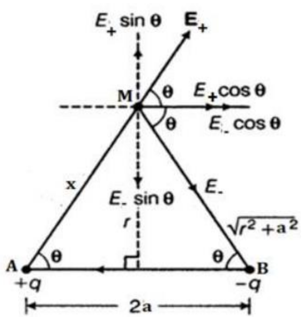
THE VILLAGE
INTERNATIONAL SCHOOL
"We Nurture Dreams"
AIM HIGH, TOGETHER WE FLY

GRADE - XII	**MT- 2 [2023-2024]** **PHYSICS ANSWER KEY**	**Max Marks - 20** **TIME - 1 Hrs**

	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 sinΘ F=1.2 N	**2**

<table>
<tr><td>6</td><td>
<table>
<tr><th>Paramagnetic Substances</th><th>Diamagnetic Substances</th></tr>
<tr><td>The term paramagnetic refers to the attraction of material to an external magnetic field.</td><td>The term diamagnetic refers to the repulsion of material from an external magnetic field.</td></tr>
<tr><td>These substances have at least one unpaired electron.</td><td>These substances have no unpaired electrons.</td></tr>
<tr><td>Magnetic field direction is the same as that of the external magnetic field.</td><td>Magnetic field direction is opposite to the direction of the external magnetic field.</td></tr>
<tr><td>They exhibit stronger magnetic behavior.</td><td>They exhibit weaker magnetic behavior and easily get surpassed in the presence of stronger magnetic properties.</td></tr>
</table>
</td><td>2</td></tr>
<tr><td></td><td>Section C</td><td></td></tr>
<tr><td>7</td><td>


$$E = \frac{1}{4\pi\varepsilon_0}\frac{q}{x^2} \quad and \quad \cos\theta = \frac{a}{x}$$

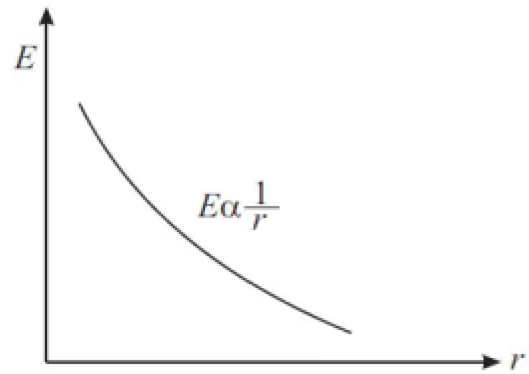
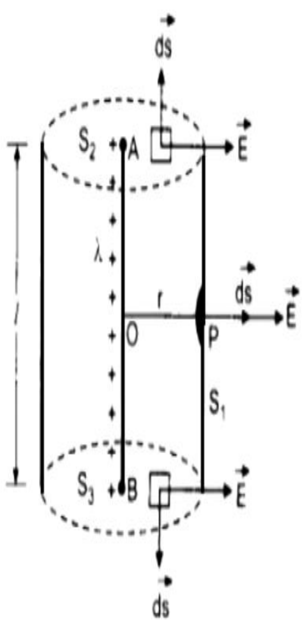
$$E_{eq} = 2 \times \frac{1}{4\pi\varepsilon_0}\frac{q}{x^2} \times \frac{a}{x} = \frac{1}{4\pi\varepsilon_0}\frac{2qa}{x^3} = \frac{1}{4\pi\varepsilon_0}\frac{p}{x^3}$$

$$but, x^3 = (r^2 + a^2)^{3/2}$$

$$\therefore E_{eq} = \frac{1}{4\pi\varepsilon_0}\frac{p}{(r^2 + a^2)^{3/2}}$$

$$if\ r \gg a, (r^2 + a^2)^{3/2} = (r^2)^{3/2} = r^3$$

$$\therefore E_{eq} = \frac{1}{4\pi\varepsilon_0}\frac{p}{r^3}$$
</td><td>3</td></tr>
</table>

		
	Section D	
8	According to Gauss's theorem, the total flux through a closed surface in free space in an electric field is $1/\varepsilon_0$ times the total charge enclosed by the surface. $$\varphi_E = \frac{1}{\varepsilon_0}(q_{enclosed})$$  $Flux\ through\ S_1 : \varphi_2 = \int \vec{E}.\overrightarrow{dS_2} = 0\ [since, \theta = 90]$ $Flux\ through\ S_3 : \varphi_3 = \int \vec{E}.\overrightarrow{dS_3} = 0\ [since, \theta = 90]$	5

	$$E \times 2\pi r L = \frac{1}{\epsilon_0} \times \lambda L$$ $$E = \frac{1}{2\pi\epsilon_0} \times \frac{\lambda}{r}$$ $$\vec{E} = \frac{1}{2\pi\epsilon_0} \times \frac{\lambda}{r}\ \hat{n}$$	
	Section E	
	Case Study Based Question : Read the Case Study given below and answer the question that follow:	**1X4=4**
9	1.(a) τ=p x E 2.(d) Both (a) and (c) 3.(c) F=0, $\tau \neq 0$ 4.(c) 2 x 10^{-3} Nm	