

D-8-Z

Roll No.

Total No. of Questions : 22]

[Total No. of Printed Pages : 8

12thARM(H/Z)JKUTL2024-25

608-Z

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

SECTION-A

1 each

1. (i) Electric field varies as r^{-1} due to :

(A) Point charge

(B) A quadrupole

(C) An infinite line charge

(D) An infinite plane sheet of charge

(ii) A parallel plate capacitor is charged. If the plates are pulled apart :

(A) the potential difference increases

(B) the capacitance increases

(C) the total charge increases

(D) the charge and the potential difference remain the same

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Turn Over

D-8-Z

(iii) Watt-hour meter measures :

- (A) Electrical energy
- (B) Current
- (C) Voltage
- (D) Power

(iv) Ohm's law is not obeyed by :

- (A) Electrolytes
- (B) Discharge tubes
- (C) Vacuum tubes
- (D) All of these

(v) Which of the following is ferromagnetic ?

- (A) Antimony
- (B) Silver
- (C) Marble
- (D) Alnico

(vi) Earth's magnetic field is nowhere horizontal, *except* at :

- (A) Equator
- (B) Poles
- (C) Both at equator and poles
- (D) None of these

(vii) Which of the following will deflect in electric field ?

- (A) X-rays
- (B) γ -rays
- (C) Cathode rays
- (D) Ultraviolet rays

(viii) A virtual image larger than the object can be produced by :

- (A) A concave mirror
- (B) A convex mirror
- (C) A plane mirror
- (D) Concave lens

(ix) If an electron and a photon propagate in the form of wave having the same wavelength, then they have the same :

- (A) Energy
- (B) Momentum
- (C) Velocity
- (D) Angular momentum

(x) The main difference between conductors, insulators and semiconductors is because of :

- (A) Binding energy of electrons
- (B) Work functions
- (C) Mobility of electrons
- (D) Width of forbidden energy gap

SECTION-B

2 each

2. What are the drawbacks of Rutherford's atomic model ?
3. Write *four* properties of electric lines of force.
4. Find the capacitance in farad of a spherical conductor of radius 1 m.
5. Establish the relation between drift velocity and electric current.
6. A galvanometer has a resistance of $60\ \Omega$ and a full scale deflection is produced by 1.0 mA. How will you convert it into a voltmeter to read 3 V (full scale) ?
7. Define Self-induction. Give its S.I. unit.

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Turn Over

8. The instantaneous voltage from an a.c source is given by $V = 300 \sin 314 t$. What is the root mean square value of the source ?
9. What is displacement current ? Explain its causes.
10. Derive the relation between critical angle and refractive index of the medium.

SECTION-C

3 each

11. Using Gauss' theorem, derive an expression for electric field at a point due to a uniformly charged infinite plane sheet.
12. Apply Kirchhoff's laws to obtain the condition of balanced Wheatstone bridge.
13. Define interference of light. Write *four* conditions for obtaining sustained interference. <https://www.jkboseonline.com>
14. The radii of curvature of the faces of a double convex lens are 10 cm and 12 cm respectively. If the focal length of the lens is 12 cm, find the refractive index of the material of the lens.

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15. What is Photoelectric Effect ? Derive the Einstein's photoelectric equation.
16. What is Binding Energy ? Explain the significance of binding energy per nucleon in the stability of the nucleus.
17. Write three postulates of Bohr's model of atom.
18. Explain the function of p - n junction diode as full-wave rectifier by giving a diagram.
19. What are Extrinsic Semiconductors ? Describe P-type semiconductor.

SECTION-D

5 each

20. Draw the labelled diagram of a moving coil galvanometer. Describe its principle, construction and working.

Or

Derive an expression for the force per unit length between two long parallel straight current carrying conductors in the same or opposite direction. Hence, define ampere.

21. Derive an expression for the average power in an a.c circuit containing L, C and R.

Or

State Faraday's laws of electromagnetic induction and explain any *one* method of producing induced e.m.f.

22. State Huygen's principle. Hence derive laws of reflection from it.

Or

Describe construction and working of an astronomical telescope. Calculate its magnifying power in normal adjustment.

