UP Board Class 12 Physics 2025 (Code 346 JS) 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). The angle between polarization plane and direction of propagation of electromagnetic waves is :

(A) 0°

(B) 45°

(C) 90°

(D) 180°

1(b). The energy is emitted when two nuclei of masses m_1 and m_2 are fused together to make a nucleus of mass m. In this process :

(A) $(m_1 + m_2) < m$

(B) $(m_1 + m_2) > m$

(C) $(m_1 + m_2) = m$

(D) $m_1 m_2 > m^2$

1(c). The resistance of 8 ohm and inductive reactance of 6 ohm are connected in series in an alternating current circuit. The impedance of circuit will be :

(A) 2 ohm

(B) 14 ohm

(C) $14\sqrt{2}$ ohm

(D) 10 ohm

1(d). The unit of permittivity of vacuum is :

(A) Newton m^2/coulomb^2

(B) coulomb^2/Newton m^2

(C) Newton/coulomb

(D) Newton volt/m^2

1(e). Electro-magnetic wave of minimum frequency is :

(A) Ultraviolet rays

(B) X-rays

(C) Gamma (γ-) rays

(D) Micro waves

1(f). How does the magnetic susceptibility (χ) of paramagnetics change with respect to absolute temperature (T) ?

(A) $\chi \propto T$

(B) $\chi \propto T^{-1}$

(C) χ = constant

(D) $\chi \propto e^{T}$

2(a). What do you mean by total internal reflection ? Show it by drawing ray diagram.

2(b). Differentiate between isotopes and isobars.

2(c). Draw the graph between Voltage (V) and Current (I) for ohmic and non-ohmic resistances.

2(d). A conductor has positive charge of 2.4×10^{-18} coulomb. Find how much electrons are in deficit/excess on the conductor.

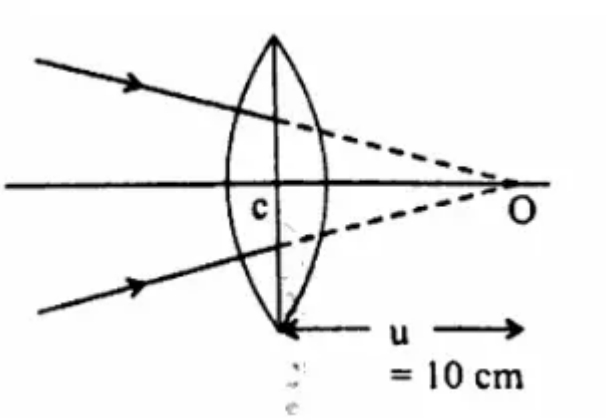
2(e). Voltage (V) equation in an alternating current circuit is represented by $V = 40\sin(100\pi t)$ volt. Here t is in second. Draw the time-voltage graph for one cycle with proper scale.

2(f). Electron in the hydrogen atom is moving round the nucleus with 6.0×10^{15} cycle per second. What will be the value of current at a point on circular path ?

3(a). What are the demerits of Rutherford model of an atom ?

3(b).

The light rays are incident on a convex lens as in figure. If focal length of lens is 20 cm then find the position of image. Show ray diagram as well.



3(c). What are electromagnetic waves ? By drawing its propagation diagram, show the electric field and magnetic field in it.

3(d). Establish the formula of magnetic dipole moment.

4(a). Derive the formula for electric field due to a uniformly charged straight wire of infinite length using Gauss's law.

4(b). Draw a ray diagram of reflecting telescope. Explain its working.

4(c). Differentiate between paramagnetic, diamagnetic and ferromagnetic substances by giving one example of each.

4(d). Explain the classification of conductors, insulators and semiconductors on the basis of energy bands.

4(e). What is meant by self-inductance ? The self-inductance of a coil is 0.4 m Henry. The value of current flowing in it changes by 1 ampere in 0.1 second. Calculate the induced electro motive force.

5(a). What is the principle of transformer ? Explain the working of step-up transformer by drawing circuit diagram.

5(b). What is the effect on the capacitance of a parallel plate capacitor when
(i) distance between the plates is doubled.
(ii) area of the plates is halved.
(iii) a dielectric medium is filled between the plates.

5(c). What is meant by interference and diffraction of light ? Write the conditions of interference.

5(d).

Establish the relation between the resistances of arms of wheatstone bridge in balance conditions.

OR

The ratio of lengths and masses of three wires of same metal are 3 : 2 : 1 and 1 : 2 : 3 respectively. Find the ratio of resistances of those wires.}

5(e). Establish the formula for focal length of combination of two thin lenses placed in contact.

6. How is the p-n junction diode used as the full wave rectifier ? Explain its working by drawing simple circuit.

OR

Describe in brief, the α-scattering experiment. Write down about the atomic-structure from the observation obtained from the experiment.

7. What is the solenoid ? Obtain the expression for magnetic field inside a long current carrying solenoid.

OR

The work function of photoelectric surface is 4.0 eV. Radiation of frequency 3×10^{15} Hz is incident on it. Calculate the maximum velocity of emitted photo-electron.

8. What do you understand by polarized light ? When a third polaroid is rotated between two crossed polaroids, then discuss the change in the intensity of the transmitted light.

OR

A lamp "50 watt and 100 volt" is to be connected to AC mains of 200 volt 50 Hz. Calculate the capacity of condenser required in series of lamp.

9. What is meant by the concept of matter-wave of de Broglie ? Establish the relation for de Broglie wavelength in terms of kinetic energy.

OR

Explain binding energy. If 0.3% be the mass defect in a nuclear fusion reaction then how much energy will be released in fusion reaction of mass of 1 kg ?