Bihar Board Class 10th Physics- 117 -Set D - 2025 Question Paper

Time Allowed :3 Hour 15 Mins	Maximum Marks :70	Total Questions :96

General Instructions

Read the following instructions very carefully and strictly follow them:

1. Candidate must enter his/her Question Booklet Serial No. (10 digits) in the OMR Answer Sheet.
2. Candidates are required to give their answers in their own words as far as practicable.
3. Figures in the right-hand margin indicate full marks.
4. 15 minutes of extra time have been allotted for the candidates to read the questions carefully.
5. This question booklet is divided into two sections – Section-A and Section-B.
6. In Section-A, there are 70 objective type questions, out of which any 35 questions are to be answered. If more than 35 questions are answered, then only the first 35 will be evaluated. Each question carries 1 mark. For answering these, darken the circle with a blue or black ball pen against the correct option on the OMR Answer Sheet provided to you. Do not use whitener, liquid, blade, nail, etc. on the OMR Answer Sheet; otherwise, the result will be treated as invalid.
7. In Section-B, there are 20 short answer type questions, each carrying 2 marks, out of which any 10 questions are to be answered. Apart from these, there are 6 long answer type questions, each carrying 5 marks, out of which any 3 questions are to be answered.
8. Use of any electronic appliances is strictly prohibited.

1. Two equal positive point charges of 1 μC charge are kept at a distance of 1 metre in air. The electric potential energy of the system will be

(1) 1 joule
(2) 1 eV
(3) 9×10^{-3} joule
(4) zero

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2. Which one of the following is unit of capacity?

(1) coulomb
(2) ampere

(3) volt
(4) coulomb/volt

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3. The capacity of any condenser does not depend upon

(1) shape of plates
(2) size of plates
(3) charge on plates
(4) distance between plates

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4. The electric field on the outer surface of a charged conductor is

(1) parallel to the surface
(2) perpendicular to the surface
(3) at 45° angle to the surface
(4) zero

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5. If a conductor is placed in an external electric field, the field inside the conductor will be

(1) zero
(2) equal to the external field
(3) twice the external field
(4) half the external field

---

6. Which of the following statements is true for two point charges of opposite sign?

(1) The potential energy is always negative
(2) The potential energy is always positive
(3) The potential energy can be either positive or negative
(4) The potential energy is zero

---

7. Gauss's law states that the electric flux through a closed surface is

(1) proportional to the charge enclosed
(2) inversely proportional to the charge enclosed
(3) zero

(4) proportional to the square of the charge enclosed

---

8. Kilowatt-hour (kWh) is the unit of

(1) energy
(2) power
(3) torque
(4) force

---

9. Which of the following laws is based on the principle of energy conservation?

(1) Ampere's law
(2) Faraday's law of electrolysis
(3) Lenz's law
(4) None of these

---

10. When an ammeter is shunted then its measurement limit

(1) increases
(2) decreases
(3) remains unchanged
(4) none of these

---

11. Dimensional formula of permeability is

(1) $[MLT^{-2}A^{-2}]$
(2) $[MLT^{2}A^{-2}]$
(3) $[MLT^{2}A^{2}]$
(4) $[MLT^{-2}A]$

---

12. Unit of $\sqrt{\frac{\mu_0}{\varepsilon_0}}$ is

(1) $\frac{\text{newton}}{\text{coulomb}}$
(2) ohm
(3) henry

(4) farad

---

13. If the number of turns is increased in any moving coil galvanometer, then its sensitivity

(1) increases
(2) decreases
(3) remains unchanged
(4) may increase or may decrease

---

14. At neutral points

(1) $B > B_H$
(2) $B < B_H$
(3) $B = B_H$
(4) $B = 0$

---

15. The peak value of an alternating current is 10 A. Its root mean square value will be

(1) 5 A
(2) 7.07 A
(3) 10 A
(4) 14.14 A

---

16. In a purely inductive circuit, the power factor is

(1) 0
(2) 1
(3) 0.5
(4) infinity

---

17. In an a.c. circuit containing only capacitor, the phase difference between current and voltage is

(1) 0°
(2) 90°
(3) 180°

(4) 45°

---

18. In resonance condition, the frequency of L-C circuit is

(1) $\frac{1}{2\pi}\sqrt{\frac{1}{LC}}$
(2) $2\pi\sqrt{\frac{1}{LC}}$
(3) $2\pi\sqrt{LC}$
(4) $\frac{1}{2\pi}\sqrt{LC}$

