TECHNO INDIA GROUP PUBLIC SCHOOL
MOCK TEST-1 (2025-2026)
CLASS-XII

PHYSICS

Time allowed : 3 hours   *Maximum Marks : 70*

General Instruction:

1. There are 33 questions in all. All questions are compulsory.
2. This question paper has five sections : Section A, Section B, Section C, Section D and Section E.
3. All these sections are compulsory.
4. **Section A** contains sixteen questions, twelve MCQ and four Assertion Reasoning based of 1 mark each. **Section B** contains five questions of two marks each. **Section C** contains seven questions of three marks each. **Section D** contains two case study –based questions of four marks each and **section E** contains three long answer questions of five masks each.
5. There is no overall choice. However , an internal choice has been provided in one question in section B, one question in Section C, one question in each CBQ in Section D and all three questions in Section E. You have to attempt only one of the choices in such questions.
6. Use of calculator is not allowed.
7. You may use the following values of physical constants where ever necessary.

   [i] $c = 3 \times 10^8$ m/s   [ii] $m_e = 9.1 \times 10^{-31}$ kg   [iii] $m_p = 1.7 \times 10^{-27}$ kg

   [iv] $e = 1.6 \times 10^{-19}$ C   [v] $\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1} [vi] $h = 6.63 \times 10^{-34}$ Js

   [vii] $\epsilon_0 = 8.854 \times 10^{-12}$ C^{2}N^{-1}m^{-2}

   [viii] Avogadro's number = 6.023×10^{23} per gram mole.

### SECTION A   [1 × 16 = 16]

Section A consists of 16 questions of 1 mark each.

1.
   I. If a system contains two point charges q_1 and q_2, the total charge of the system is obtained simply by adding algebraically q_1 and q_2. e.g., (–2 unit charge) + (6 unit charge) = 4 unit charge.

   II. (–2 unit charge) + (6 unit charge) = 8 unit charge.

   III. Charge has magnitude but no direction, similar to mass.

   IV. Mass of a body is always positive whereas a charge can be either positive or negative.

   Incorrect statement is

   Ⓐ   only I   Ⓑ   only III   Ⓒ   only IV   Ⓓ   only II   [1]

2. The potential energies associated with four orientations of an electric dipole in an uniform electric field are

   (i) – V_0 (ii) – 7 V_0 (iii) 3V_0 (iv) 4V_0

   Choose correct statement if V_0 is positive.

   Ⓐ   The angle between electric field and dipole is maximum in case (ii)

   Ⓑ   The maximum torque is being experienced by the dipole in case (i)

   Ⓒ $V_0 = |p| \, |E|$ with usual notations

   Ⓓ   The angle between $\vec{E}$ and $\vec{P}$ is acute in case (iii)   [1]

3.	The electric field at a distance $\frac{3R}{2}$ from the centre of a charged conducting spherical shell of radius R is E. The electric field at a distance $\frac{R}{2}$ from the centre of the sphere is Ⓐ zero Ⓑ E Ⓒ $\frac{E}{2}$ Ⓓ $\frac{E}{3}$	[1]
4.	An electric dipole is placed in an electric field generated by a point charge Ⓐ The net electric force on the dipole must be zero Ⓑ The net electric force on the dipole may be zero Ⓒ The torque on the dipole due to the field must be zero Ⓓ The torque on the dipole due to the field may be zero	[1]
5.	Nichrome of Manganin is widely used in wire bound standard resistors because of their Ⓐ absolutely temperature independent resistivity Ⓑ very weak temperature dependent resistivity Ⓒ strong dependence of resistivity with temperature Ⓓ mechanical strength	[1]
6.	Resistance P, Q, S and R are arranged in a cyclic order to form a balanced Wheatstone's network. The ratio of power consumed in the branches $(P + Q)$ and $(R + S)$ is Ⓐ 1 : 1 Ⓑ R : P Ⓒ $P^2 : Q^2$ Ⓓ $P^2 : R^2$	[1]
7.	A bar magnet is demagnetized by inserting in inside a solenoid of length 0.2 m, 100 turns, and carrying a current of 5.2 A. The coercivity of the bar magnet is: Ⓐ 1200 A/m Ⓑ 2600 A/m Ⓒ 520 A/m Ⓓ 285 A/m	[1]
8.	A magnetic needle is kept in a non-uniform magnetic field. It experiences— Ⓐ a torque but not a force Ⓑ neither a force nor a torque Ⓒ a force and a torque Ⓓ a force but not a torque	[1]
9.	Imagine that a current is flowing around this test paper in the anticlockwise direction. If an external magnetic field is in +ve x direction, which edge of the paper would be lifted under the influence of the torque of the magnetic field? Ⓐ top edge Ⓑ bottom edge Ⓒ left edge Ⓓ right edge	[1]
10.	According to Faraday's Laws of electro magnetic induction: Ⓐ The direction of the induced current is such that it opposes itself Ⓑ The induced emf in the coil is proportional to the rate of change of magnetic flux associated with it Ⓒ The direction of induced emf is such that it opposes itself Ⓓ None of the above	[1]

