between a p-region & n-region is established which of the following is most likely to take place?  
 a. Electrons from N-region diffuse to P-region  
 b. Holes from P-region diffuse to N-region  
 **c. Both of the above mentioned statements are true**  
 d. Nothing will happen

17. What is the continuity equation in words?

a. Rate of increase = (inflow – outflow) + drift – diffusion

**b. Rate of increase = (inflow – outflow) + generation - recombination**

c. Rate of increase = (inflow - outflow)

d. Rate of increase = (inflow + outflow)

18. When a reverse bias is applied to a diode, it will

**a. Raise the potential barrier**

b. Lower the potential barrier

c. Increases the majority-carrier a current greatly

d. None of these

19. For a PN junction diode, the current in reverse bias may be

a. Few miliamperes

b. Few mili amperes to several amperes

c. Few amperes

**d. Few micro amperes to nano amperes**

20. As a PN junction is forward biased

**a. Holes as well as electrons tend to drift away from the junction**

b. The depletion region decreases

c. The barrier tends to breakdown

d. None of the above

21. The rectifying metal-semiconductor junction is also called as

 a. Ohmic Junction

**b. Schottky Junction**

c. Conducting Junction

d. PN Junction

22. Whe the work function of metal is smaller than that of n type semiconductor it forms

 a. **Non rectifying Junction**

b. Rectifying Junction

c. Conducting Junction

d. PN Junction

23. Whenever, the work function of metal is smaller than that of p type semiconductor it forms

 a. Ohmic Junction

**b. Schottky Junction**

c. Conducting Junction

d. PN Junction

24. Which of the following junction conducts on both forward bias and reverse bias

**a. Non rectifying Junction**

b. Schottky Junction

c. Semiconductor-Insulator Junction

d. Metal-Insulator Junction

25. The expression for drift current density due to electrons is given by

 a.J = pμeE

b. J = pμeV

**c. J = nμeE**

d. J = nμeV

26. The expression for diffusion current density due to electrons is given by

 a. J = -eDnE(dn/dx)

b. J = -ieDn(dn/dx)

c. J **= -**eDnv(dn/dx)

**d. J = -eDn(dn/dx)**

27. Which of the following materials can be used to construct Photodiode?

 a. Indium Chloride

b. Barium Chloride

c. Tin oxide

**d. Arsenide Phosphide**

28. A light emitting diode is …………. diode.

**a. Heavily doped**

b. Lightly doped

c. Intrinsic semiconductor

d. None of the above

29. Photo diode acts as a

 a. Inductor

b. Capacitor

**c. Sensor**

d. Insulator

30. Photo diode operates on

**a. Reverse Bias**

b. Forward Bias

c. Without any Bias

d. None of the above

31. Which process of the Electron-hole pair is responsible for emitting of light?

 a. Generation

b. Ionisation

**c. Recombination**

d. Diffusion

32. Which of the following materials can be used to produce infrared LED?

 a. Si

b. Ge

**c. GaAs**

d. CdS

33. ………… is the critical angle if the refractive index of the LED material is 2.9.

 a. 19

**b. 20**

c. 16

d. 17

34. What is full form of AMOLED?

**a. Active matrix organic light emitting diode**

b. Array matrix organic light emitting diode

c.Active motion organic light emitting diode

d. Array motion organic light emitting diode

35. The color of the light depends on the type of organic molecule in the

 a. Cathode

b. Anode

c.Conducting Layer

**d. Emissive Layer**

36. ………… the wavelength of radiation given out by an LED with an energy of 3 eV, given

that h = 6.626 × 10-34 m2kg/s and C= 3 × 108 m/s.

 a. 345.6 nm

b. 437.1 nm

c. 548.2 nm

**d. 621.1nm**

**37.** In semiconductor transition  takes place between valence band and conduction band is called as ……………

1. **Interband transition**
2. Intraband transition
3. Impurity level transition
4. Free carrier transition

38. Photon flow per unit area per second ………………

1. Electron density
2. Energy density
3. **Photon density**
4. Phonons density

39. In semiconductors if the transition takes place between a donor (or) acceptor level to a band called as ……………

1. Interband transition
2. Intraband transition
3. Intrinsic semiconductor
4. **Impurity level transition**

40. Free carrier transition also called as ……………….

1. Interband transition
2. **Intraband transition**
3. Impurity level transition
4. phonons

41. ………… is the process in which the photons are absorbed by the semiconductor

 materials causes transition of electron from valence band to conduction band.

a. **Absorption**

b. Emission

c.Conducting Layer

d. Emissive Layer

42. …………….is the process where electron hole pairs created and recombined radiatively.

1. **Photo Luminescence**
2. Conducting layer
3. Photoelectric effect
4. Electroluminescence

43. The annihilation of positively charged holes and negatively charged impurity or free electrons are called as ……………..

a. **Recombination**

b. Generation

c. Absorption

d. Phosphorescence

44. Optical processes directly involve \_\_\_\_\_\_\_\_\_\_\_\_absorption and emission

1. Electron
2. Proton
3. **Photon**
4. neutron

45.  ----------------- Statistics can be applied to identical, indistinguishable particles of half spin.

1. Bose- Einstein
2. **Fermi-Dirac**
3. Maxwell-Boltzmann
4. Bose-Dirac

46. The Einstein coefficient for spontaneous and stimulated emission is\_\_\_\_\_\_\_\_\_\_\_\_

1. https://lh5.googleusercontent.com/n-x637pc180fSr791u3eNvcGbGcyKjyt_0Tw74riV9Su94Ro4eCCAQ-3rwO1tjTXwtwjVDezrBKVx3OpytZzr8eL-EZ_7pYbhZmAzxyMc1QWpcrCeDVIS6RqgXyOqoGWYem3tDQ
2. https://lh4.googleusercontent.com/1vVsYxLTVsWyEIY4UojHby08JDpvtU1_AKyG7Qr4rRvyrH93uODz2al2a8en_oq6lX_2HsUSCMv3o6E5CXI0ISzZ5wPDAX72I7eDx1p2qVhOdf3Ue5ucHlewL8awK1XFdlAnUBc
3. https://lh5.googleusercontent.com/L0dDMhy7aYRKw08CcF5GmcEStWKOZmtYhq_TEfX2P1_LhGdA9b-3cVhifh5GzNNigp5X2KO8Q1Yo7_Feu1xnsRZ8fOaOa2bjytSuyMePpqQAn87p3_ZfuTdO1qza5HkCUtcZVas
4. https://lh4.googleusercontent.com/bpTpIIhX_obuyf239GOrhs8cO2y_DmcpMbLQWcN0EeixPz3n9ZvOtH_PLAKRMyihBraV_imOeDZAnjvS_bpaEfS61R-R90s645lMqZ6Gtws-HJJJvgO6RGPCIw7xgFxauMA2s6w

47…………… is the process of radiative recombination of electron-hole pairs created by electron bombardment.

1. Luminescence
2. **Cathodoluminescence**
3. Photoluminescence
4. Electroluminescence

48. The absorption coefficient of semiconducting materials strongly depends on the……………

1. Properties of material
2. **Wavelength**
3. Amount of light
4. Amplitude

49. …………….takes place without interaction with other photons, and the direction and phase are random.

1. **Spontaneous emission**
2. Stimulated emission
3. Absorption
4. Amplification

50. ………………. takes place when the excited electron interacts with another photon.

1. Spontaneous emission
2. **Stimulated emission**
3. Absorption
4. Amplification