INDIAN SCHOOL AL WADI AL KABIR

DEPARTMENT OF SCIENCE 2024-25

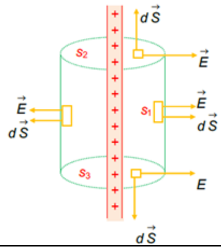
UT MARKING SCHEME PHYSICS (042) CLASS XII

SET II

1	(b) $\vec{F}$ /8	**1**
2	(b) -(1.0 x 10^3 N/C) $\hat{\imath}$	**1**
3	(c) $C^2N^{-1}m^{-2}$	**1**
4	(c) C/4	**1**
5	(b) 4W	**1**
6	**(d)**	**1**
7	(c) Assertion is correct but Reason is incorrect.	**1**
8	(b) Both Assertion and Reason are correct and the Reason is not a correct explanation of the Assertion.	**1**
9	Definition equipotential surface, Diagram for isolated charge, and electric dipole Or Applying Guass's law, proof E = $1/4\pi\epsilon_o\, q/r^2$	**1** **½ + ½**
10	Definition of drift speed, V = E – iR 4 = 6 – 2R r = 1Ω	**2**
11	Current per unit cross-section area Derivation of $\rho = \frac{m}{ne^2\tau}$	**1** 2
12	Definition of electric potential energy, $U = \frac{1}{4\pi\varepsilon_o}\left(\frac{q_1q_2}{r^2} + \frac{q_2q_3}{r^2} + \frac{q_3q_1}{r^2}\right)$ $U = 9\times10^9\left(\frac{1\times10^{-6}\times(-1\times10^{-6})}{0.1^2} + \frac{(-1\times10^{-6})\times(2\times10^{-6})}{0.1^2} + \frac{(2\times10^{-6})\times1\times10^{-6}}{0.1^2}\right)$ $U = 9\times10^9(-1\times10^{-10} - 2\times10^{-10} + 2\times10^{-10}) = 9\times10^9\times -1\times 10^{-10} = -0.9J$ So, work done by an external agent to bring the charges in such a configuration, $W = -U = -(-0.9J) = 0.9J$.	**1** 2
13	E = E_1-E_2 = E = $\frac{1}{2\pi\epsilon_o}\frac{\lambda 1}{0.1}$ - $\frac{1}{2\pi\epsilon_o}\frac{\lambda 1}{0.2}$ = 18 x 10^9 [10 $\lambda 1 - 5\lambda 2$] = 18 x 10^9 x 200 x 10^{-6} = 3.6 x 10^6 N/C F= eE = 1.6 x10^{-19} x 3.6 x 10^6 = 5.6 x 10^{-13} N Or Gaussian surface is a cylinder of radius r and length L. Contribution of flux at flat surfaces (s_2 and s_3) = $\vec{E}.d\vec{A}$ = E dA cos90° = 0	**3**

<table>
<tr><td></td><td>Contribution of flux at curved surface(s_1)
$= \int \vec{E}.d\vec{A} = \int E\,dA\,\cos 0° = E\int dA = E(2\pi rL)$
Using Gauss's law,

$\phi_E = E(2\pi rL) + 0 = \frac{total\ charge}{\epsilon_\circ} = \frac{\lambda L}{\epsilon_\circ}$

$E2\pi rL = \frac{\lambda L}{\epsilon_\circ}$,  $E2\pi r = \frac{\lambda}{\epsilon_\circ}$, $E = \frac{1}{2\pi\epsilon_\circ}\frac{\lambda}{r}$.</td><td></td></tr>
<tr><td>14</td><td>(i) a (ii) a (iii) b (iv) c OR d</td><td>4</td></tr>
<tr><td>15</td><td>a non-metallic substance having a high specific resistance, a negative temperature coefficient of resistance and a high insulating resistance.
negative charges in the material orient themselves toward the positive electrode and the positive charges shift toward the negative electrode
(a) capacity increases C = kC' (b) E = constant as E = v/d (c) increases as C increases
Or
Derivation
1/8 times
$E = 2Kq\sqrt{2}$</td><td>5</td></tr>
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