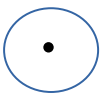
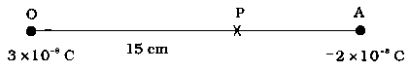
HSE-II

HIGHER SECONDARY FIRST TERMINAL EVALUATION, AUG-2023

Part-III, PHYSICS

ANSWER KEY

Q.No	Value points	Score	Total
	1 to 7 5x1=5		
1.	c	1	1
2.	b	1	1
3.	Zero	1	1
4.	F or farad	1	1
5.	c	1	1
6.	a	1	1
7.	increases	1	1
	8 to 14 5 x2=10		
8.	a) 3 b) 4 c) 2 d) 1	½ ½ ½ ½	2
9.	Figure Gauss's law Derivation Final equation	½ ½ ½ ½	2
10.	Figure a) b)	 1 1	2
11.	Derivation Final equation /Electric field is the negative gradient of electric potential	2 1	2
12.	Equation $C=4\pi\varepsilon_0 R$ 711μF	1 1	2
13.	Rα l, Rα 1/A, temperature (any two factors) Equation	1 1	2
14.	Statement Equation	1 1	2
	15 to 21 6x3=18		
15.	a) n=q/e = 1.9 x 10^{12}, Wool to polythene. b) Yes, there is a transfer of mass.	2 1	3
16.	a) Statement of Coulomb's law $\vec{F} = K\frac{q_1 q_2}{r_{12}^2}\widehat{r_{12}}$ b) Coulomb force between two charges does not depend on the presence of third charge.	1 1 1	3
17.	a) 9 pF b) $Q_1=C_1V=2x10^{-12}x100=2x10^{-10}C$ $Q_2=C_2V=3x10^{-12}x100=3x10^{-10}C$ $Q_3=C_3V=4x10^{-12}x100=4x10^{-10}C$	1 2	3
18.	a) Any two properties b) 	2 1	3
19.	Definition of Drift velocity. Derivation of **I= n e A v_d**	1 2	3
20.	a) Statement of Ohm's law b) Two Limitations of Ohm's law	1 2	3
21	Derivation of **τ =m x B**	3	3
	22 to 25 3 x 4= 12		
22.	a. Electric Dipole b. Definition of Dipole moment/ Equation(p=2aq) Direction (Negative to Positive) c. Derivation of **τ =p x E** figure only ½ score final equation only ½ score	1 ½ ½ 2	4
23.	a. Correct definition b. Explanation based on Polarisation and reduction of net electric field c. $C=\frac{K\varepsilon_0 A}{d}$	1 2 1	4
24.	a. Definition of Temperature Coefficient of resistivity/ Equation b. K^{-1} c. Increases/α is positive Decreases/α is negative	1 1 2	4
25.	a. Explanation with figure Figure/Equation only 1 score b. $R=\frac{V}{I_g}-G$	2 1	4

	Substitution Final answer R= 5988 Ω Final answer only 1 score	 ½ ½	
	26 to 29 **3x 5=15**		
26.	(i) Figure $\oint_S \vec{E}.\vec{dS} = \frac{q}{\varepsilon_0}$ $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$ or $E = \frac{\sigma}{\varepsilon_0}\frac{R^2}{r^2}$ (ii) $E = \frac{1}{4\pi\varepsilon_0}\frac{q}{R^2}$ or $E = \frac{\sigma}{\varepsilon_0}$ (iii) E = 0	1 1 1 1 1	5
27.	(a) Figure $V = V_{+q} + V_{-q}$ $\therefore \quad V = \frac{q}{4\pi\varepsilon_0}\left[\frac{1}{r-a\,Cos\,\theta} - \frac{1}{r+a\,Cos\,\theta}\right]$ $V = \frac{1}{4\pi\varepsilon_0}\frac{p\,Cos\,\theta}{(r^2 - a^2\,Cos^2\,\theta)}$ or $V = \frac{1}{4\pi\varepsilon_0}\frac{p\,Cos\,\theta}{r^2}$ (b)  $\frac{1}{4\pi\varepsilon_0}\left[\frac{3\times10^{-8}}{x\times10^{-2}} - \frac{2\times10^{-8}}{(15-x)\times10^{-2}}\right] = 0$ Electric potential is zero at 9 cm and 45 cm away from the positive charge on the side of the negative charge.	1 ½ ½ 1 ½ ½ 1	5
28.	(a) Statements of two laws or $\Sigma I = 0$ $\Sigma IR = \Sigma E$ (b) Figure Derivation or Final equation only	1 + 1 ½ ½ 1 2 1	5
29.	(a) Statement / Equation (b) Figure Derivation or	1 1 2	
	Final answer only (c) Coiled wires have magnetic field mainly along the axis compared to that just outside it. But straight wires have magnetic field around it which will affect the smooth functioning of sensitive equipment connected with it.	1 ½ ½	5

Answer key Prepared by HSPTA Malappuram