Question Bank

Electronic Materials and Components(312316)

UNIT-1 Electronic Materials

Factors affecting the resistivity of material like temperature, area of cross-section,length (or distance) ofthe element.

1. **What is the primary factor affecting the resistivity of a material?**

- A) Voltage

- B) Temperature

- C) Current

- D) Magnetism

****Answer: B) Temperature****

2. **How does an increase in temperature affect the resistivity of most materials?**

- A) Increases

- B) Decreases

- C) Remains unchanged

- D) Depends on the material

****Answer: A) Increases****

3. **Which of the following is directly proportional to the resistivity of a material?**

- A) Area of cross-section

- B) Length of the element

- C) Temperature

- D) Voltage

****Answer: B) Length of the element****

4. **What happens to the resistivity of a material as the cross-sectional area is increased?**

- A) Increases
- B) Decreases
- C) Remains unchanged
- D) Depends on the temperature

Answer: C) Remains unchanged

5. **In the formula for resistance (R), how is resistivity (ρ) related to the cross-sectional area (A) and length (L) of the material?**

- A) $R = \rho A/L$
- B) $R = A/\rho L$
- C) $R = \rho L/A$
- D) $R = AL/\rho$

Answer: C) $R = \rho L/A$

6. **Which factor influences the resistance of a material more significantly, assuming all other parameters are constant?**

- A) Temperature
- B) Area of cross-section
- C) Length of the element
- D) Voltage

Answer: A) Temperature

7. **What is the unit of resistivity in the International System of Units (SI)?**

- A) Ohms
- B) Ohm-meters
- C) Ampere
- D) Joules

Answer: B) Ohm-meters

8. **If the length of a wire is doubled while keeping the cross-sectional area constant, how does this affect the resistance?**

- **A) Doubles**
- **B) Halves**
- **C) Quadruples**
- **D) Remains unchanged**

****Answer: A) Doubles****

9. **Which material property is responsible for the opposition to the flow of electric current within a substance?**

- **A) Conductivity**
- **B) Voltage**
- **C) Permittivity**
- **D) Resistivity**

****Answer: D) Resistivity****

10. **What effect does an increase in the area of cross-section have on the resistance of a material?**

- **A) Increases**
- **B) Decreases**
- **C) Remains unchanged**
- **D) Depends on the length**

****Answer: C) Remains unchanged****

11. **Which of the following materials is likely to have the lowest resistivity?**

- **A) Rubber**
- **B) Copper**
- **C) Glass**
- **D) Wood**

Answer: B) Copper

12. **How does the resistivity of most metals change with a decrease in temperature?**

- A) Increases
- B) Decreases
- C) Remains unchanged
- D) Depends on the metal

Answer: B) Decreases

13. **What is the relationship between the resistivity and temperature of a semiconductor material?**

- A) Directly proportional
- B) Inversely proportional
- C) No relationship
- D) Randomly fluctuates

Answer: A) Directly proportional

14. **If the voltage across a material is doubled while keeping the temperature and other factors constant, how does this affect the resistance?**

- A) Doubles
- B) Halves
- C) Quadruples
- D) Remains unchanged

Answer: D) Remains unchanged

15. **What is the purpose of introducing the concept of resistivity in electrical calculations?**

- A) To simplify equations
- B) To standardize resistance units
- C) To account for temperature effects

- D) To complicate the analysis

Answer: B) To standardize resistance units

1.1 Semiconductor materials: Intrinsic, extrinsic, charge carriers, P type and N Type, applications

1. **What are intrinsic semiconductor materials?**

- A) Materials with no electrons
- B) Materials with naturally occurring impurities
- C) Materials with equal numbers of electrons and holes
- D) Materials with fixed charge carriers

Answer: C) Materials with equal numbers of electrons and holes

2. **What is the primary charge carrier in intrinsic semiconductors at room temperature?**

- A) Electrons
- B) Holes
- C) Protons
- D) Neutrons

Answer: A) Electrons

3. **Which process introduces intentional impurities into semiconductor materials to modify their electrical properties?**

- A) Doping
- B) Diffusion
- C) Oxidation
- D) Annealing

Answer: A) Doping

4. **What is the major charge carrier in N-type semiconductors?**
   - A) Electrons
   - B) Holes
   - C) Protons
   - D) Neutrons
   Answer: A) Electrons

5. **In P-type semiconductors, what is the majority charge carrier?**
   - A) Electrons
   - B) Holes
   - C) Ions
   - D) Neutrons
   Answer: B) Holes

6. **What is the result of doping silicon with elements like boron or aluminum?**
   - A) N-type semiconductor
   - B) P-type semiconductor
   - C) Intrinsic semiconductor
   - D) Insulator
   Answer: B) P-type semiconductor

