Military College Sui
QDB Physics Class XII

Chapter 12 (Electrostatics)

MCQs

a. Metals are good conductors of electricity because they have _____.
   (i) Large number of bounded electrons (ii) Small number of bounded electrons
   (iii) Large number of free electrons (iv) Small number of free electrons

b. SI unit of charge is _____.
   (i) Calorie (ii) Coulomb
   (iii) Volt (iv) Ampere

c. The number of free electrons in one coulomb charge is _____.
   (i) 6.2×10^{18} (ii) 1.6×10^{-19}
   (iii) 6.2×10^{20} (iv) Zero

d. An electric field cannot deflect _____.
   (i) Alpha particles (ii) Electrons
   (iii) x-rays (iv) Protons

e. Electric flux through any surface depend on _____.
   (i) Area of the surface (ii) Direction of the surface
   (iii) Electric field intensity (iv) All of above

Short Questions

a. What are the factors on which electric flux depends?
b. Describe the force or forces on a positive point charge when placed between parallel plates with similar and equal charges. Explain briefly.
c. What are the factors on which Coulomb's force between two charges depends?
d. Define permittivity of free space and relative permittivity. Also give their units.
e. Write the similarities and dissimilarities between electric force and gravitational force.
f. How the orbits of planets will be modified if they were electrically charged?
g. Do electrons tend to go to a region of high potential or low potential?
h. Write any two characteristics of electric field lines.
i. Suppose that you follow an electric field line due to positive point charge. Do electric field and the potential increase or decrease? Explain.
j. Define potential gradient and give its S.I. units.
k. List the properties of electric field lines.
l. Show how Vm-1 and NC-1 are equivalent units for electric field intensity.

Long Questions

a. State the Guass's law and apply it to find electric field intensity due to an infinite sheet of charge two oppositely charged parallel plates.
b. What is a capacitor? Derive the expression for energy density for a capacitor which has electric filed strength 'E'.
c. Derive an expression for the potential at a certain point in the field of a positive point charge.

d. State and explain the Coulomb's law. Also describe the effect of medium between the two charges on the Coulomb's force between them.
e. Describe the applications of electrostatics including Xerography and Inkjet printers.
f. Define electric potential and its unit. Also derive an expression for electric field as a potential gradient.
g. How can the charge on an electron determined by employing the Millikan's method?
h. Define capacitance and its unit. Also explain the charging and discharging process of a parallel plate capacitor.

Numerical Problems

12. Two charges 5 ì C and -2 ì C are kept at a distance from each other. At what point the electrical intensity due to these charges will be zero.
13. The potential difference between two plates is 100 volts. The distance between two plates is 10cm. Find the electric field between the plates.
14. Find the forces that an electron experience in an electric field of 1000 NC^{-1}. If the electron is free to move, find the distance covered by it in 10 ns.
15. A capacitor of 5 ì F is charged by a 12 volts battery. Find the charge and energy stored on it.

Chapter13 (Current Electricity)

MCQs

a. One Coulomb/sec = _____.
   (i) Ohm (ii) Ampere
   (iii) volt (iv) Capacitance
b. V=IR represents _____:
   (i) Coulomb's law (ii) Ohm's law
   (iii) Ampere's law (iv) Faraday's law
c. The conductance of a conductor increases by _____.
   (i) Increasing temperature (ii) Decreasing temperature
   (iii) Increasing length (iv) Decreasing area of cross-section
d. Ohm is defined as
   (i) Volt/ampere (ii) Volt / coulomb
   (iii) Volt x ampere (iv) Coulomb / volt
e. The potential difference across each resistance in series combination is _____.
   (i) Maximum (ii) Zero
   (iii) Same (iv) Different

Short Questions

a. List and briefly explain four kinds of current sources.
b. What is a voltameter? Define its two electrodes.
c. Define ohmic and non-ohmic devices and give examples.
d. What is a thermistor? Give its applications.
e. Define electronic current and conventional current.
f. Briefly explain Kirchhoff's second rule for an electric circuit.
g. What is a potentiometer? Give its two uses.
h. Why does the resistance of a conductor rise with temperature?

i. Write two uses of rheostat and draw their diagrams.
j. Define temperature coefficient of resistance and write its formula and units.

Long Questions

a. State Ohm's Law and derive its expression. Discuss why filament of a lighted bulb is non-ohmic by graph. Also give any two example of non-ohmic devices.
b. What is Wheatstone bridge? How can it be used to determine unknown resistance?
c. Explain the circuit and working of a potentiometer.