11.	Figure shows plane figure made of a conductor located in a magnetic field along the inward normal to the plane of the figure. The magnetic field starts increasing. Then choose the incorrect statement related to induced current—	[1]
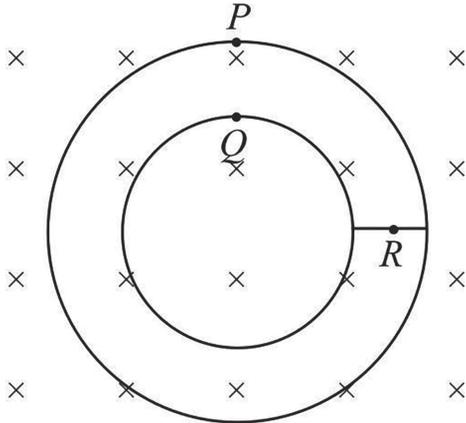
Ⓐ	at point P, is anticlockwise	Ⓑ	at point Q, is clockwise
Ⓒ	at point Q, is anticlockwise	Ⓓ	at point R, is zero

12.	A rectangular, a square, a circular and an elliptical loop, all in the (x – y) plane, are moving out of a uniform magnetic field with a constant velocity, $\vec{V} = v\hat{i}$. The magnetic field is directed along the negative z axis direction. The induced emf, during the passage of these loops, out of the field region, will not remain constant for:	[1]

   Ⓐ   any of the four loops

   Ⓑ   the rectangular, circular and elliptical loops

   Ⓒ   the circular and the elliptical loops

   Ⓓ   only the elliptical loop

13.	In given LCR circuit, the voltage across the terminals of a resistance	[1]

Ⓐ	400V, 2A	Ⓑ	800V, 2A	Ⓒ	100V, 2A	Ⓓ	100V, 4A
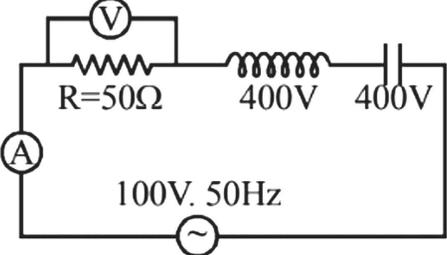
14.	What is the flux through a cube of side 'a' if a point charge of q is at one of its corner?	[1]

   Ⓐ $\dfrac{2q}{\epsilon_0}$ Ⓑ $\dfrac{q}{8\epsilon_0}$ Ⓒ $\dfrac{q}{\epsilon_0}$ Ⓓ $\dfrac{q}{2\epsilon_0}6a^2$

15.	In an AC circuit decrease in impedance with increase in frequency always, indicates that circuit has/have:	[1]

Ⓐ	Only resistance	Ⓑ	Resistance & inductance
Ⓒ	Resistance & capacitance	Ⓓ	Resistance, capacitance & inductance

