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CLASS 12

Physics

Sample Paper 5 - 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. Which concept is illustrated in this example? Greater momentum corresponds to shorter wavelength. **1**

(A) Electric field
(B) Electric potential
(C) de Broglie wavelength
(D) Electromagnetic induction

2. Which concept is illustrated in this example? An induced current resists the change that produced it. **1**

(A) Binding energy
(B) Lenz's law
(C) Electric field
(D) Capacitance

3. Which concept is illustrated in this example? Frequency affects maximum photoelectron kinetic energy. **1**

(A) Drift velocity
(B) Photoelectric effect
(C) de Broglie wavelength
(D) Lenz's law

4. Which statement correctly describes Capacitance? **1**

(A) Force per unit positive test charge defines the field.

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

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

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

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

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

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

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

(D) Force per unit positive test charge defines the field.

6. Which concept is illustrated in this example? An optical fibre can guide light through repeated internal reflection. **1**

(A) Coulomb's law

(B) Drift velocity

(C) Electric field

(D) Total internal reflection

7. Which concept is illustrated in this example? Mass defect corresponds to energy through the mass-energy relation. **1**

(A) Electric potential

(B) Semiconductor diode

(C) Resonance in an AC circuit

(D) Binding energy

8. Which statement correctly describes Kirchhoff's junction rule? **1**

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

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

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

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

9. Which statement correctly describes Semiconductor diode? 1

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

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

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

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

10. Which statement correctly describes Coulomb's law? 1

(A) Changing magnetic flux induces an emf.

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

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

(D) Charge carriers have a small average velocity associated with current.

11. Which statement correctly describes Electromagnetic induction? 1

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

(B) Changing magnetic flux induces an emf.

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

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

12. Which concept is illustrated in this example? The circuit's impedance is then purely resistive under ideal assumptions. 1

(A) Lenz's law

(B) de Broglie wavelength

(C) Resonance in an AC circuit

(D) Magnetic force

13. Which concept is illustrated in this example? Electrons drift while also undergoing random thermal motion. 1

(A) Kirchhoff's junction rule

(B) Drift velocity

(C) Semiconductor diode

(D) Electric field

14. Which concept is illustrated in this example? An equipotential displacement involves no electrostatic work. 1

(A) Magnetic force

(B) Capacitance

(C) Lenz's law

(D) Electric potential

15. Which statement correctly describes Electric field? 1

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

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

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

(D) Force per unit positive test charge defines the field.

16. Which statement correctly describes Magnetic force? 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) Potential energy per unit charge is a scalar quantity.

Section B - Short responses

17. Light has frequency 37 x 10^{14} Hz. Use h = 6.6 x 10^{-34} J s. Give photon energy as a coefficient of 10^{-20} J. 2

18. Use this situation to explain Resonance in an AC circuit, connecting the definition to the details: The circuit's impedance is then purely resistive under ideal assumptions. 2

19. A resistor of 42 ohms carries 3 A. Calculate power dissipated. 2

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

21. An object is placed at twice the focal length of a convex lens with f = 46 cm. Calculate the image distance in cm using Cartesian signs. **2**

Section C - Short responses

22. Use this situation to explain Magnetic force, connecting the definition to the details: A charge moving parallel to a magnetic field has zero magnetic force. **3**

23. An ideal transformer has primary voltage 200 V and turns ratio Ns/Np = 38/10. Calculate secondary voltage. **3**

24. Use this situation to explain Interference, connecting the definition to the details: Two suitable slits produce alternating bright and dark fringes. **3**

25. A 41 microfarad capacitor is connected across 12 V. Calculate stored charge in microcoulombs. **3**

26. Use this situation to explain Binding energy, connecting the definition to the details: Mass defect corresponds to energy through the mass-energy relation. **3**

27. Light has frequency 43 x 10^{14} Hz. Use h = 6.6 x 10^{-34} J s. Give photon energy as a coefficient of 10^{-20} J. **3**

28. Use this situation to explain Photoelectric effect, connecting the definition to the details: Frequency affects maximum photoelectron kinetic energy. **3**

Section D - Case and application questions

29. Consider this situation: An induced current resists the change that produced it.

(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: A positive test charge experiences force along the field direction.

(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 Coulomb's law, giving an appropriate feature of each. 2

Section E - Extended responses

31. (a) Explain Drift velocity and analyse this application: Electrons drift while also undergoing random thermal motion. 5
(b) Explain Kirchhoff's junction rule and show how this second application fits it: Total incoming current equals total outgoing current in steady operation.

32. (a) Explain Electromagnetic induction and analyse this application: Moving a magnet relative to a coil can produce an induced signal. 5
(b) Explain Lenz's law and show how this second application fits it: An induced current resists the change that produced it.

33. (a) Explain Kirchhoff's junction rule and analyse this application: Total incoming current equals total outgoing current in steady operation. 5
(b) Explain Drift velocity and show how this second application fits it: Electrons drift while also undergoing random thermal motion.

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