



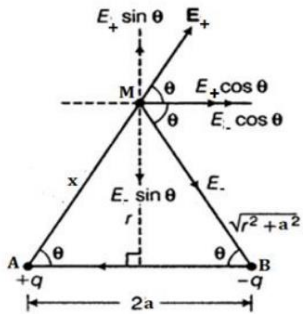
THE VILLAGE
INTERNATIONAL SCHOOL
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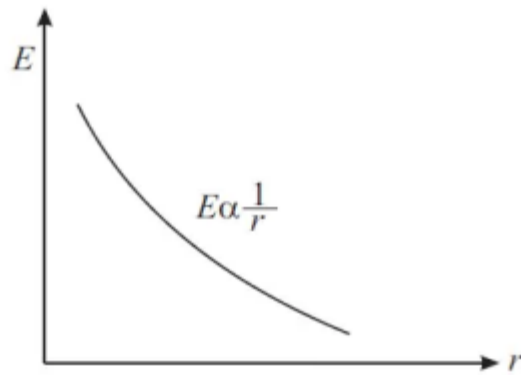
GRADE - XII	MT- 2 [2023-2024] PHYSICS ANSWER KEY	Max Marks - 20 TIME - 1 Hrs
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	Section A	
1	a.half	1
2	d.vector	1
3	(c) ferromagnetic	1
4	D) Both Assertion and Reason are incorrect.	1
	Section B	
5	$F = Bil \sin \theta$ $F = 1.2 \text{ N}$	2

6	Paramagnetic Substances	Diamagnetic Substances	2
	The term paramagnetic refers to the attraction of material to an external magnetic field.	The term diamagnetic refers to the repulsion of material from an external magnetic field.	
	These substances have at least one unpaired electron.	These substances have no unpaired electrons.	
	Magnetic field direction is the same as that of the external magnetic field.	Magnetic field direction is opposite to the direction of the external magnetic field.	
	They exhibit stronger magnetic behavior.	They exhibit weaker magnetic behavior and easily get surpassed in the presence of stronger magnetic properties.	

Section C

7	 <p> $E = \frac{1}{4\pi\epsilon_0} \frac{q}{x^2} \quad \text{and} \quad \cos \theta = \frac{a}{x}$ $E_{eq} = 2 \times \frac{1}{4\pi\epsilon_0} \frac{q}{x^2} \times \frac{a}{x} = \frac{1}{4\pi\epsilon_0} \frac{2qa}{x^3} = \frac{1}{4\pi\epsilon_0} \frac{p}{x^3}$ $\text{but, } x^3 = (r^2 + a^2)^{3/2}$ $\therefore E_{eq} = \frac{1}{4\pi\epsilon_0} \frac{p}{(r^2 + a^2)^{3/2}}$ $\text{if } r \gg a, (r^2 + a^2)^{3/2} = (r^2)^{3/2} = r^3$ $\therefore E_{eq} = \frac{1}{4\pi\epsilon_0} \frac{p}{r^3}$ </p>	3
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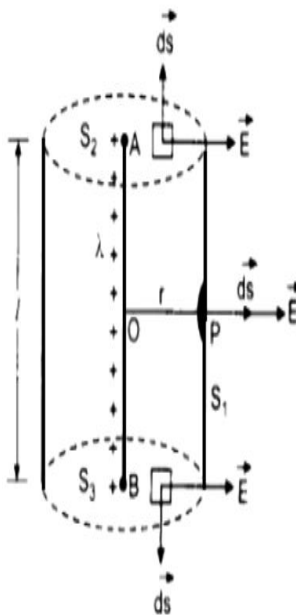
Section D

8

According to Gauss's theorem, the total flux through a closed surface in free space in an electric field is $1/\epsilon_0$ times the total charge enclosed by the surface.

5

$$\phi_E = \frac{1}{\epsilon_0} (q_{enclosed})$$



$$\text{Flux through } S_1: \phi_2 = \int \vec{E} \cdot d\vec{S}_2 = 0 \text{ [since, } \theta = 90 \text{]}$$

$$\text{Flux through } S_3: \phi_3 = \int \vec{E} \cdot d\vec{S}_3 = 0 \text{ [since, } \theta = 90 \text{]}$$

$$E \times 2\pi rL = \frac{1}{\epsilon_0} \times \lambda L$$

$$E = \frac{1}{2\pi\epsilon_0} \times \frac{\lambda}{r}$$

$$\vec{E} = \frac{1}{2\pi\epsilon_0} \times \frac{\lambda}{r} \hat{n}$$

Section E

Case Study Based Question :Read the Case Study given below and answer the question that follow:

1X4=4

9

- 1.(a) $\tau = p \times E$
- 2.(d) Both (a) and (c)
- 3.(c) $F=0, \tau \neq 0$
- 4.(c) $2 \times 10^{-3} \text{ Nm}$