---

19. In a step-up transformer, the value of current in secondary compared to the primary coil is

(1) equal
(2) less
(3) more
(4) no relation between the two

---

20. Image formed by convex mirror is always

(1) in between centre of curvature and focus
(2) in between centre of curvature and infinity
(3) in between pole and focus
(4) none of these

---

21. If the critical angle for total internal reflection from any medium to vacuum is 30°, then the velocity of light in the medium is

(A) 3×10^8 m/s
(B) 1.5×10^8 m/s
(C) 6×10^8 m/s
(D) 4.5×10^8 m/s

---

22. The distance between two charges is made half and one of the charges is also halved. The force acting between the two will become as compared to previous value

(A) half
(B) double
(C) thrice
(D) none of these

---

23. The speed of an electron accelerated from rest under a potential difference V is

(A) proportional to V
(B) proportional to $\sqrt{V}$
(C) proportional to $\frac{1}{V}$
(D) proportional to V^2

---

24. The specific charge of electron is

(A) 1.8×10^{11} C/kg
(B) 1.67×10^{-19} C/kg
(C) 1.8×10^{-19} C/kg
(D) 6.67×10^{11} C/kg

---

25. In parallel combination of condensers, which quantity remains same for each condenser?

(A) Charge
(B) Energy
(C) Potential difference
(D) Capacity

---

26. On inserting a dielectric material between two positive charges in air, the value of repulsive force will

(A) increase
(B) decrease
(C) remain same
(D) become zero

---

27. The distance between two equal and opposite charges of 0.2 C is 3.0 cm. Their electric dipole moment will be

(A) 6.0 coulomb-metre
(B) 6.0×10^{-8} coulomb-metre
(C) 12.0 coulomb-metre
(D) 12.0×10^{-8} coulomb-metre

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28. Inside a closed surface, n electric dipoles are situated. The electric flux coming out from the closed surface will be

(A) $\frac{q}{\varepsilon_0}$
(B) $\frac{2q}{\varepsilon_0}$
(C) $\frac{nq}{\varepsilon_0}$
(D) zero

---

29. Two light waves of equal amplitude and equal wavelengths are superimposed. The amplitude of the resultant wave will be maximum when the phase difference between them is

(A) zero
(B) $\frac{\pi}{4}$
(C) $\frac{\pi}{2}$
(D) π

---

30. In polarised light, the angle between plane of vibration and plane of polarization is

(A) 0°
(B) 45°
(C) 90°
(D) 180°

---

31. Which of the following is not an electromagnetic wave?

(1) Alpha rays
(2) Gamma rays
(3) Infrared rays
(4) X-rays

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32. The speed of electromagnetic wave in any material medium does not depend

(1) Upon its wavelength
(2) Upon its frequency
(3) Upon its intensity
(4) Upon its permittivity

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33. In the phenomenon of photoelectric emission, on increasing the intensity of incident light, the photoelectric current

(1) increases
(2) decreases
(3) remains unchanged
(4) first increases then remains constant

---

34. The wavelength of de Broglie wave associated with any moving particle does not depend on

(1) mass
(2) charge
(3) velocity
(4) momentum

---

35. The formula of kinetic mass of photon is

(1) $\frac{hv}{c}$
(2) $\frac{hv}{c^2}$
(3) $\frac{hc}{v}$
(4) $\frac{c^2}{hv}$

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36. If two converging lenses of equal focal length f are kept in contact, then the focal length of the combination will be