D-8-Y

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608-Y

PHYSICS

Time : 3 Hours]

[Maximum Marks : 70

SECTION-A

1 each

1. (i) When air is replaced by a dielectric medium of constant K , the maximum capacitance of the capacitor :
- (A) Increases K times
 - (B) Increases K^2 times
 - (C) Remains unchanged
 - (D) Decreases K times
- (ii) Electric field varies as r^{-3} due to :
- (A) A point charge
 - (B) An electric dipole
 - (C) An infinite line charge
 - (D) An infinite plane sheet of charge

Turn Over

12th ARM(H/Z)JKUTL2024-25-608-Y

D-8-Y

(iii) A Kilowatt-hour is a unit of

- (A) Energy
- (B) Electric current
- (C) Electric charge
- (D) Power

(iv) Which of the following has negative co-efficient of resistance ?

- (A) Copper
- (B) Aluminium
- (C) Iron
- (D) Germanium

(v) Susceptibility is positive and large for a :

- (A) Diamagnetic
- (B) Non-magnetic
- (C) Ferromagnetic
- (D) Paramagnetic

(vi) Choose the correct answer :

- (A) All electrons possess magnetic moment
- (B) All protons possess magnetic moment
- (C) All nuclei possess magnetic moment
- (D) All atoms possess magnetic moment

(vii) Which has the longest wavelength ?

- (A) Infrared rays
- (B) X-rays
- (C) Ultraviolet rays
- (D) Radio waves

(viii) A lens behaves as a converging lens in air and a diverging lens in water. The refractive index of the material of lens is :

- (A) Equal to unity
- (B) Equal to 1.33
- (C) Between unity and 1.33
- (D) Greater than 1.33

(ix) If c is the velocity of light, the momentum of a photon of frequency ν is :

(A) $h\nu/c^2$

(B) ν/c

(C) $h\nu/c$

(D) $h\nu c^2$

(x) The main difference between conductors, semiconductors and insulators is because of :

(A) Binding energy of electrons

(B) Work functions

(C) Mobility of electrons

(D) Width of forbidden energy gap

SECTION-B

2 each

2. Explain nuclear fission and fusion.
3. What is an equipotential surface ? Give *two* properties of equipotential surface.
4. Find the work done in placing a charge of 8×10^{-18} coulomb on a capacitor of capacity 100 microfarad.
5. Define Conductivity and Conductance. Give their S.I. units.
6. An ammeter of resistance 100Ω can measure a maximum current of 5 mA. What will you do to measure maximum current of 5 A with it ?
7. Define Mutual Inductance. Give its S.I. unit.

9. The instantaneous voltage from an a.c source is given by $V = 300 \sin 314 t$. What is the root mean square value of the source ?
10. What is displacement current ? Explain its causes.
10. Derive the relation between critical angle and refractive index of the medium.

SECTION-C

3 each

11. Using Gauss' theorem, derive an expression for electric field at a point due to a uniformly charged infinite plane sheet.
12. Apply Kirchhoff's laws to obtain the condition of balanced Wheatstone bridge.
13. Define interference of light. Write *four* conditions for obtaining sustained interference.
14. The radii of curvature of the faces of a double convex lens are 10 cm and 12 cm respectively. If the focal length of the lens is 12 cm, find the refractive index of the material of the lens.

15. What is Photoelectric Effect ? Derive the Einstein's photoelectric equation.
16. What is Binding Energy ? Explain the significance of binding energy per nucleon in the stability of the nucleus.
17. Write three postulates of Bohr's model of atom.
18. Explain the function of p - n junction diode as full-wave rectifier by giving a diagram. <https://www.jkboseonline.com>
19. What are Extrinsic Semiconductors ? Describe P-type semiconductor.

SECTION-D

5 each

20. Draw the labelled diagram of a moving coil galvanometer. Describe its principle, construction and working.

Or

Derive an expression for the force per unit length between two long parallel straight current carrying conductors in the same or opposite direction. Hence, define ampere.

Turn Over

21. Derive an expression for the average power in an a.c circuit containing L, C and R.

Or

State Faraday's laws of electromagnetic induction and explain any one method of producing induced e.m.f.

22. State Huygen's principle. Hence derive laws of reflection from it.

Or

Describe construction and working of an astronomical telescope. Calculate its magnifying power in normal adjustment.

