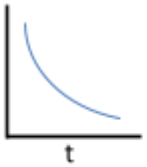
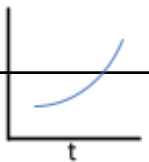
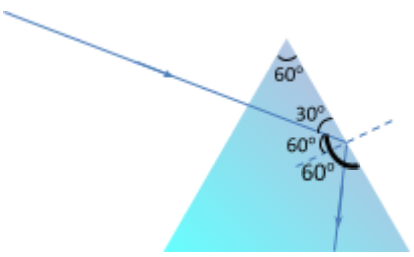
KENDRIYA VIDYALAYA SANATHAN LUCKNOW REGION

PREBOARD 2025-26

CLASS – XII

SUBJECT – PHYSICS MARKING SCHEME

	SOLUTIONS **Marking Scheme**	
1	A) Doubled	**1**
2	B) –80 J	**1**
3	C) –20 V	**1**
4	B) 5×10^{-6} T southward	**1**
5	D) 4B	**1**
6	B) Halves	**1**
7	D) Small and negative	**1**
8	A) The plane of the coil is parallel to the magnetic field	**1**
9	D) 1.5	**1**
10	B) Increases the number of emitted electrons	**1**
11	B) Planck's constant	**1**
12	A) $E_n = -13.6/n^2$ eV	**1**
13	C	**1**
14	A	**1**
15	A	**1**
16	D	**1**
	SECTION – B: SHORT ANSWER TYPE-I	
17	(a) $i = neAv_d$ $v_d = i/neA$ $v_d \propto 1/n$ nichrome is material used for making resistance hence its number of free electrons per unit volume (n) is small as compared to copper, hence nichrome has greater drift velocity. (b) Because nichrome has high resistivity and high melting point. **OR** Draw the graph showing the variation of resistivity (ρ) with temperature (T) for: (i) a metal,  (ii) a semiconductor.  	**1** **1** **1** **1**

		1
18	(a)  R.I. of glass =1.5 Critical angle for glass air interface is ⌊ = $Sin^{-1}(1/1.5) = 42^o$ Angle of incidence at glass air interface is 60^o which is greater than 42^o that is critical angle so light will be totally internally reflected and light will not emerge out. (b) No prism will not show any deviation for normal incidence as light will not emerge out of prism	**1** ½ ½
19	(a) $1/f = 1/f_1 + 1/f_2$ $= 1/15 + 1/-10$ $= (2 - 3)/30$ $= -1/30$ Therefore f = -30 cm. (b) System behaves as a diverging lens as focal length is negative.	½ **1** ½
20	(a) E - √ = Kmax hc/⌊ - √ = Kmax $\frac{(6.626x10^{-34})x(3x10^{-8})}{300x10^{-9} \times 1.6x10^{-19}}$ eV – 2eV = Kmax $\frac{1240}{300}$ eV – 2 eV = Kmax 4.13 eV – 2 eV = Kmax Kmax = 2.13 eV (b) eV_c = Kmax V_c = Kmax/e	½ **1** ½

	= 2.13 eV/e = 2.13 V	
21	When p-n junction diode is formed p and n regions join, electrons and holes near the junction recombine, leaving behind immobile ions, creating a region free of charge carriers which is known as depletion layer.	**2**
	SECTION – C: SHORT ANSWER TYPE-II	
22	(a) $1/C_{eq} = 1/C_1 + 1/C_2$ $= 1/6\mu + 1/12\mu$ $= (2 + 1)/12\mu$ $= 3/12\mu$ $= 1/4\mu$ $C_{eq} = 4\mu F$. (b) $q_{eq} = C_{eq}V$ $= 4\mu F \times 24V$ $= 96\mu$ C. $q_{eq} = q_1 = q_2 = 96\ \mu C$. (c) $V_1 = q_1/C_1 = 96C/6\mu = 16$ V $V_2 = q_2/C_2 = 96C/12\mu = 8$ V.	**1** **1** **1**
23	(a) i = E/(r +R) = 2/(.1 + 3.9) = 2/4 = 0.5 A. (b) V = E – ir = 2 - .5x.1 = 2 - .05 = 1.95 V (c) i = E/(r +R) = 2/(.1 + .1) = 2/.2 = 10 A. V = E – ir = 2 - 10x.1 = 2 - 1 = 1 V	**1** **1** **½** **½**
24	(a) r = mv/qB $\frac{r_\alpha}{r_p} = \frac{m_\alpha v}{q_\alpha B} \times \frac{q_p B}{m_p v}$ $= \frac{m_\alpha q_p}{m_p q_\alpha}$ $= \frac{4\ m_p e}{m_p 2e}$ = 2:1 (b) $K = ½\ mv^2$	**1** **1**