7. **Which of the following elements is commonly used as a dopant for creating N-type semiconductors?**

- A) Silicon

- B) Boron

- C) Phosphorus

- D) Aluminium

****Answer: C) Phosphorus****

8. **What is the purpose of creating P-type and N-type semiconductors?**

- A) To make them insulators

- B) To enhance mechanical strength

- C) To control charge carrier types and concentrations

- D) To reduce thermal conductivity

****Answer: C) To control charge carrier types and concentrations****

9. **Which type of semiconductor material has more electrons than holes?**

- A) P-type

- B) N-type

- C) Intrinsic

- D) Extrinsic

****Answer: B) N-type****

10. **What happens when a P-type semiconductor is joined with an N-type semiconductor?**

- **A) They repel each other**
- **B) They form an insulator**
- **C) They create a diode**
- **D) They have no interaction**

****Answer: C) They create a diode****

11. **In semiconductor diodes, which region is depleted of majority carriers when a voltage is applied? **

- **A) P-type region**
- **B) N-type region**
- **C) Intrinsic region**
- **D) Extrinsic region**

****Answer: C) Intrinsic region****

12. **What is a common application of semiconductor diodes in electronic circuits?**

- **A) Audio amplification**
- **B) Voltage regulation**
- **C) Mechanical motion control**
- **D) Heat dissipation**

****Answer: B) Voltage regulation****

**13. **Which semiconductor property makes it suitable for use in transistors and integrated circuits? **

- A) High resistance
- B) Low resistivity
- C) Variable resistivity
- D) High capacitance

Answer: B) Low resistivity

14. **What is the primary function of a semiconductor amplifier in electronic devices?

- A) Generate heat
- B) Increase signal strength
- C) Decrease signal frequency
- D) Convert light to electricity

Answer: B) Increase signal strength

15. **In which application are semiconductor materials commonly used for light emission?

- A) Cooking appliances
- B) Solar panels
- C) Light-emitting diodes (LEDs)
- D) Electric motors

Answer: C) Light-emitting diodes (LEDs)

1.2 Photo emissive materials: Properties, applications

1. **What is the primary characteristic of photoemissive materials?**

   - A) High resistance

   - B) Low melting point

   - C) Ability to emit electrons upon exposure to light

   - D) Insulating properties

   Answer: C) Ability to emit electrons upon exposure to light

2. **Which phenomenon describes the emission of electrons from a material when exposed to light of sufficient energy?**

   - A) Photoelectric effect

   - B) Thermionic emission

   - C) Conduction

   - D) Resistivity

   Answer: A) Photoelectric effect

3. **What property of photoemissive materials allows them to respond to different wavelengths of light?**

   - A) Absorption coefficient

   - B) Refractive index

- C) Bandgap

- D) Thermal conductivity

****Answer: C) Bandgap****

4. **In photoemissive materials, what is the relationship between the intensity of incident light and the emitted photoelectrons?**

- A) Directly proportional

- B) Inversely proportional

- C) No relationship

- D) Nonlinear relationship

****Answer: A) Directly proportional****

5. **Which application commonly utilizes the photoemissive effect for detection of light or photons?**

- A) Refrigeration

- B) X-ray imaging

- C) Digital audio processing

- D) Light-sensitive alarms

****Answer: B) X-ray imaging****

6. **What is the primary advantage of using photoemissive materials in imaging devices compared to other technologies?**

- A) Lower cost

- B) Higher resolution

- C) Longer lifespan

- D) Resistance to environmental factors

****Answer: B) Higher resolution****

7. **Which property allows photoemissive materials to be used in photomultiplier tubes for amplifying low-light signals?**

- A) High thermal conductivity

- B) Low dark current

- C) Wide bandgap

- D) Photoelectric sensitivity

****Answer: B) Low dark current****

8. **What type of materials are commonly employed in the construction of photoemissive cathodes in electronic devices?**

- A) Semiconductors

- B) Conductors

- C) Insulators

- D) Superconductors

****Answer: A) Semiconductors****

9. **Which factor is crucial for achieving high quantum efficiency in photoemissive materials?**

- A) Low temperature

- B) High intensity light

- C) Narrow bandgap

- D) Long wavelength

****Answer: B) High intensity light****

10. **What is the primary function of a photoemissive material in a phototube?**

- A) Store electrical charge

- B) Convert light to sound

- C) Emit electrons in response to light

- D) Reflect light efficiently

****Answer: C) Emit electrons in response to light****

11. **In which application are photoemissive materials commonly used to convert light signals into electrical signals?**