D-8-X

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12thARM(H/Z)JKUTL2024-25

608-X

PHYSICS

Time : 3 Hours]

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SECTION-A

1 each

1. (i) Potential at any point inside a charged hollow sphere :

- (A) increases with distance
- (B) is a constant
- (C) decreases with distance from centre
- (D) is zero

(ii) In a charged capacitor, the energy resides :

- (A) on the positive plate
- (B) on both positive and negative charged plates
- (C) in the field between the plates
- (D) around the edge of the capacitor plates

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Turn Over

(iii) One ampere is equivalent to :

- (A) 1 coulomb second
- ~~(B)~~ 1 coulomb second⁻¹
- (C) 1 joule second
- (D) 1 joule second⁻¹

(iv) The internal resistance of a cell is the resistance of :

- (A) Material used in the cell
- ~~(B)~~ Electrolyte used in the cell
- (C) Electrodes of the cell
- (D) Vessel of the cell

(v) The magnetic permeability is maximum for :

- (A) Paramagnetic
- ~~(B)~~ Ferromagnetic
- (C) Diamagnetic
- (D) Non-magnetic

(vi) A uniform magnetic field is obtained in :

- (A) a bar magnet
- (B) a horse shoe magnet
- (C) a circular coil carrying a current
- ~~(D)~~ a cylindrical coil carrying a current

(vii) Which of the following radiations has the least wavelength ?

- (A) α -rays
- (B) β -rays
- (C) γ -rays
- (D) X-rays

(viii) If the light propagating along a straight line bends by a small but fixed angle, it may be due to :

- (A) Reflection
- ~~(B)~~ Refraction
- (C) Diffraction
- (D) Dispersion

(ix) The de-Broglie wavelength λ of a particle is related to its kinetic energy E as :

(A) $\lambda \propto \sqrt{E}$

~~(B)~~ $\lambda \propto \frac{1}{\sqrt{E}}$

(C) $\lambda \propto E$

(D) $\lambda \propto \frac{1}{E}$

(x) The main difference between conductors, semiconductors and insulators is because of :

(A) Binding energy of electrons

(B) Work function

(C) Mobility of electrons

~~(D)~~ Width of forbidden energy gap

SECTION-B

2 each

2. What were the important conclusions drawn from α -scattering experiment ?
3. State and explain Coulomb's law of force in electrostatics.
4. Find the area of the plates of a 3F parallel plate capacitor, if the separation between the plates is 5 mm.
5. On what factors resistivity of the material depends ?
6. A galvanometer has a resistance of $60\ \Omega$ and a full scale deflection is produced by 1.0 mA. How will you convert it into an ~~ammeter~~ to read 1 A (full scale).
7. State Lenz's law. What factors do govern the direction of e.m.f. ?

8. The instantaneous voltage from an a.c source is given by $V = 300 \sin 314 t$. What is the root mean square value of the source ?
9. What is displacement current ? Explain its cause.
10. Derive the relation between critical angle and refractive index of the medium.

SECTION-C

3 each

11. Using Gauss' theorem, derive an expression for electric field at a point due to a uniformly charged infinite plane sheet.
12. Apply Kirchhoff's laws to obtain the condition of balanced Wheatstone bridge. <https://www.jkboseonline.com>
13. Define interference of light. Write *four* conditions for obtaining sustained interference.
14. The radii of curvature of the faces of a double convex lens are 10 cm and 12 cm respectively. If the focal length of the lens is 12 cm, find the refractive index of the material of the lens.

15. What is Photoelectric Effect ? Derive the Einstein's photoelectric equation.
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17. Write three postulates of Bohr's model of atom.
18. Explain the function of $p-n$ junction diode as full-wave rectifier by giving a diagram.
19. What are Extrinsic Semiconductors ? Describe P-type semiconductor.

SECTION-D

5 each

20. Draw the labelled diagram of a moving coil galvanometer. Describe its principle, construction and working.

Or

Derive an expression for the force per unit length between two long parallel straight current carrying conductors in the same or opposite direction. Hence, define one ampere.

21. Derive an expression for the average power in an a.c circuit containing L, C and R.

Or

State Faraday's laws of electromagnetic induction and explain any *one* method of producing induced e.m.f.

22. State Huygen's principle. Hence derive laws of reflection from it.

Or

Describe construction and working of an astronomical telescope.
Calculate its magnifying power in normal adjustment.

