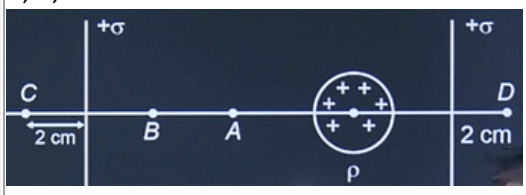
JEE MAIN 4 APRIL 2025 SHIFT 1

PHYSICS QUESTION PAPER WITH ANSWER KEY

Q.No.	Question	Answers
1	Find the dimension of E/B where, E represents electric field and B represents magnetic field	2. LT^{-1}
2	A ring and a solid sphere released from rest from same height on enough rough inclined surface. Ratio of their speed when they reach at bottom is √(7/x) m/s then x is ____	10
3	Mean free path for an ideal gas is to be observed 20 µm while average speed of molecules of gas is observed to be 600 m/s, then frequency of collision is near by	3 x 10^7
4	Find the equivalent capacitance between A and B, where C = µF	3. $32\mu F$
5	4 rods of equal length are joined as shown in the figure. Combined system is moving with speed 10 m/s in a perpendicular magnetic field of 1/√2 tesla. Find emf induced between point P and Q (I = 10 cm).	1. 1 volt
6	A real object placed in front of a spherical mirror forms an image whose magnification is -1/3. If the distance between the image and object is 30 cm. The focal length of the mirror is ____ cm.	1. -11.25 cm
7	The current in a AC circuit is given as i = 100√2sin(100π/t)A. Find rms current and frequency is Hertz	4. 100A, 50 Hz
8	An electric dipole with charges 2 µC and a separation 20 cm is placed close to an infinitely charge non-conducting sheet with surface charge density 100 C/m_2. Find the torque acting on the dipole makes an angle 30° with the normal to the sheet.	4. $1/\varepsilon_o$ x 10^{-5} N - m
9	**Assertion (A)**: The minimum kinetic energy required to take a body of mass m from surface to earth to infinity is mgR. **Reason (R)**: Potential energy at surface of earth is zero.	3. (A) is correct but (R) is incorrect
10	Longitudinal sound waves travel in three different gases namely helium, methane and carbon dioxide. Mean temperature of three gases are equal then ratio of speeds of wave in 3 gases respectively are	3. √5:1:√(21/55)
11	**Assertion (A)**: In photoelectric effect, if intensity of monochromatic light is increased then stopping potential increases. **Reason (R)**: Increased intensity results in increment of photocurrent.	3. A is incorrect and R is correct

12	A block of mass m kg is connected to two strings as shown. If $T_1 = \sqrt{3}T_2$, then choose the correct option	2. $\theta_1 = 60°$, $\theta_2 = 30°$, $T_2 = mg/2$
13	A closed organ pipe having fundamental frequency f_o. Now 1/5 of volume its filled with water then % change in the fundamental frequency.	3. -20%
14	In arrangement shown, has two non-conducting plane sheets with charge density σ, and a non-conducting sphere with volume charge density p. Choose the correct relation between the magnitude of electric fields at A, B, C, and D. Point A is at the middle of two sheets. 	2. $E_A > E_B$, $E_C \neq E_D$
15	Two simple pendulums with amplitudes θ_1 and θ_2 have length of strings as I_1 and I_2 respectively. Choose the correct options if the maximum angular accelerations are same.	2. $\theta_1 I_2 = \theta_2 I_1$
16	In YDSE setup, distance between slits d = 0.2 mm. If d is changed to 0.4 mm, then % change in fringe width	2. 50%
17	Regarding the rotational motion of rigid bodies, following two statements are giv is are having usual meaning. S1 : Torgue τ is given as $\vec{\tau} = \frac{d\vec{L}}{dt}$ and angular momentum about inertial p $\vec{L} = \sum(\vec{r}_i \times \vec{p}_i)$. S2 : Torque τ is given as $\vec{\tau} = I\vec{r}$ and angular momentum about inertial point is g	1. S1 is correct and S2 is incorrect
18	A small mirror of mass m is suspended to a fix point with an ideal string of length I. A photon of energy E incident normally on the mirror. Find maximum angular deviation (θ) of the mirror.	4. $2E/mc\sqrt{(gl)}$
19	$\vec{L}$ and $\vec{p}$ are angular momentum about origin and linear momentum of a position vector of particle is given as $\vec{r} = a(\sin\omega t\hat{i} + \cos\omega t\hat{j})$ then direct is	4. Opposite to $\vec{p} \times \vec{L}$
20	The figure shows two boxes with identical square cross-sections and heights h_1 and h_2 ($h_1 = 2h_2$) are made of different materials. An equal force is applied on the square cross-sections such that the deformations θ_1 and θ_2 are realized ($\theta_1 = 2\theta_2$). If shear modulus of box-1 is 4×10^9 N/m$_2$ and that of box-2 is $x \times 10^9$ N/m$_2$, then x is _____.	8