- A) Microwave communication

- B) Fiber optics

- C) Solar cells

- D) Photoelectric cells

****Answer: D) Photoelectric cells****

12. **What property of photoemissive materials allows for fast response times in imaging devices?**

- A) Low thermal conductivity

- B) High electron mobility

- C) Low quantum efficiency

- D) Wide bandgap

****Answer: B) High electron mobility****

13. **What is the primary disadvantage of using photoemissive materials in certain applications?**

- A) Limited color sensitivity

- B) High manufacturing cost

- C) Environmental degradation

- D) Low quantum efficiency

****Answer: A) Limited color sensitivity****

14. **Which property of photoemissive materials is crucial for applications requiring high-speed detection and response?**

- A) Dark current

- B) Electron affinity

- C) Quantum efficiency

- D) Electron mobility

****Answer: D) Electron mobility****

15. **In which field are photoemissive materials commonly employed for the detection and analysis of atomic and molecular structures?**

- A) Medicine

- B) Chemistry

- C) Astrophysics

- D) Geology

****Answer: C) Astrophysics****

1.3 Dielectric Materials: Types, Properties, Effect of frequency on performance of dielectric materials

1. **What is the primary purpose of dielectric materials in electronic circuits?**

- A) Conduction of electricity

- B) Amplification of signals

- C) Insulation and energy storage

- D) Mechanical support

****Answer: C) Insulation and energy storage****

2. **Which type of dielectric material is commonly used in capacitors for its high dielectric constant?**

- A) Air

- B) Mica

- C) Ceramic

- D) Polyester

****Answer: C) Ceramic****

3. **What property of dielectric materials is represented by the term "permittivity"?

- A) Ability to conduct electricity
- B) Insulating strength
- C) Ability to store electrical energy
- D) Thermal conductivity

Answer: C) Ability to store electrical energy

4. **How does increasing the permittivity of a dielectric material affect the capacitance of a capacitor?

- A) Increases capacitance
- B) Decreases capacitance
- C) No effect on capacitance
- D) Changes the resistance

Answer: A) Increases capacitance

5. **Which type of dielectric material is known for its stability over a wide range of temperatures and frequencies?

- A) Paper
- B) Oil
- C) Polyethylene
- D) Tantalum

Answer: C) Polyethylene

6. **What is the primary function of a dielectric material in a capacitor?

- A) Allow current flow

- B) Store electrical charge

- C) Increase resistance

- D) Generate magnetic fields

****Answer: B) Store electrical charge****

7. **Which dielectric material is commonly used for high-voltage applications due to its excellent insulating properties?**

- A) Rubber

- B) Glass

- C) Diamond

- D) Porcelain

****Answer: D) Porcelain****

8. **What effect does an increase in frequency have on the performance of certain dielectric materials in capacitors?**

- A) Improves performance

- B) Degrades performance

- C) No significant effect

- D) Changes the color

****Answer: B) Degrades performance****

9. **Which term describes the phenomenon where the dielectric constant of a material decreases as the frequency of the applied electric field increases?**

- **A) Dielectric saturation**
- **B) Ferroelectricity**
- **C) Dielectric relaxation**
- **D) Piezoelectricity**

****Answer: C) Dielectric relaxation****

10. **Why do some dielectric materials exhibit higher losses (dissipation factor) at higher frequencies?**

- **A) Increased conductivity**
- **B) Decreased permittivity**
- **C) Enhanced insulation**
- **D) Improved thermal conductivity**

****Answer: A) Increased conductivity****

11. **Which dielectric property is crucial for energy storage applications, such as in capacitors?**

- **A) Low permittivity**
- **B) High dissipation factor**
- **C) High breakdown voltage**
- **D) Low dielectric constant**

****Answer: C) High breakdown voltage****

12. **In which type of capacitors are tantalum-based dielectric materials commonly used?**

- **A) Ceramic capacitors**
- **B) Electrolytic capacitors**
- **C) Paper capacitors**
- **D) Air capacitors**

****Answer: B) Electrolytic capacitors****

13. **How does the dielectric constant of a material affect the efficiency of a capacitor?**

- **A) No effect**
- **B) Increases efficiency**
- **C) Decreases efficiency**
- **D) Improves mechanical strength**

****Answer: B) Increases efficiency****

14. **Which dielectric material is often used in applications requiring high dielectric strength and low loss at microwave frequencies?**

- **A) Polystyrene**
- **B) Teflon**
- **C) Polycarbonate**
- **D) PVC**

****Answer: B) Teflon****

15. **What is the primary reason for selecting a dielectric material with a high breakdown voltage in high-voltage applications?**

- **A) To decrease energy storage**
- **B) To increase energy dissipation**
- **C) To prevent electrical breakdown**
- **D) To reduce capacitance**

****Answer: C) To prevent electrical breakdown****

1.4 Magnetic Materials: Properties, classification: Permanent magnetic dipole, diamagnetism, paramagnetism, ferromagnetism.