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12th ARF(SZ)JKUT2024-25

308-Z

PHYSICS

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SECTION-A

1 each

1. Choose the correct/most appropriate answer :

(i) Resistivity of the material is independent of :

(A) Nature of material

☒ (B) Dimensions of material

(C) Temperature of material

(D) None of these

(ii) No force is exerted by magnetic field on a stationary :

(A) Current loop

(B) Electric dipole

☒ (C) Magnetic dipole

(D) Current carrying conductor

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B-8-Z

Turn Over

(iii) Magnetic field strength due to a bar magnet at a point distant 'd' from centre of magnet is proportional to :

(A) $\frac{1}{d}$

(B) d

(C) d^3

(D) $\frac{1}{d^3}$

(iv) If the magnetic field is parallel to a surface, then magnetic flux through the surface is :

☒ (A) Zero

(B) Infinite

(C) Small but not zero

(D) Large but not infinite

(v) The frequency of the visible light is of the order of :

(A) 10^7

(B) 10^{11}

☒ (C) 10^{15}

(D) 10^{19}

(vi) The refractive index of glass with respect to air is 1.5. The refractive index of air w.r.t. glass is :

~~(A)~~ Less than 1

(B) 1

(C) Between 1 and 1.5

(D) More than 1.2

(vii) The correct formula for magnifying power of simple microscope is :

(A) $m = \left[1 + \frac{f}{d} \right]$

(B) $m = \left[1 - \frac{f}{d} \right]$

~~(C)~~ $m = \left[1 + \frac{d}{f} \right]$

(D) $m = \left[1 - \frac{d}{f} \right]$

(viii) The radius of first orbit of hydrogen atom is of the order of :

(A) 0.5 Å

(B) 1 Å

(C) 2 Å

(D) 3 Å

(ix) The volume of atom in comparison to volume of nucleus is of the order of :

(A) 10^5

(B) 10^{25}

(C) 10^{15}

(D) 10^{36}

(x) What is the nature of net charge on n -type extrinsic semiconductor ?

(A) -ve

(B) +ve

✓(C) Neutral

(D) -ve or +ve depending on amount of impurity

SECTION-B

2 each

2. Why test charge should be extremely small, when measuring electric field ?
3. Two positive point charges $q_1 = 2 \mu\text{C}$ and $q_2 = 4 \mu\text{C}$ are separated by a distance of 0.2 m apart. Calculate the electric field at the mid-point between the charges.
4. What is the function of the radial magnetic field in a moving coil galvanometer ?
5. A wire of length 0.1 m moves with a speed of 10 ms^{-1} perpendicular to a field of 1 Wb m^{-2} . Calculate induced e.m.f.

6. State *four* characteristics of e.m. waves.
7. Write *four* applications of optical fibers.
8. What are conditions for sustained interference of light ?
9. Explain the term stopping potential and threshold frequency.

Or

Is photoelectric emission possible at all frequencies ? Give reasons for your answer.

10. What is the de-Broglie wavelength of 0.3 kg object moving with a speed of 6 ms^{-1} ?

SECTION-C

3 each

11. A silver wire has a resistance of 2.1Ω at 27.5°C and a resistance of 2.7Ω at 110°C . Determine the temperature coefficient of resistivity of silver.
12. Using Kirchhoff's laws derive the condition for balance of a Wheatstone bridge circuit.

Or

Define drift velocity of electrons and establish relation between drift velocity and electric current.

13. A conducting wire of 100 turns is wound over and near the centre of a solenoid of 100 cm length and 2 cm radius having 600 turns. Calculate mutual inductance of two coils.
14. Using phasor treatment derive an expression for impedance and phase angle of LCR circuit.
15. Explain refraction through prism and show $\delta = (i_1 + i_2) - A$.
16. Distinguish between excitation potential and ionization potential.
17. What are nuclear forces ? Give their important characteristics.
18. What is meant by depletion region in a junction diode ? Explain its formation.
19. With the help of a circuit diagram, explain forward characteristics of a $p-n$ diode. <https://www.jkboseonline.com>

SECTION-D

5 each

20. Using Gauss' theorem derive an expression for electric field due to infinitely long straight wire.

Or

- What is electric potential ? Derive an expression for electric potential at a distance from a charge $+Q$.

21. Derive an expression for force acting on a current carrying conductor placed in a uniform magnetic field. Also mention the cases when force is minimum and maximum.

Or

What are dia, para and ferromagnetic substances ? Discuss their important properties.

22. State Huygens' principle and prove the laws of refraction on its basis.

Or

Describe an Astronomical telescope. Drive an expression for its magnifying power when image is formed at infinity.