Numeric Problems

11. Find the number of electrons that pass through an electric bulb in one sec connected a cross of cell of 1.5 volts. The resistance of the bulb is 10 ohms.
12. Find the resistance of 10 meteres long copper wire of diameter 1mm.
14. Find the number of possible combinations in which 3 resistances each of 6 ohms can be connected. Find the equivalent resistance in each case.
15. A copper wire has resistance of 16 ohms. It is cut into 4 equal pieces. Find the resistance when all these pieces are twisted together.

Chapter 14 (Electromagnetism)

MCQ

a. A current carrying conductor is surrounded by _____.
   (i) Gravitational field (ii) Electric Field
   (iii) Nuclear Field (iv) Magnetic Field
b. The charged particle moving in a magnetic field experiences a magnetic force given by _____.
   (i) F= q B / V (ii) F= q V x B (iii) F= q V. B (iv) F= q V / B
c. Weber is unit of _____.
   (i) Magnetic Field (ii) Magnetic flux density
   (iii) Magnetic flux (iv) Magnetic Induction
d. The expression $B.\Delta l = \mu o I$ is known as _____.
   (i) Ampere's law (ii) Lenz's law (iii) Gauss's law (iv) Faraday's law
e. The e/m of an electron moving with speed along a circular path in a magnetic field is _____.
   (i) Br/V (ii) B/Vr (iii) V/Br (iv) Vr/B

Short Questions

a. How can the sensitivity of a galvanometer be increased?
b. How can you convert a galvanometer into a voltmeter?
c. Why the resistance of an ammeter should be very low?
d. Define the permeability of free space and give its units
e. What is digital multimeter? Give its two advantages over AVO meter.
f. Define (i) tesla and (ii) weber.
g. What is CRO? Write the name of any four main parts of it.
h. List the uses of a cathode ray oscilloscope
i. What is Lorentz force? Write it in mathematical expression.
j. Why voltmeter should have a very high resistance?
k. State Ampere's Law and write it in mathematical form.

Long Questions

a. State Ampere's law and apply it to find the field due to a current carrying solenoid.
b. How can the e/m value of an electron be determined? Explain.
c. Derive the expression for the force acting on a moving charge in a magnetic field.
d. What is a Cathode Ray Oscilloscope? Explain its construction, working and uses.
e. Describe its various parts and their applications.

Numeric Problems

12. A solenoid 5 cm long has 100 turns. Find the magnetic field inside the solenoid if it carries a current of 2A.
13. An electron has a speed of 200 m/s when it enters in a uniform magnetic field of 0.5 T. Calculate the radius of its circular path.
14. Find the resistance that should be connected in series with galvanometer of internal resistance 100 ohms to converted into a voltmeter of range 10 volts.

Chapter 15 (Electromagnetic Induction)

MCQs

a. Lenz's law is in accordance with law of conservation of _____.
   (i) Angular momentum (ii) Charge (iii) Energy (iv) Momentum
b. The phenomenon of producing emf in the coil due to change of current in the coil itself is called _____.
   (i) The Henry effect (ii) Mutual induction
   (iii) Self-inductance (iv) Self-induction
c. One Henry can be defined as
   (i) Weber / ampere^2 (ii) Weber/ampere
   (iii) Weber ampere (iv) Ampere/ Weber
d. The only difference between construction of D.C. generator and an A.C. generator is that of _____.
   (i) Carbon brushes (ii) Coil
   (iii) Magnetic field (iv) Commutator
e. The practical application of phenomenon of mutual induction is_____.
   (i) Transformer (ii) D.C. generator
   (iii) A.C. generator (iv) Electric Motor

Short Questions

a. How can induced current be increased?
b. What is motional emf. Write its mathematical relation.
c. Distinguish between slip rings and split rings.
d. State the Lenz's law and define henry.
e. What is back motor effect in generators? Explain.
f. Can a DC motor be turned into a DC generator?
g. State Faraday's law and write it in mathematical form.
h. Define self-inductance and self-induction.
i. List the factor on which mutual inductance depends.
j. Does induced emf in a circuit depend on the resistance of the circuit?

Long Questions

a. What is inductor? Also derive a formula for energy stored in an inductor.
b. What is transformer? Describe its principle, construction and working.
c. Describe motional emf and derive an expression for it.
d. State and derive the Faraday's law of electromagnetic induction.
e. Describe mutual induction and derive an expression for it.
f. Describe self-induction and derive an expression for it.
g. Explain the principle and working of an AC generator.
h. Describe a DC motor. What is the back emf effect in motors?