1. **What is the property of a material that allows it to create its own persistent magnetic field without an external influence?**

- **A) Diamagnetism**
- **B) Paramagnetism**
- **C) Ferromagnetism**
- **D) Permanent magnetic dipole**

****Answer: D) Permanent magnetic dipole****

2. **Which type of magnetic material is characterized by having a weak, temporary induced magnetic moment when exposed to an external magnetic field?**

- **A) Diamagnetic**
- **B) Paramagnetic**
- **C) Ferromagnetic**
- **D) Permanent magnetic**

****Answer: B) Paramagnetic****

3. **What happens to the magnetic susceptibility of a diamagnetic material when it is placed in an external magnetic field?**

- **A) Increases**
- **B) Decreases**
- **C) Remains unchanged**
- **D) Reverses direction**

****Answer: B) Decreases****

4. **Which class of materials exhibits a negative magnetic susceptibility and is repelled by an applied magnetic field?**

- **A) Diamagnetic**
- **B) Paramagnetic**
- **C) Ferromagnetic**

- D) Permanent magnetic

****Answer: A) Diamagnetic****

5. **What is the primary reason behind the weak magnetic response of diamagnetic materials in an external magnetic field?**

- A) Alignment of atomic magnetic dipoles

- B) Presence of unpaired electrons

- C) Induction of permanent magnetization

- D) Generation of magnetic domains

****Answer: A) Alignment of atomic magnetic dipoles****

6. **In which type of magnetic material do individual atomic magnetic dipoles align in the direction of an applied magnetic field, resulting in a net magnetic moment?**

- A) Diamagnetic

- B) Paramagnetic

- C) Ferromagnetic

- D) Permanent magnetic

****Answer: C) Ferromagnetic****

7. **What is the term for the temperature at which a ferromagnetic material loses its spontaneous magnetization and becomes paramagnetic?**

- A) Curie temperature

- B) Saturation temperature

- C) Magnetic transition point

- D) Remanence temperature

****Answer: A) Curie temperature****

8. **Which of the following materials is an example of a permanent magnet commonly used in everyday applications?**

- A) Aluminum

- B) Copper

- C) Neodymium-iron-boron (NdFeB)

- D) Glass

****Answer: C) Neodymium-iron-boron (NdFeB)****

9. **What property distinguishes ferromagnetic materials from paramagnetic materials in terms of magnetic response to an external field?**

- A) Alignment of atomic dipoles

- B) Presence of unpaired electrons

- C) Repulsion by an external field

- D) Creation of induced magnetic moments

****Answer: A) Alignment of atomic dipoles****

10. **What is the primary factor influencing the strength of ferromagnetism in a material?**

- A) Temperature

- B) Pressure

- C) Electrical conductivity

- D) Atomic mass

****Answer: A) Temperature****

11. **Which type of magnetic material tends to retain its magnetization even after the removal of an external magnetic field?**

- **A) Diamagnetic**
- **B) Paramagnetic**
- **C) Ferromagnetic**
- **D) Permanent magnetic**

****Answer: C) Ferromagnetic****

12. **What is the primary factor that determines the magnetic behavior of a paramagnetic material?**

- **A) Presence of magnetic domains**
- **B) Alignment of atomic dipoles**
- **C) Temperature**
- **D) Saturation magnetization**

****Answer: C) Temperature****

13. **What is the term for the alignment of neighboring atomic magnetic dipoles in the same direction, leading to enhanced magnetization in ferromagnetic materials?**

- **A) Magnetic induction**
- **B) Magnetic domain formation**
- **C) Hysteresis loop**
- **D) Magnetic saturation**

****Answer: B) Magnetic domain formation****

14. **Which class of materials exhibits a positive magnetic susceptibility and is weakly attracted to an applied magnetic field?**

- **A) Diamagnetic**
- **B) Paramagnetic**
- **C) Ferromagnetic**
- **D) Permanent magnetic**

****Answer: B) Paramagnetic****

15. **What is the term for the phenomenon where a ferromagnetic material exhibits a lag in its magnetic response to changes in an external magnetic field?**

- **A) Magnetic hysteresis**
- **B) Magnetic saturation**
- **C) Magnetic remanence**
- **D) Magnetic reluctance**

****Answer: A) Magnetic hysteresis****

1.5 Soldering materials: Alloys and fluxes.

1. **Which metal alloy is commonly used as the primary component in soldering materials due to its low melting point?**