(1) f
(2) $2f$
(3) $\frac{f}{2}$
(4) $3f$

37. Power of a convex lens is 2 dioptre. Its focal length will be

(1) 20 cm
(2) 50 cm
(3) 40 cm
(4) 60 cm

---

38. Which of the following is used to reduce chromatic aberration in lenses?

(1) Convex lens
(2) Concave lens
(3) Achromatic combination
(4) Cylindrical lens

---

39. A convex lens is dipped in a liquid, whose refractive index is equal to the refractive index of the material of the lens. Then its focal length will

(1) become zero
(2) become infinity
(3) reduce
(4) increase

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40. The bubble of soap appears coloured due to

(1) diffraction
(2) polarization
(3) interference
(4) reflection

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41. Which of the following cannot be polarized?

(1) Sound waves
(2) Light waves
(3) Radio waves
(4) X-rays

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42. A person uses spectacles (lens) of +2D power. His defect of vision is

(1) Myopia
(2) Hypermetropia
(3) Presbyopia
(4) Astigmatism

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43. When boron is mixed as impurity in silicon, the resultant matter is

(1) n-type semiconductor
(2) p-type semiconductor
(3) n-type conductor
(4) p-type conductor

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44. In n-type semiconductor the minority charge carrier is/are

(1) Electrons
(2) Holes
(3) Electron and hole
(4) None of these

---

45. Which logic gate's output is true only if the inputs are different?

(1) OR gate
(2) AND gate
(3) NOT gate
(4) XOR gate

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46. Reverse biased diode is

(1) Zener diode
(2) LED
(3) Photodiode
(4) Both (1) and (3)

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47. Boolean expression of NAND gate is

(1) $\overline{A.B} = Y$
(2) $\overline{A + B} = Y$
(3) $A.B = Y$
(4) $A + B = Y$

---

48. What type of wave is used in fibre optic communication?

(1) Sound waves
(2) Electromagnetic waves
(3) Seismic waves
(4) Mechanical waves

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49. Which one of the following frequency ranges is used for TV transmission?

(1) 30 - 300 Hz
(2) 30 - 300 kHz
(3) 30 - 300 MHz
(4) 30 - 300 GHz

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50. What is the main difference between isotopes of the same element?

(1) Number of protons
(2) Number of neutrons
(3) Number of electrons
(4) Atomic number

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51. Which one of the following is not a type of radioactive decay?

(1) Alpha decay
(2) Beta decay
(3) Gamma decay
(4) Muon decay

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52. What is the energy of a photon with a wavelength of 500 nm? (Use $c = 3 \times 10^8\, m/s$ and $h = 6.626 \times 10^{-34}\, Js$)

(1) $4 \times 10^{-19}\, J$
(2) $2.5 \times 10^{-19}\, J$

(3) $1.2 \times 10^{-18}\, J$
(4) $6.6 \times 10^{-19}\, J$

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53. Which series of hydrogen spectrum lies in visible portion?

(1) Lyman series
(2) Balmer series
(3) Paschen series
(4) Brackett series

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54. Which of the following is chargeless particle?

(1) α-particle
(2) β-particle
(3) Proton
(4) Photon

---

55. X-rays are

(1) moving electron
(2) moving positive ions
(3) moving negative ion
(4) electromagnetic waves

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56. Equivalent energy of 1 amu is

(1) 190 MeV
(2) 139 MeV
(3) 913 MeV
(4) 931 MeV

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57. A capacitor of $100\,\mu F$ is charged to 100 volt. The energy stored in it will be

(1) 0.5 joule
(2) 5 joule
(3) 50 joule

(4) 100 joule

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58. Which of the following has unit volt-metre^{-1}?