Numeric Problems

10. a conductor 10 cm long is moving perpendicular to a magnetic field of 0.5 T with a velocity of 1.2 m/s. Find the induced emf across its ends.
12. In a coil of 50 turns, an emf of 2.5 V, is induced when current in a nearby coil changes from 0 to 2 A in 1 ms. Find the mutual inductance of the coil an the change of flux through the coil.
13. An emf of 2 volts is induced in a coil when current through its changes from 0.1 A to 0.5A in 1ms. Find the self-conductance of the coil and the energy stored in it.
14. A generator coil of area 6 cm^2 has 500 turns. If the coil rotates at a frequency of 50Hz in a magnetic field of 0.2 T. find the peak value of emf across it.

Chapter 16 (Alternating Current)

MCQs

a. The root mean square value of the current is given as _____.
   (i) $I_{rms}=0.505I_0$ (ii) $I_{rms}=0.606I_0$
   (iii) $I_{rms}=0.3053I_0$ (iv) $I_{rms}=0.707I_0$
b. The instantaneous value of the A.C. voltage is given by the relation _____.
   (i) $V=V_0\tan\theta$ (ii) $V=V_0\sin\theta$
   (iii) $V=V_0/\sin\theta$ (iv) $V=V_0\cos\theta$
c. The combined effect of resistance and reactance in a circuit is _____-.
   (i) Capacitance (ii) Inductance
   (iii) Impedance (iv) Resistance
d. S.I. unit of impedance is _____.
   (i) Ohm (ii) Hertz
   (iii) Ampere (iv) Henry
e. An A.C. varies as a function of _____.
   (i) Voltage (ii) Current
   (iii) Width (iv) Time

Short Questions

a. Define chock? Give its uses.
b. How does the voltage output of a generator change with its angular velocity?
c. With reference to modulation, give the difference b/w information and carrier?
d. What is a chock coil and why it is used in AC circuit?
e. Define impedance of a circuit and give its unit?

f. Define reactance? Describe the condition which will make the resistance small.
g. Define impedance and write its SI unit?
h. What is modulation ? name its types. 20. What do you mean by root mean square value (rms)?
i. Write four properties of parallel resonance circuit? 29. Write down two advantages of phase AC supply.

Long Questions

a. Discuss A.C through resistor in detail?
b. Discuss A.C through Capacitor in details? 3. Discuss A. C through an Inductor in details?
4. Discuss in details R-C and R-L series circuits?
5. What is series resonance circuit? Write its characteristics?
6. What is parallel resonance circuit? Write its characteristics?
11. Calculate the instantaneous value of A.C at 0.1 s and peak valueif rms value of A.C is 240 volts and its frequency is 50 Hz.

Numeric Problems

13. What will be the reactance of a choke of 0.2 H when connected in A.C of frequency of 50 Hz.
14. Find the resonance frequency of an RLC series circuit having R as 10 ohms, L as 0.2 mH and C as 5 µF. What is the impedance of the cicuit at resonance frequency?

Chapter 17 (Physics of Solids)

MCQs

a. A solid in which there is no regular arrangement of molecules is _____.
   (i) Polymeric solids (ii) Perfect solids
   (iii) Amorphous solids (iv) Crystalline solids
b. The S.I. unit of stress is _____.
   (i) Ncm^{-2} (ii) Nm^{-1}
   (iii) N (iv) Nm^{-2}
c. The value of stress beyond which a body is permanently deformed is called _____.
   (i) Maximum stress (ii) Yield stress
   (iii) Plastic stress (iv) Minimum stress
d. A completely filled band is called _____.
   (i) Valence band (ii) Fermi band
   (iii) Forbidden band (iv) Conduction band
e. The materials whose resistivity becomes zero below a certain temperature are called _____.
   (i) Semiconductors (ii) Insulators
   (iii) Conductors (iv) Superconductors

Short Questions

a. What is meant by hysteresis loss?
b. What are ferromagnetic and dia-magnetic substances?

c. What are super –conductor?
d. Describe briefly about the formation of energy bands in semi-conductor?
e. Define stress and strain and give their SI unit?
f. What is coericivity of material?
g. Differentiate b/w ductile and brittle substance. Give an Example of each?
h. Distinguish b/w elasticity and plasticity?
i. Define unit cell and crystal lattice?
j. Define modulus of elasticity?
k. Define ultimate tensile strength (UTS) and fracture stress?
l. What is meant by Hysteresis loss? How it is used in construction of a transformer?