- A) Copper

- B) Aluminum

- C) Tin

- D) Iron

****Answer: C) Tin****

2. **What is the primary purpose of adding lead to tin in solder alloys?**

- A) Increase melting point

- B) Improve electrical conductivity

- C) Enhance corrosion resistance

- D) Facilitate wetting and flow

****Answer: D) Facilitate wetting and flow****

3. **What is the term for the process of applying a thin layer of tin-lead alloy to the surface of a metal to promote solderability?**

- A) Fluxing

- B) Tinning

- C) Brazing

- D) Coating

****Answer: B) Tinning****

4. **Which type of soldering alloy is commonly used for electronic applications due to its eutectic composition and minimal risk of phase separation during cooling?**

- A) Tin-lead (Sn-Pb)

- B) Lead-free solder

- C) Zinc-aluminum (Zn-Al)

- D) Copper-silver (Cu-Ag)

****Answer: A) Tin-lead (Sn-Pb)****

5. **What is the primary environmental concern associated with traditional tin-lead solder alloys?**

- A) High cost

- B) Low melting point

- C) Lead toxicity

- D) Corrosion resistance

Answer: C) Lead toxicity

6. **Which element is commonly used in lead-free solder alloys as a replacement for lead to address environmental concerns?**

- A) Tin
- B) Silver
- C) Bismuth
- D) Nickel

Answer: C) Bismuth

7. **What role does flux play in the soldering process?**

- A) Provide electrical conductivity
- B) Prevent oxidation
- C) Increase melting point
- D) Enhance mechanical strength

Answer: B) Prevent oxidation

8. **Which type of flux is activated by heat during the soldering process to remove oxides and facilitate solder wetting?**

- A) Rosin flux
- B) Water-soluble flux
- C) No-clean flux
- D) Inorganic acid flux

Answer: A) Rosin flux

9. **What is the advantage of using water-soluble flux in soldering applications?**

- **A) Reduced environmental impact**
- **B) Higher melting point**
- **C) Enhanced electrical conductivity**
- **D) Increased corrosion resistance**

****Answer: A) Reduced environmental impact****

10. **Which flux type is designed to remain on the soldered joint without cleaning, leaving a protective residue after soldering?**

- **A) Rosin flux**
- **B) Water-soluble flux**
- **C) No-clean flux**
- **D) Inorganic acid flux**

****Answer: C) No-clean flux****

11. **In soldering, what is the term for the ability of molten solder to spread and adhere to the surfaces being joined?**

- **A) Wetting**
- **B) Oxidation**
- **C) Fluxing**
- **D) Tinning**

****Answer: A) Wetting****

12. **What is the primary disadvantage of using rosin-based fluxes in soldering applications?**

- **A) Poor wetting**
- **B) Environmental concerns**
- **C) High cost**
- **D) Limited flux activation**

****Answer: B) Environmental concerns****

13. **Which alloy is commonly used in high-temperature soldering applications, such as plumbing, due to its elevated melting point?**

- **A) Tin-lead (Sn-Pb)**
- **B) Lead-free solder**
- **C) Silver-copper (Ag-Cu)**
- **D) Zinc-aluminum (Zn-Al)**

****Answer: C) Silver-copper (Ag-Cu)****

14. **What is the purpose of adding a small amount of flux to the surface of a solder joint before soldering?**

- **A) Increase melting point**
- **B) Enhance electrical conductivity**
- **C) Prevent oxidation**
- **D) Improve mechanical strength**

****Answer: C) Prevent oxidation****

15. **Which of the following is a common application of soldering in electronics?**

- **A) Welding large metal structures**
- **B) Assembling plastic components**
- **C) Creating electrical connections on circuit boards**
- **D) Joining glass materials**

****Answer: C) Creating electrical connections on circuit boards****

UNIT-2

2.1 Passive Components: Concepts of Resistance, Capacitance. Induciance. Specifications, type and applications Voltage Dependent Resistor (VDR), Temperature Dependent Resistor(TDR), Light Dependent Resistor (LDR).

