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CLASS 12

Physics

Sample Paper 3 - Questions

33 questions | 70 marks | 2026-27

Time: 3 hours. Answer all questions and subparts unless a choice is stated. Marks are shown on the right. Write answers on separate sheets. Independently prepared practice paper.

Section A - Objective questions

1. Identify the term described by this statement: Force per unit positive test charge defines the field. **1**

(A) Electric field

(B) Electric potential

(C) Total internal reflection

(D) Coulomb's law

2. Which statement correctly describes Interference? **1**

(A) A p-n junction conducts asymmetrically under forward and reverse bias.

(B) Electrostatic force varies inversely with separation squared for point charges.

(C) Light reflects internally beyond the critical angle when travelling toward a lower-index medium.

(D) Coherent waves superpose to form a sustained intensity pattern.

3. Which statement correctly describes Binding energy? **1**

(A) Electrostatic force varies inversely with separation squared for point charges.

(B) Light reflects internally beyond the critical angle when travelling toward a lower-index medium.

(C) Energy is required to separate a nucleus into its constituent nucleons.

(D) Stored charge divided by potential difference defines capacitance.

4. Which statement correctly describes Coulomb's law? **1**

(A) Electrostatic force varies inversely with separation squared for point charges.

(B) Potential energy per unit charge is a scalar quantity.

(C) Conservation of charge balances current at a junction.

(D) The induced response opposes the flux change responsible for it.

5. Identify the term described by this statement: Light reflects internally beyond the critical angle when travelling toward a lower-index medium. **1**

(A) Drift velocity

(B) Total internal reflection

(C) Coulomb's law

(D) Electromagnetic induction

6. Which statement correctly describes Photoelectric effect? **1**

(A) Light can eject electrons if photon energy meets the material's threshold condition.

(B) Coherent waves superpose to form a sustained intensity pattern.

(C) A moving charge experiences a force related to velocity and magnetic-field orientation.

(D) Inductive and capacitive reactances balance at a resonant frequency in a series RLC model.

7. Identify the term described by this statement: The induced response opposes the flux change responsible for it. **1**

(A) Total internal reflection

(B) Capacitance

(C) Magnetic force

(D) Lenz's law

8. Identify the term described by this statement: A moving charge experiences a force related to velocity and magnetic-field orientation. **1**

(A) Interference

(B) Magnetic force

(C) Lenz's law

(D) Coulomb's law

9. Which statement correctly describes Semiconductor diode? 1

(A) A moving charge experiences a force related to velocity and magnetic-field orientation.

(B) A particle's associated wavelength equals Planck's constant divided by momentum.

(C) Light can eject electrons if photon energy meets the material's threshold condition.

(D) A p-n junction conducts asymmetrically under forward and reverse bias.

10. Identify the term described by this statement: Potential energy per unit charge is a scalar quantity. 1

(A) Electric field

(B) Electric potential

(C) Kirchhoff's junction rule

(D) Lenz's law

11. Identify the term described by this statement: Charge carriers have a small average velocity associated with current. 1

(A) Electric potential

(B) Coulomb's law

(C) Total internal reflection

(D) Drift velocity

12. Identify the term described by this statement: A particle's associated wavelength equals Planck's constant divided by momentum. 1

(A) de Broglie wavelength

(B) Total internal reflection

(C) Binding energy

(D) Electric field

13. Identify the term described by this statement: Conservation of charge balances current at a junction. 1

(A) Kirchhoff's junction rule

(B) Semiconductor diode

(C) Binding energy

(D) Electric field

14. Identify the term described by this statement: Changing magnetic flux induces an emf. 1

(A) Coulomb's law

(B) Interference

(C) Electromagnetic induction

(D) Binding energy

15. Which statement correctly describes Resonance in an AC circuit? 1

(A) Electrostatic force varies inversely with separation squared for point charges.

(B) Inductive and capacitive reactances balance at a resonant frequency in a series RLC model.

(C) Changing magnetic flux induces an emf.

(D) Stored charge divided by potential difference defines capacitance.

16. Identify the term described by this statement: Stored charge divided by potential difference defines capacitance. 1

(A) Drift velocity

(B) Magnetic force

(C) Capacitance

(D) Semiconductor diode

Section B - Short responses

17. An ideal transformer has primary voltage 200 V and turns ratio Ns/Np = 21/10. Calculate secondary voltage. 2

18. Compare Photoelectric effect and de Broglie wavelength. Give the meaning and an appropriate application of each. 2

19. An object is placed at twice the focal length of a convex lens with f = 30 cm. Calculate the image distance in cm using Cartesian signs. 2

20. Compare Electromagnetic induction and Lenz's law. Give the meaning and an appropriate application of each. 2

21. Light has frequency 25 x 10^{14} Hz. Use h = 6.6 x 10^{-34} J s. Give photon energy as a coefficient of 10^{-20} J. **2**

Section C - Short responses

22. Explain how the following example illustrates Kirchhoff's junction rule: Total incoming current equals total outgoing current in steady operation. **3**

23. A resistor of 24 ohms carries 3 A. Calculate power dissipated. **3**

24. Explain how the following example illustrates Binding energy: Mass defect corresponds to energy through the mass-energy relation. **3**

25. An ideal transformer has primary voltage 200 V and turns ratio Ns/Np = 23/10. Calculate secondary voltage. **3**

26. Explain how the following example illustrates Resonance in an AC circuit: The circuit's impedance is then purely resistive under ideal assumptions. **3**

27. A 25 microfarad capacitor is connected across 12 V. Calculate stored charge in microcoulombs. **3**

28. Compare Coulomb's law and Electric field. Give the meaning and an appropriate application of each. **3**

Section D - Case and application questions

29. Consider this situation: Two suitable slits produce alternating bright and dark fringes.

(a) Name the concept demonstrated in the case. **1**

(b) Explain the connection between the situation and that concept. **1**

(c) Distinguish that concept from Electromagnetic induction, giving an appropriate feature of each. **2**

30. Consider this situation: An equipotential displacement involves no electrostatic work.

(a) Name the concept demonstrated in the case. 1

(b) Explain the connection between the situation and that concept. 1

(c) Distinguish that concept from Capacitance, giving an appropriate feature of each. 2

Section E - Extended responses

31. (a) Explain Magnetic force and analyse this application: A charge moving parallel to a magnetic field has zero magnetic force. 5
(b) Explain Electric field and show how this second application fits it: A positive test charge experiences force along the field direction.

32. (a) Explain de Broglie wavelength and analyse this application: Greater momentum corresponds to shorter wavelength. 5
(b) Explain Photoelectric effect and show how this second application fits it: Frequency affects maximum photoelectron kinetic energy.

33. (a) Explain Electric field and analyse this application: A positive test charge experiences force along the field direction. 5
(b) Explain Coulomb's law and show how this second application fits it: Doubling the separation reduces force magnitude to one quarter.

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