Long Questions

a. Write a note on Elastic limit and yeild strength in detail with the graphical explanation?
b. Discuss strain energy in deformed materials and drive its expression?
c. Discuss energy band theory in detail with proper diagram?
d. Discuss hysperisis loop in detail with diagram?

Numeric Problems

14. A 1.25 cm diameter cylinder is subjected to a load of 2500 kg. calculate the stress on bar in mega pascals.
15. A wire 2.5 m longand cross-section area $10^{-5}m^2$ is stretched 1.5 mm by a force of 100 N in the elastic region. Calculate
    (i) the strain
    (ii)Young's modulud
    (iii) the energy stored in the wire.

Chapter 18 (Electronics)

MCQs

a. Depletion region carries _____.
   (i) Negative charge (ii) Positive charge
   (iii) Protons (iv) No charge
b. The potential barrier for germanium at room temperature is _____.
   (i) 0.3 volt (ii) 7 volt
   (iii) 5 volt (iv) 2 volt
c. Process of conversion of A.C. into D.C. is called _____.
   (i) Amplification (ii) Modulation
   (iii) Rectification (iv) Biasing
d. The electronic circuit which gives the inversion of input signal at the output is called _____.
   (i) NOT GATE (ii) XOR GATE
   (iii) OR GATE (iv) AND GATE
e. In npn transistor current does not flow in the direction from _____.
   (i) Collector to Emitter (ii) Base to Collector
   (ii) Emitter to Collector (iv) Emitter to Base

Short Questions

a. Draw a circuit symbol for n-pn & p-n-p transistor?
b. Give four applications of a photodiode?
c. Draw a diagram of exclusive OR gate?
d. What is photocell? Write its four uses.
e. Define depletion region and potential barrier?
f. Write some important uses of operational amplifier?
g. What is the mathematical expression of AND gate? Write its truth table.
h. Write down the logic expression and table for exclusive OR gate.
i. Write down symbols and truth table of exclusive NOR gate.
j. What is LED? Write its uses.

Long Questions

a. What is rectification? Write a note on half wave rectification?
b. What is rectification? Write a note on full wave rectification?
c. Write a note on transistor as an amplifier.
d. Write a note on transistor as a switch.
e. Write a note on OP-AMP as Inverting Amplifier?
f. Write a note on OP-AMP as Non-Inverting Amplifier?

Numeric Problems

(i)18 and 3

Chapter 19 (Dawn of Modern Physics)

MCQs

a. All motions are _____.
   (i) Absolute (ii) Uniform
   (iii) Variable (iv) Relative
b. If a material object moves with speed of light, its mass becomes _____.
   (i) Equal to its rest mass (ii) Four times of its rest mass
   (iii) Infinite (iv) Double
c. If mass of particle is m0 and relativistic mass is m, then its kinetic energy is _____.
   (i) $(m-m_0)c^2/2$ (ii) $(m-m_0)c^2$
   (iii) $mv^2/2$ (iv) mc^2
d. Joule-second is the unit of _____.
   (i) Energy (ii) Heat
   (iii) Work (iv) Angular momentum
e. In which of the following phenomenon, the electromagnetic radiations show particle property _____.
   (i) Polarization (ii) Photoelectric effect
   (iii) Interference (iv) Diffraction

Short Questions

a. Write three results of special theory of relatively.
b. If an electron and proton have same de-broglie wavelength. Which particle has greater speed?
c. Define frame of reference? Differentiate inertial frame from non inertial frame.
d. What advantages an electron microscope has over an optical microscope?

e. Two postulates of special theory of relativity.
f. Define pair production and annhilition of matter?
g. Write the advantages of NAVSTAR navigation system?
h. Define Compton effect write the formula of Compton shift for scattering angle ɵ?
i. If an electron and a proton have the same de Broglie wavelength, which particle has greater speed?

Long Questions

a. What is black body radiation and discuss Intensity distribution diagram?
b. Write a Note on Photoelectric effect? 3. Discuss compton's effect in detail?
c. Discuss Davissan and Germer Experiment in detail?

Numeric Problems

11. What is the mass of a 70 kg man in space rocket travelling at 0.8 c from us as measured from Earth?
14. The period of a pendulum is measured to be 3.0 s in the inertial reference frame of pendulum. What is its period measured by an observer moving at a speed of 0.95 c with respect to the pendulum?
16. A sodium surface is illuminated with light of wavelength 300 nm. The work function of sodium metal is 2.46 eV. Find the maximum K.E of the ejected electon and the cut off wavelength for sodium.
17. A 50 keV photon is Compton scattered by a quasi-free electron. If the scattered photon comes off at 45^{o} what is its wavelength?
18. A particle of mass 5.0 mg moves with speed of 10 m/s. Calculate its de-Broglie wavelength.