1. What is the SI unit of resistance?

a. Volt

b. Ampere

c. Ohm

d. Farad

Answer: c. Ohm

2. Capacitance is the ability of a component to store:

a. Voltage

b. Current

c. Energy in the form of an electric field

d. Resistance

Answer: c. Energy in the form of an electric field

3. The opposition that a component offers to the flow of current is known as:

a. Impedance

b. Resistance

c. Reactance

d. Conductance

Answer: b. Resistance

4. Inductance is a property associated with:

a. Capacitors

b. Resistors

c. Inductors

d. Diodes

Answer: c. Inductors

5. What is the unit of inductance?

a. Ohm

b. Henry

c. Farad

d. Volt

Answer: b. Henry

6. A Voltage Dependent Resistor (VDR) is also known as:

a. Thermistor

b. Photoresistor

c. Varistor

d. Resistor

Answer: c. Varistor

7. Which of the following resistors exhibits a non-linear voltage-current characteristic?

a. Fixed resistor

b. Variable resistor

c. Varistor

d. Thermistor

Answer: c. Varistor

8. A Temperature Dependent Resistor (TDR) is commonly known as a:

a. Varistor

b. Thermistor

c. Photoresistor

d. Potentiometer

Answer: b. Thermistor

9. Light Dependent Resistors (LDRs) are most commonly used in applications related to:

a. Temperature sensing

b. Light sensing

c. Voltage regulation

d. Current amplification

Answer: b. Light sensing

10. The resistance of a resistor marked with the color code Red, Green, Blue, and Gold would be:

a. 25 ohms

b. 52 ohms

c. 56 ohms

d. 56 kilohms

Answer: c. 56 ohms

11. Which passive component stores electrical energy in an electrostatic field?

a. Resistor

b. Capacitor

c. Inductor

d. Varistor

Answer: b. Capacitor

12. The time constant of an RC circuit is determined by the product of:

a. Resistance and capacitance

b. Resistance and inductance

c. Capacitance and inductance

d. Resistance, capacitance, and inductance

Answer: a. Resistance and capacitance

13. What is the primary application of an inductor in an electronic circuit?

a. Voltage regulation

b. Energy storage

c. Current sensing

d. Signal filtering

Answer: b. Energy storage

14. A resistor with a negative temperature coefficient is classified as a:

a. NTC thermistor

b. PTC thermistor

c. Varistor

d. Photoresistor

Answer: a. NTC thermistor

15. The resistance of an LDR decreases with:

a. Increasing light intensity

b. Decreasing light intensity

c. Constant light intensity

d. Changing temperature

Answer: a. Increasing light intensity

2.2 Electronic Materials and doping level for PN junction diode, Zener diode, LEDs, PNP and NPN transistor

1. What is the primary material used for the fabrication of semiconductor devices?

a. Copper

b. Silicon

c. Aluminum

d. Gold

Answer: b. Silicon

2. In a PN junction diode, the P-type semiconductor is doped with:

a. Electrons

b. Holes

c. Neutrons

d. Protons

Answer: b. Holes

3. Which of the following materials is commonly used for the construction of Zener diodes?

a. Germanium

b. Silicon

c. Gallium arsenide

d. Zinc oxide

Answer: b. Silicon

4. A Zener diode is designed to operate in:

a. Forward bias

b. Reverse bias

c. No bias

d. None of the above

Answer: b. Reverse bias

5. What is the purpose of doping in semiconductor devices?

a. To enhance conductivity

b. To reduce conductivity

c. To change the color of the material

d. To increase the size of the material

Answer: a. To enhance conductivity

6. LEDs (Light Emitting Diodes) are made from semiconductor materials that exhibit:

a. Insulating properties

b. Superconducting properties

c. Photovoltaic properties

d. Electroluminescent properties

Answer: d. Electroluminescent properties

7. The NPN transistor has how many layers of semiconductor material?

a. One

b. Two

c. Three

d. Four

Answer: c. Three

8. In an NPN transistor, the majority charge carriers in the emitter region are:

a. Electrons

b. Holes

c. Protons

d. Neutrons

Answer: a. Electrons

9. What is the primary purpose of the P-type material in an NPN transistor?

a. To act as the emitter

b. To act as the collector

c. To act as the base

d. To act as the insulator

Answer: c. To act as the base

10. Which of the following is true for a PNP transistor?

a. Electrons are the majority carriers in the emitter

b. Holes are the majority carriers in the collector

c. Electrons are the majority carriers in the base

d. Holes are the majority carriers in the emitter

Answer: d. Holes are the majority carriers in the emitter

11. What happens to the depletion region width in a PN junction diode under reverse bias?

a. It increases

b. It decreases

c. It remains the same

d. It disappears

Answer: a. It increases

12. The breakdown voltage of a Zener diode is primarily determined by:

a. Forward bias

b. Reverse bias

c. Temperature

d. Light exposure

Answer: b. Reverse bias

13. The energy bandgap of a semiconductor material determines:

a. Conductivity

b. Color

c. Density

d. Magnetic properties

Answer: b. Color

14. What is the primary mechanism by which LEDs emit light?

a. Electroluminescence

b. Photoelectric effect

c. Thermionic emission

d. Photoconductivity

Answer: a. Electroluminescence

15. The term "doping" in semiconductor physics refers to the:

a. Addition of impurities to alter conductivity