B-8-Y

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308-Y

PHYSICS

Time : 3 Hours]

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SECTION-A

1 each

1. Choose the correct/most appropriate answer :

(i) The S.I. unit of conductivity is :

(A) ohm

(B) mho

(C) ohm-m

(D) mho m^{-1}

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B-8-Y

Turn Over

- (ii) The force on a current carrying conductor in a magnetic field is maximum, when angle between current and magnetic field is
- (A) Zero
 - (B) $\frac{\pi}{2}$
 - (C) $\frac{\pi}{4}$
 - (D) $\frac{3\pi}{4}$
- (iii) S-I unit of magnetic pole strength is
- (A) Ampere metre¹
 - (B) Ampere metre²
 - (C) Ampere metre
 - (D) Ampere metre²
- (iv) The magnetic flux through a coil is inversely proportional to
- (A) Number of turns
 - (B) Area
 - (C) Magnetic field
 - (D) None of these

(v) Who was the first to demonstrate the existence of e.m. waves ?

~~(A)~~ Faraday

~~(B)~~ Maxwell

(C) Ampere

(D) Hertz

(vi) A beam of light passes from air to glass, how does the velocity of light vary ?

~~(A)~~ Decreases

~~(B)~~ Increases

(C) Remains unchanged

(D) It may decrease or increase depending upon the colour

(vii) The final image of an Astronomical telescope (w.r.t. object) is :

~~(A)~~ Virtual and erect

(B) Real and erect

(C) Real and inverted

~~(D)~~ Virtual and inverted

Turn Over

(viii) The energy of electron in n th stationary orbit of hydrogen atom is :

~~(A)~~ $\frac{13.6}{n^2}$ Joule

(B) $\frac{13.6}{n^2}$ eV

☒ (C) $-\frac{13.6}{n^2}$ eV

~~(D)~~ $-\frac{13.6}{n^2}$ Joule

(ix) What is number of neutrons in ${}_{17}\text{C}^{37}$?

(A) 17

(B) 37

☒ (C) 20

(D) 54

(5)

(X) What should be the valency of impurity element for using it as a donor for semiconductor ?

(A) 1

(B) 3

(C) 5

(D) 4

SECTION-B

2 each

1. At what position the torque experienced by a dipole in uniform electric field is maximum ?

2. When a charge of one microcoulomb is placed in an electric field it experiences a force of 2.4×10^{-4} N. What is the strength of the field ?

3. State *two* properties of the material of the wire used for suspension of the coil in moving coil galvanometer.

4. If the rate of change of current of 4 As^{-1} induces an e.m.f. of 20 mV in a solenoid, what is the self-inductance of solenoid ?

6. State *four* characteristics of e.m. waves.
7. Write *four* applications of optical fibers.
8. What are conditions for sustained interference of light ?
9. Explain the term stopping potential and threshold frequency.

Or

Is photoelectric emission possible at all frequencies ? Give reasons for your answer.

10. What is the de-Broglie wavelength of 0.3 kg object moving with a speed of 6 ms^{-1} ?

SECTION-C

3 each

11. An electric cable having a resistance of 0.2Ω delivers 10 kW at 220 V d.c. to a factory. Find the efficiency of transmission.
12. Using Kirchhoff's laws derive the condition for balance of a Wheatstone bridge circuit.

Or

Define drift velocity of electrons and establish relation between drift velocity and electric current.

13. A conducting wire of 100 turns is wound over and near the centre of a solenoid of 100 cm length and 2 cm radius having 600 turns. Calculate mutual inductance of two coils.
14. Using phasor treatment derive an expression for impedance and phase angle of LCR circuit.
15. Explain refraction through prism and show $\delta = (i_1 + i_2) - A$.
16. Distinguish between excitation potential and ionization potential.
17. What are nuclear forces ? Give their important characteristics.
18. What is meant by depletion region in a junction diode ? Explain its formation.
19. With the help of a circuit diagram, explain forward characteristics of a $p-n$ diode.

SECTION-D

5 each

20. Using Gauss' theorem derive an expression for electric field due to infinitely long straight wire. <https://www.jkboseonline.com>

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What is electric potential ? Derive an expression for electric potential at a distance from a charge $+Q$.

21. Derive an expression for force acting on a current carrying conductor placed in a uniform magnetic field. Also mention the cases when force is minimum and maximum.

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What are dia, para and ferromagnetic substances ? Discuss their important properties.