16.	Match List-I (Electromagnetic wave type) with List-II (Its association / application) and select the correct option from the choices given the lists:	[1]

	List – I		List – II
(a)	Infrared waves	(i)	To treat muscular strain
(b)	Radio waves	(ii)	For broadcasting
(c)	X-rays	(iii)	To detect fracture of bones
(d)	Ultraviolet rays	(iv)	Absorbed by the ozone layer of the atmosphere

Ⓐ (a) – (iii), (b) – (ii), (c) – (i), (d) – (iv) Ⓑ (a) – (i), (b) – (ii), (c) – (iii), (d) – (iv)

Ⓒ (a) – (iv), (b) – (iii), (c) – (ii), (d) – (i) Ⓓ (a) – (i), (b) – (ii), (c) – (iv), (d) – (iii)

SECTION B

[2 × 5 = 10]

Section B consists of 5 questions of 2 marks each.

17.	Figure shows the tracks of three charged particle in a uniform electric field. Give the sign of the three charges.	[2]

Which particle has the largest charge to mass ratio.

18.	What is the largest voltage you can safely apply across a resistor marked 196Ω, 1W?	[2]
19.	The plate separation in a parallel plate capacitor is d and plate are is A. If it is charged to V volts, then calculate the work done in increasing the plate separation to 2d.	[2]
20.	The electric field lines are always perpendicular with the equipotential surface–prove the statement.	[2]
21.	If there is/a potential difference between two points in a circuit, even no current flow between this two points. Give a circumstances to support the statement.	[2]

SECTION C

[3 × 7 = 21]

Section C consists of 7 questions of 3 marks each

22.	Draw a graph to show the variation of impedence with angular frequency in aw AC circuit. What is power factor?	[3]
23.	What are the differences 3 points between induced electric field due to time varying magnetic field and electric field produce by a rest charge.	[3]
24.	What is motional emf? Derive an expression of it.	[3]
25.	Three identical long solenoids P, Q and R connected to each other as shown in the figure. If the magnetic field at the centre of P is 2T, what would be the field at the centre of Q?	[3]

26.	A beam of protons is deflected sideways. Could this deflection be caused by (i) a magnetic field (ii) an electric field? If either possible, what would be the difference?	[3]
27.	In case of photoelectric effect. Draw the following graphs— (i) frequency of incident radiation and kinetic energy of emitted electron. (ii) Anode voltages vs. current.	[3]
28.	If an electron rotate in a hydrogen atom with velocity v and radius r, prove that its magnetic dipole moment is $\frac{ver}{2}$.	[3]

SECTION D

[2 × 5 = 10]

Section D consists of 2 questions of 5 marks each

29.	**Case Based Questions** A diode in forward bias shows rapid current rise after 0.7 V (i) Reason for threshold voltage. (ii) Draw I – V graph. (iii) Effect of temperature on threshold voltage. (iv) Write one application of this circumstances.	[5]
30.	**Case Based Questions** A 20 μF capacitor connected to 12V via 2KΩ resistor. (i) Write a expression for charging current. (ii) Find time constant. (iii) Find voltage after one time constant. (iv) Why capacitor never charges instantly.	[5]

SECTION E

[3 × 5 = 15]

Section E consists of 3 questions of 5 marks each.

31.	State and explain Ampere' circuital law. Derive magnetic field of long straight conductor. Write the assumptions for this.	[5]
32.	(a) State two conditions to obtain sustained interference of light.	[2]
	(b) In YDSE the width of fringes obtained with light of wavelength 6000A is 2.0 mm. What will be the fringe width, of the entire apparatus is immersed in water. $\left(\mu = \frac{4}{3}\right)$	[3]
33.	(a) Explain transformer principle, working and energy losses.	[3]
	(b) A transformer steps up 220V to 11000V, primary turns = 500 and efficiency = 90%, then find primary current if secondary current is 1A and also power loss.	[2]