b. Process of manufacturing semiconductor devices

c. Coloration of semiconductor materials

d. Recycling of semiconductor waste

Answer: a. Addition of impurities to alter conductivity

2.3 Construction, working principle and applications of OLED

1. What does OLED stand for?

a. Overlapping Light Emitting Diode

b. Organic Light Emitting Diode

c. Optically Linked Emitting Diode

d. Operational Light Emitting Device

Answer: b. Organic Light Emitting Diode

2. In an OLED, the organic layers responsible for emitting light are typically composed of:

a. Silicon

b. Gallium arsenide

c. Organic molecules

d. Tungsten

Answer: c. Organic molecules

3. What is the primary advantage of OLEDs over traditional LED displays?

a. Higher cost

b. Thicker construction

c. Flexibility

d. Shorter lifespan

Answer: c. Flexibility

4. The construction of an OLED includes layers of:

a. Silicon only

b. Organic and inorganic materials

c. Aluminum only

d. Copper only

Answer: b. Organic and inorganic materials

5. How does an OLED emit light?

a. Through electroluminescence of organic materials

b. Through phosphorescence of inorganic materials

c. Through thermoluminescence of organic materials

d. Through photoluminescence of inorganic materials

Answer: a. Through electroluminescence of organic materials

6. OLED pixels emit light when subjected to:

a. Heat b. Pressure

c. Electric current

d. Magnetic fields

Answer: c. Electric current

7. OLEDs are known for their:

a. High power consumption

b. Low contrast ratio

c. Thin and lightweight construction

d. Limited color range

Answer: c. Thin and lightweight construction

8. The working principle of OLED is based on the movement of:

a. Electrons

b. Protons

c. Neutrons

d. Photons

Answer: a. Electrons

9. Which layer in an OLED serves as the emissive layer, producing light when an electric current is applied?

a. Anode

b. Cathode

c. Substrate

d. Emissive layer

Answer: d. Emissive layer

10. OLED technology is commonly used in the manufacturing of:

a. Incandescent bulbs

b. LED displays

c. Plasma screens

d. Flexible displays

Answer: d. Flexible displays

11. The color produced by an OLED pixel is determined by the:

a. Organic materials used in the emissive layer

b. Thickness of the substrate

c. Temperature of the environment

d. Voltage applied to the anode

Answer: a. Organic materials used in the emissive layer

12. OLEDs are self-emissive, meaning that they do not require:

a. External power supply

b. Backlighting c. Cooling systems

d. Color filters

Answer: b. Backlighting

13. What is the typical lifespan of OLED displays compared to traditional LCD displays?

a. Shorter

b. Longer

c. Approximately the same

d. Unpredictable

Answer: b. Longer

14. OLEDs find applications in:

a. TVs and monitors

b. Lighting

c. Wearable devices

d. All of the above

Answer: d. All of the above

15. Which factor contributes to the flexibility of OLED displays?

a. Thin-film transistors

b. Organic materials

c. Inorganic materials

d. High operating temperature

Answer: a. Thin-film transistors

2.4 Integrated Circuit: Introduction to Monolithic IC thick & thin film IC, Hybrid IC, Linear IC, Digital IC and IC packages (SIP, TOS, Flat, DIP), Pin,/ Demonstrations Device Identification, Temperature ranges

1. What does the term "IC" stand for in the context of electronics?

a. Integrated Capacitor

b. Intelligent Circuit

c. Integrated Circuit

d. Insulated Conductor

Answer: c. Integrated Circuit

2. Monolithic ICs are fabricated on a single semiconductor substrate, typically made of:

a. Silicon

b. Aluminum

c. Gold

d. Copper

Answer: a. Silicon

3. In the context of IC fabrication, what is the primary purpose of thick and thin film techniques?

a. To reduce the size of the IC

b. To increase the thickness of the IC substrate

c. To deposit resistive and conductive materials

d. To enhance the visual appearance of the IC

Answer: c. To deposit resistive and conductive materials

4. Hybrid ICs combine the advantages of both monolithic and discrete components. What type of components are typically used in hybrid ICs?

a. Only transistors

b. Only resistors

c. Both active and passive components

d. Only capacitors

Answer: c. Both active and passive components

5. Linear ICs are designed to operate over a continuous range of input signals, making them suitable for applications such as:

a. Digital signal processing

b. Audio amplification

c. Binary calculations

d. Microcontroller programming

Answer: b. Audio amplification

6. Digital ICs are widely used in applications that involve:

a. Analog signal processing

b. Continuous voltage changes

c. Binary data manipulation

d. Direct current (DC) circuits

Answer: c. Binary data manipulation

7. What does the term "SIP" stand for in IC packaging?

a. Single Inline Package

b. Surface-mount Integrated Package

c. Small Integrated Processor

d. Serial Inline Processor

Answer: a. Single Inline Package

8. The term "DIP" in IC packaging stands for:

a. Dual Inline Package

b. Digital Integrated Processor

c. Double Integrated Package

d. Direct Inline Processor

Answer: a. Dual Inline Package

9. "TOS" in IC packaging stands for:

