UP Board Class 12 Physics 2024 (Code 346 FV) Question Paper

General Instructions

(i) This question paper contains 9 questions. All questions are compulsory.

(ii) It has multiple-choice questions as well as questions that need a written answer.

(iii) Attempt every question; detailed solutions are provided in the companion solutions booklet.

1(a). V/m and newton/coulomb both are the units of a physical quantity. The physical quantity is

(A) potential difference

(B) electric flux

(C) electric field intensity

(D) none of these

1(b). In pure resistive alternating circuit, phase difference between voltage and current is

(A) π

(B) $\pi/2$

(C) $3\pi/2$

(D) 0

1(c). p-terminal of a p-n diode is connected to earth. On applying -2.2 V voltage on the n-terminal of the diode, in the diode

(A) conduction will take place

(B) break down will occur

(C) conduction will not occur

(D) a feeble current will flow

1(d). Two nuclei of masses m_1 and m_2 fuse to form a nucleus of mass m. Energy is also released in this process. The true relation in this reference is

(A) $m_1 + m_2 = m$

(B) $m_1 + m_2 > m$

(C) $m_1 + m_2 < m$

(D) none of these

1(e). Formula for the dynamic mass of a photon is

(A) $\frac{h\nu}{\lambda}$

(B) $\frac{h\nu}{c}$

(C) $\frac{h}{\lambda}$

(D) $\frac{h}{c\lambda}$

1(f). Charge on a hollow metallic sphere is 10 coulomb. Radius of the sphere is 5 cm. Electric field inside the sphere will be

(A) zero

(B) 5 V/m

(C) equal to that at the surface of the sphere

(D) 12.4 V/m

2(a). Write the name of mirror used in vehicles as rear view mirror.

2(b). Explain the meaning of the work function of a photosensitive surface.

2(c). Write the relation between size of nucleus and mass number.

2(d). Of which quantity is the unit kilowatt-hour ? How many joules are there in 1 kilowatt-hour ?

2(e). An uncharged rod is placed near a charged rod. What will be the effect on the potential of the charged rod ?

2(f). Show the magnetic field lines produced by a straight current carrying wire.

3(a). Define current sensitivity of a galvanometer. How can it be increased ?

3(b). Explain the meaning of power factor and wattless current in alternating circuits.

3(c). Electric field in an electromagnetic wave is $E_y = 3 \times 10^{-7} \sin(0.5 \times 10^3 x + 1.5 \times 10^{11} t)$ V/m. Find the wavelength and equation for magnetic field of the wave.

3(d). Explain the difference between diamagnetic and paramagnetic substances.

4(a). Give a brief comment on the need of displacement current. Which physical quantity will be same for X-rays of wavelength 10^{-10} m, radio waves of wavelength 55 m and light waves of wavelength 6000 Å ?

4(b). State the difference between isotopic, isobaric and isotonic nuclei. Give example in support of your answer.

4(c). Explain the meanings of electric dipole and electric dipole moment. In an electric dipole charges of + 20 μC and – 20 μC are separated by a distance of 1.0 cm. Find the electric field intensity at an axial point at a distance of 1 m from the pole of the dipole.

4(d). Explain the difference between electromotive force (e.m.f.) and terminal potential difference of a cell. A cell of e.m.f. 2.0 V is connected to an external resistance of 3.9 ohm. Current flowing in the circuit is 0.5 ampere. What is the internal resistance of the cell ?

4(e). Two thin convex lenses are placed in contact. Find the formula for the focal length of this combination. If one lens of this combination is replaced by a concave lens of focal length equal to that of the other remaining lens, what will be behaviour of the combination ?

5(a). Write the conditions to obtain the interference between waves. What is meant by coherent source ?

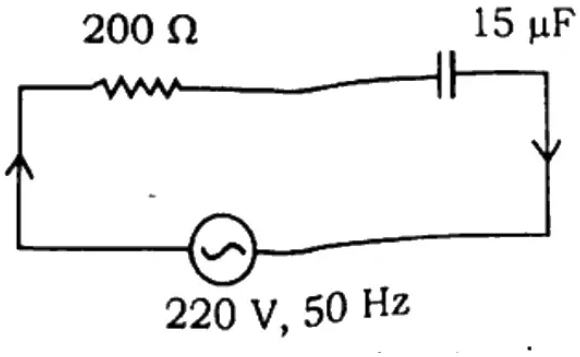
5(b). Write the formula for the potential energy of a magnetic dipole placed in an external magnetic field. What will be the maximum and minimum values of potential energy ?

5(c). What is the meaning of polarization of light ? How are unpolarized and plane polarized light represented ? Which nature of light waves is proved by polarization of light ?

OR

Show the difference between conductor, semiconductor and insulator by energy band diagram of solids.

5(d).



Find the value of current flowing in the circuit given below. Compare the algebraic sum of the voltage across the terminals of the resistance and the capacitor with the voltage given to the circuit. Why is the difference obtained in them ?

5(e). Write down the postulates of Bohr atomic model.

6. What are dielectric materials ? Define electric susceptibility and relative permittivity of a medium. Deduce the relation between the two.

OR

Establish the relation between drift velocity of electrons and current flowing in a conductor. Length of a conducting wire is 3.0 m and free electron density in it is $8.5 \times 10^{28}\ m^{-3}$. How much time will the electron take to drift from one end to other end of the wire ? Cross-section of the wire is $2.0 \times 10^{-6}\ m^2$ and current flowing in the wire is 3.0 ampere.

7. Discuss the magnitude and direction of force acting on a charge moving in a uniform magnetic field. If charge moves along the direction of the magnetic field, what will be the magnitude of the force ? Comment on the work done by the magnetic field on the moving charge.

OR

What is the meaning of electromagnetic induction ? Explain Faraday's laws of electromagnetic induction. Radius of a circular coil is 10 cm, resistance is 2 Ω and number of turns in it is 500. Plane of coil is perpendicular to a magnetic field of 3×10^{-5} tesla. Coil rotates 180° about its perpendicular axis in 0.25 s. Find the induced voltage and current in the coil.

8. Draw the diffraction pattern of light a single slit and write the formula for the width of central maximum. Mention the factors affecting the width of central maximum. What may be the maximum possible value of the angle of diffraction ?

OR

State the Huygens principle of secondary wavelets. On its basis verify the laws of refraction of light.

9. What are de Broglie matter waves? Mention its main properties. α-particle, proton and electron have the same kinetic energy. de Broglie wavelength associated with which particle will be maximum and why?

OR

Explain the effect of forward and reverse biasing on depletion region and potential barrier of a *p*-*n* junction. Draw circuit diagram of a full-wave rectifier using junction diode. Depict the shape of input and output current.