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12thARF(SZ)JKUT2024-25
308-X
PHYSICS

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SECTION-A

1 each

1. Choose the correct/most appropriate answer :

(i) In case of insulators as the temperature decreases, resistivity :

- (A) Increases
- (B) Decreases
- (C) Remains constant
- (D) Becomes zero

(ii) No force acts on a current carrying conductor in a magnetic field when angle between current and magnetic field is :

- | | |
|---------------------|----------------------|
| (A) Zero | (B) $\frac{\pi}{4}$ |
| (C) $\frac{\pi}{2}$ | (D) $\frac{3\pi}{4}$ |

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Turn Over

(iii) Torque acting on a magnet held at angle θ with magnetic field is maximum when θ is equal to :

- (A) 0°
- (B) 180°
- (C) 360°
- (D) 90°

(iv) The SI unit of magnetic flux is :

- (A) Weber
- (B) Gauss
- (C) Oersted
- (D) Tesla

(v) The dimensions of $\frac{E}{B}$ are same as that of :

- (A) Acceleration
- (B) Velocity
- (C) Charge
- (D) Current

(3)

(vi) The velocity of light in vacuum is $3 \times 10^8 \text{ ms}^{-1}$. The velocity of light in a medium of refractive index 1.5 is :

(A) $4.5 \times 10^8 \text{ ms}^{-1}$

(B) $3 \times 10^8 \text{ ms}^{-1}$

(C) $2 \times 10^8 \text{ ms}^{-1}$

(D) $1.5 \times 10^8 \text{ ms}^{-1}$

(vii) In a compound microscope, the distance between objective lens and eye lens is :

(A) Fixed

(B) Variable

(C) Infinite

(D) 1 metre

Turn Over

12thARF(SZ)JKUT2024-25-308-X

B-8-X

(viii) The series of hydrogen spectrum which lies in visible region is :

- (A) Lyman series
- (B) Paschen series
- (C) Balmer series
- (D) None of these

(ix) 'A' stands for atomic mass number and 'Z' for atomic number.

The number of electrons in an atom is :

- (A) $A - Z$
- (B) $A + Z$
- (C) Z
- (D) A

(5)

(x) What is the order of the forbidden gap in energy bands of silicon ?

(A) 0.1 eV

(B) 1.1 eV

(C) 2.1 eV

(D) 0.7 eV

SECTION-B

2 each

2. Draw the lines of force due to two equal and similar charges for :

(i) $q_1 = q_2 < 0$ and

(ii) $q_1 = q_2 > 0$

3. An electron is separated from the proton through a distance of $0.53 \text{ \AA}$. Calculate the electric field at the location of the electron.

4. State two factors on which the sensitivity of a moving coil galvanometer depends.

5. A magnetic flux of $5 \mu \text{ Wb}$ is linked with a coil when a current of 1 mA flows through it. What is the self-inductance of coil ?

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B-8-X

Turn Over

6. State *four* characteristics of e.m. waves.
7. Write *four* applications of optical fibers.
8. What are conditions for sustained interference of light ?
9. Explain the term stopping potential and threshold frequency.

Or

Is photoelectric emission possible at all frequencies ? Give reasons for your answer.

10. What is the de-Broglie wavelength of 0.3 kg object moving with a speed of 6 ms^{-1} ?

SECTION-C

3 each

11. Calculate the number of electrons moving per second through the filament of a lamp of 100 watt operating at 200 volt.
12. Using Kirchhoff's laws derive the condition for balance of a Wheatstone bridge circuit.

Or

Define drift velocity of electrons and establish relation between drift velocity and electric current.

13. A conducting wire of 100 turns is wound over and near the centre of a solenoid of 100 cm length and 2 cm radius having 600 turns. Calculate mutual inductance of two coils.
14. Using phasor treatment derive an expression for impedance and phase angle of LCR circuit.
15. Explain refraction through prism and show $\delta = (i_1 + i_2) - A$.
16. Distinguish between excitation potential and ionization potential.
17. What are nuclear forces ? Give their important characteristics.
18. What is meant by depletion region in a junction diode ? Explain its formation.
19. With the help of a circuit diagram, explain forward characteristics of a $p-n$ diode.

SECTION-D

5 each

20. Using Gauss' theorem derive an expression for electric field due to infinitely long straight wire. <https://www.jkboseonline.com>

Or

What is electric potential ? Derive an expression for electric potential at a distance from a charge $+Q$.

21. Derive an expression for force acting on a current carrying conductor placed in a uniform magnetic field. Also mention the cases when force is minimum and maximum.

Or

What are dia, para and ferromagnetic substances ? Discuss their important properties.

22. State Huygens' principle and prove the laws of refraction on its basis.

Or

Describe an Astronomical telescope. Derive an expression for its magnifying power when image is formed at infinity.