(1) Electric flux
(2) Electric potential
(3) Electric field
(4) Electric capacity

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59. The relation between drift velocity v of free electrons in conductor in electric conduction and potential difference V between ends of conductor is

(1) proportional to V
(2) inversely proportional to V
(3) proportional to V^2
(4) inversely proportional to V^2

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60. The graph between voltage V of a conductor and current I is a straight line which makes an angle θ with y-axis (which represents I). The resistance of the conductor will be

(1) $\tan\theta$
(2) $\cot\theta$
(3) $\sin\theta$
(4) $\cos\theta$

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61. Power of electric circuit is

(1) $V \cdot R$
(2) $V^2 \cdot R$
(3) $\frac{V^2}{R}$
(4) $V^2 \cdot R \cdot I$

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62. With the rise in temperature, the resistance of semiconductor

(1) increases
(2) decreases

(3) sometimes increases and sometimes decreases
(4) remains unchanged

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63. Which of the following represents resistance, R? (ρ = resistivity, l = length of a material, A = cross-sectional area)

(1) $\rho\left(\frac{l}{A}\right)$
(2) $\rho\left(\frac{A}{l}\right)$
(3) $\frac{1}{\rho A}$
(4) $\frac{lA}{\rho}$

---

64. The relative permeability (μ_r) of ferromagnetic substance is

(1) $\mu_r < 1$
(2) $\mu_r = 1$
(3) $\mu_r > 1$
(4) $\mu_r \gg 1$

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65. In a series circuit with resistors R_1, R_2, and R_3, the current flowing through each resistor is

(1) same
(2) different
(3) zero
(4) divided proportionally to the value of resistance

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66. The unit of current density is

(1) ampere (A)
(2) coulomb (C)
(3) ampere per square metre (A/m^2)
(4) volt per metre (V/m)

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67. If the length of a conductor is doubled while keeping the potential difference across it constant, then the drift velocity of electrons will

(1) remain the same
(2) be double
(3) be halved
(4) increase fourfold

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68. The direction of magnetic field inside a current-carrying solenoid is

(1) circular
(2) parallel to axis
(3) perpendicular to the axis
(4) random

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69. Which of the following devices is based on the principle of electromagnetic induction?

(1) Voltmeter
(2) Electric motor
(3) Electric generator
(4) Ammeter

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70. The self-inductance of a solenoid depends on

(1) The current flowing through its medium
(2) The number of turns per unit length
(3) The length of the solenoid
(4) Both (2) and (3)

Section-B

1. What do you mean by power of accommodation of eye?

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2. Explain electrical resonance.

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3. The applied voltage in an alternating circuit is 220 V. If $R = 8\ \Omega$ and $X_L = X_C = 6\ \Omega$, then find the root mean square value of voltage and the impedance of the circuit.

4. How does the refractive index of any medium depend upon the wavelength of light?

5. What is Curie temperature?

6. Write two properties of paramagnetic substance.

7. Convert decimal numbers 21 and 43 into their equivalent binary numbers.

8. Write down the difference between nuclear fission and nuclear fusion.

9. Write the necessary conditions for total internal reflection of light.

10. Write Fleming's left hand rule.

11. Write down two basic differences between interference and diffraction.

12. Compare the magnetic properties of steel and soft iron.

13. Mention the two characteristic properties of the material suitable for making core of a transformer.

14. A proton and an electron have the same kinetic energy. Which one has the greater de Broglie wavelength and why?

15. Define volume density of charge. Write its SI unit.

16. Explain magnetic moment. Write its SI unit.

17. Write two properties of beta (β) rays.

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18. Explain Bohr's stable orbit.

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19. An electric dipole is held in a uniform electric field. The dipole is aligned parallel to the electric field. Find the work done in rotating it through an angle of $180°$.

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20. Mention two different modes of propagation used in communication system.

Section-C

21. State and prove Gauss's theorem in electrostatics. Calculate the electric field intensity at a point outside a hollow uniformly charged sphere.

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22. State Kirchhoff's laws and use them to obtain the condition for balance of a Wheatstone bridge.

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23. Define wavefront and secondary wavelets. Verify the law of reflection on the basis of Huygens' wave theory.

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24. What is equivalent lens? Derive an expression for equivalent focal length of two lenses of focal lengths f_1 and f_2 kept at a distance d.

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25. Define self-inductance and mutual inductance. Find an expression for mutual inductance of two coaxial solenoids.

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26. What is photoelectric effect? What are the laws of photoelectric effect? Explain this law given by Einstein.