Chapter 20 (Atomic Spectra)

MCQs

a. Real mass of an electron is _____.
   (i) $9.10x10^{-27}$ kg (ii) $9.10x10^{-28}$ kg
   (iii) $9.10x10^{-31}$ kg (iv) $9.10x10^{-29}$ kg
b. Which one of the following various series of hydrogen spectrum lies in the visible region?
   (i) Balmer series (ii) Bracket series
   (iii) Lyman series (iv) Paschen series
c. The energy in electron volt necessary to remove the most loosely bound electron from the neutral atom is known as _____.
   (i) Excitation potential (ii) Excitation energy
   (iii) Ionization potential (iv) Ionization energy
d. Life time of excited state is _____.
   (i) 10^{-5} sec (ii) 10^{-5} sec
   (iii) 10^{-3} sec (iv) 10^{-8} sec
e. X-rays are similar in nature to _____.
   (i) Positive rays (ii) Gamma rays
   (iii) Alpha rays (iv) Cathode rays

Short Questions

a. How does stimulated emission differ from spontaneous emission?
b. What is difference b/w Bremsstrahlung radiation and characteristic X-rays in production?

c. Write any two postulates of Bohr's model of H-atom?
d. What happen when an electron loses all its energy in X-rays?
e. Differentiate b/w ground state, excited state and ionized state of an atom?
f. Differentiate b/w line spectrum and band spectrum?
g. Define characteristic X-rays and continuous X-rays?
h. What is meant by normal population and population inversion?

Long Questions

a. Discuss Bohar's Model in detail for hydrogen atom?
b. What is Quantized radii and Quantized energy derive its expression and numerical value?
c. Write a Note on X-Rays Production?
d. Write a Note on Laser in detail?

Numeric Problems

10. An electron jumps from a level $E_2=3.5x10^{-19}J$ to $E_1=-1.20x10^{-18}J$. What is the wavelength of the emitted light?
11. Find the wavelength of the spectral line corresponding to the transition in hydrogen from n=6 state to p=3 state?
14. Electrons in an X-rays tube are accelerated through a potential difference of 3000V. If these electrons were showed down in a target, what will be the minimum wavelength of X-rays produced?
15. A tungsten target is struck by electrons that have been accelerated from rest through 40kV potential difference. Find the shortest wavelength of the bremsstrahlung radiation emitted?

Chapter 21 (Nuclear Physics)

MCQs

a. Neutrons and protons in the nucleus are together called _____.
   (i) Photon (ii) Nucleons
   (iii) X-rays (iv) Mesons
b. Mass of proton is _____.
   (i) $9.1x10^{-31}$ kg (ii) $1.67x10^{-31}$ kg
   (iii) $1.6x10^{-19}$ kg (iv) $1.67x10^{-27}$ kg
c. Isobars have the same _____.
   (i) Mass number (ii) Atomic number
   (iii) Mass and atomic number (iv) Avogadro's number
d. Positrons are prepared in a process of _____.
   (i) Pair production (ii) X-rays
   (iii) Annihilation of matter (iv) Fission
e. β-particles are _____.
   (i) Hydrogen nuclei (ii) Electrons
   (iii) Photons (iv) Positrons

Short Questions

a. Define Decay constant?
b. What are the main parts of the nuclear reactor?
c.. Define half-life of a radioactive element?

d. What is mean by Mass defect and binding energy?
e. Define atomic number and mass number?
f. Differentiate b/w Leptons and Hadrons?
g. What is nuclear chain reaction? Explain.
h. Define Isotopes? Give two examples.
i. Define fission and fusion reaction?
j. Differentiate b/w controlled and un-controlled chain reaction?
k. What are the basic forces? Write the name of basic sources of nature.
l. How can radioactivity help in the treatment of cancer?

Long Questions

a. Write a note on mass spectrograph in detail?
b. Write a note on Wilson cloud Chamber?
c. Write a note on Geiger Muller Counter?
d. Write a note on Solid state dector? 5. Discuss fission and fussion reactions in detail?

Numeric Problem

12. Find the mass defect and the binding energy for tritium, if the atomic mass of tritium is 3.016049 u.
14. A sheet of lead 5.0mm thick reduces the intensity of a beam of Gamma-rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity to half of its initial value.
15. Radiation from a point source obeys the inverse square law. If the count rate at a distance of 1.0m from Geiger counter is 360 counts per minute, what will be its counts rate at 3.0 m from the source?