a. Triple Outline Shape

b. Thin Outline Small

c. Thermal Overload Shutdown

d. Transistor Output Stage

Answer: b. Thin Outline Small

10. What is the primary function of the pins in an IC package?

a. To provide mechanical support

b. To conduct heat away from the IC

c. To connect the IC to external circuits

d. To illuminate the IC

Answer: c. To connect the IC to external circuits

11. Device identification codes on ICs help in:

a. Determining the manufacturing date

b. Identifying the IC manufacturer

c. Identifying the IC's application

d. Both b and c

Answer: d. Both b and c

12. Which temperature range is typically considered "Commercial" in IC specifications?

a. -40°C to +85°C

b. -55°C to +125°C

c. 0°C to +70°C

d. -20°C to +75°C

Answer: c. 0°C to +70°C

13. The "Military" temperature range for ICs is usually specified as:

a. -40°C to +85°C

b. -55°C to +125°C

c. -20°C to +75°C

d. -10°C to +80°C

Answer: b. -55°C to +125°C

14. IC packages designed for high-frequency applications often use the term "GHz" to indicate:

a. Gigabit per second

b. Gigahertz

c. Gigabyte

d. Gravity height

Answer: b. Gigahertz

15. Which IC package is characterized by a flat, rectangular shape and is commonly used in surface-mount technology?

a. SIP

b. TOS

c. Flat Pack

d. DIP

Answer: c. Flat Pack

2.5 Types and applications of micro electror ic components: Micro motors, Micro relay, Micro sv tches

1. What is the primary function of a micro motor in electronic devices?

a. Signal amplification

b. Power generation

c. Mechanical motion

d. Voltage regulation

Answer: c. Mechanical motion

2. Micro motors are commonly used in applications such as:

a. Power distribution

b. Audio amplification

c. Robotics and drones

d. Temperature sensing

Answer: c. Robotics and drones

3. What is the primary purpose of a micro relay in electronic circuits?

a. Signal modulation

b. Power storage

c. Switching high-power loads

d. Temperature control

Answer: c. Switching high-power loads

4. Micro relays are essential components in applications like:

a. Microwave ovens

b. Low-power sensors

c. Audio headphones

d. Voltage regulators

Answer: a. Microwave ovens

5. Micro switches are commonly used to:

a. Regulate temperature

b. Control the flow of fluids

c. Open or close electrical circuits

d. Generate mechanical motion

Answer: c. Open or close electrical circuits

6. In electronic devices, micro switches play a crucial role in:

a. Adjusting audio volume

b. Controlling power supply

c. Activating display backlight

d. All of the above

Answer: d. All of the above

7. The mechanism of a micro switch involves the use of:

a. Magnetic fields

b. Microprocessors

c. Mechanical contacts

d. Optical sensors

Answer: c. Mechanical contacts

8. Micro motors are often categorized based on their operating principle, such as:

a. DC motors and stepper motors

b. Synchronous motors and asynchronous motors

c. Brushed motors and brushless motors

d. All of the above

Answer: d. All of the above

9. Which type of micro motor is commonly used in precision applications where precise control of angular position is required?

a. DC motor

b. Stepper motor

c. Synchronous motor

d. Brushless motor

Answer: b. Stepper motor

10. Micro relays are crucial in applications where switching high-power loads with minimal power consumption is essential, such as in:

a. Smartphone screens

b. Automobiles

c. LED flashlights

d. Wearable devices

Answer: b. Automobiles

11. Micro switches designed for high reliability and long life are often used in:

a. Industrial automation

b. Home lighting

c. Mobile phones

d. Virtual reality headsets

Answer: a. Industrial automation

12. What is the primary advantage of using micro relays in electronic circuits compared to traditional relays?

a. Lower power consumption

b. Higher switching speed

c. Smaller size

d. Improved temperature stability

Answer: c. Smaller size

13. The switching mechanism in micro switches is typically triggered by:

a. Magnetic fields

b. Mechanical force

c. Light sensors

d. Temperature variations

Answer: b. Mechanical force

14. In which of the following applications would you likely find micro switches?

a. Temperature-controlled oven

b. Electric toothbrush

c. Solar power plants

d. Submarine navigation systems

Answer: b. Electric toothbrush

15. Micro motors are crucial components in the operation of:

a. Memory modules

b. Hard disk drives

c. Touchscreens

d. Microphones

Answer: b. Hard disk drives