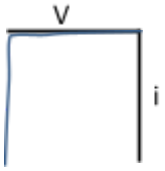
	$v = (K/m)^{1/2}$ $\frac{v_\alpha}{v_p} = \frac{m_p^{1/2}}{m_\alpha^{1/2}}$ $= \frac{m_p^{1/2}}{(4m_p)^{1/2}}$ $= \frac{m_p^{1/2}}{4^{1/2} m_p^{1/2}}$ $= \frac{1}{2}$ (c) $T = \frac{2\pi m}{qB}$ $\frac{T_\alpha}{T_p} = \frac{m_\alpha q_p}{m_p q_\alpha}$ $= \frac{4m_p e}{m_p 2e} = \frac{2}{1}$	**1**
25	(a)1st Law: Whenever the magnetic flux linked with a loop changes, an emf is induced in the loop. The induced emf lasts only while the flux is changing. 2nd Law: The magnitude of the induced emf is directly proportional to the rate of change of magnetic flux linked with the loop. (b) $E = -N\frac{\otimes\phi}{\otimes t}$ $= -N\frac{\phi_2 - \phi_1}{\otimes t}$ $= -500 \times \frac{0 - 0.2\times0.1}{0.05}$ $= 200$ V (c) Since $E \propto N$ If number of turns N is doubled emf is also doubled. If N'=2N E' = 2E=2x200V=400V	**1** **1** **1**
26	(a) $\lambda = c/\nu$ $= 3\times10^8/1.0\times10^{-10}$ $= 3\times10^{18}$ Hz (b) $E = h\nu$ $= 6.63\times10^{-34}\times3\times10^{18}$	**1** **1**

	$=1.99\times10^{-15}$ J =12.4 keV. (c) X- ray. Used in medical imaging / bone fracture detection.	**1**
27	(a) Balmer series (b) Using Rydberg formula: λ=1.523×1061=6.56×10−7m=656nm (c) Visible (red) region	**1** **1** **1**
28	(a) Mass of (2p + 2n) = 2(1.0073u)+2(1.0087u) = 4.0320 u Mass defect Δm = Mass of (2p + 2n) – Mass of $_2He^4$ = 4.0320− 4.0015 = 0.0305 u b) E = Δm×931 MeV = 0.0305×931 =28.4 MeV (c) It shows how strongly nucleons are bound in the nucleus. Or (a) Total BE before: 1.1×2+2.8×3=11.51.1MeV, after: 7.1×4=28.4 MeV → Increase = 16.9 MeV. (b) Light nuclei have lower BE/nucleon; fusion increases stability. (c) Energy generation in stars / experimental fusion reactors.	1 1 1 1 1
	SECTION – D: CASE STUDY BASED	
29	(a) Fringe width β=λD/d=600×10^{-9}×1/0.2x10^{-3}=3 mm. (b) β'= λ'D/d=λD/nd=β/n=2.25 mm. (c) Coherent light ensures **constant phase difference**, necessary for stable fringes. or (c) Coloured fringes are observed. (d) (ii) Shifts towards the covered slit	**1** **1** **1** **1**
30	(a) Forward conduction / knee voltage reached	**1** **1**

(b)(i) Avalanche breakdown

(c)

Or



(d) Used in LEDs / rectifiers

1

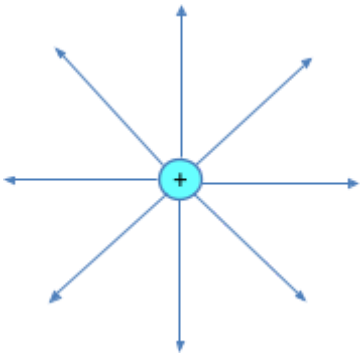
1

SECTION – E: LONG ANSWER TYPE

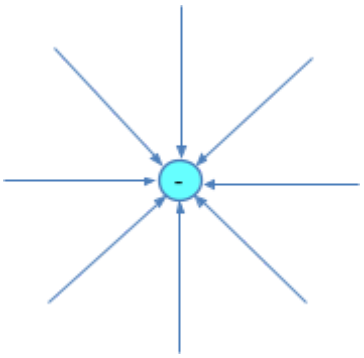
(03 ues. × 05 Marks each = 15 Marks)

31 (a)Electrical lines of forces

(i)



(ii)



2

(b) Figure

½

Derivation of $E = \frac{1}{4\pi\sum_o} \frac{p}{(a^2 + r^2)^{3/2}}$

2

Derivation of E for or r>>a,

½

$E = \frac{1}{4\pi\sum_o} \frac{p}{r^3}$

OR

½

(a) Statement of Gauss' law

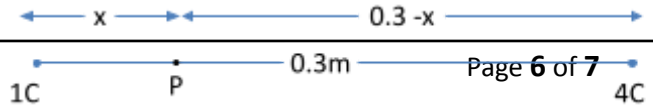
2

Derivation of $E = \lambda/2\pi\sum_o r$

½

Graph between E and r

(b)



		1
	Electric field at point P due to $1\int C$ is $E_1 = \frac{1}{4\pi\sum_o} \frac{1x10^{-6}}{x^2}$ (Towards right)	
	Electric field at point P due to $4\int C$ is $E_2 = \frac{1}{4\pi\sum_o} \frac{4x10^{-6}}{(0.3-x)^2}$ (Towards left)	
	For net field at P to be zero	**1**
	$E_1 = E_2$	
	$\frac{1}{4\pi\sum_o} \frac{1x10^{-6}}{x^2} = \frac{1}{4\pi\sum_o} \frac{4x10^{-6}}{(0.3-x)^2}$	
	$(0.3-x)^2 = 4x^2$	
	$0.3-x = 2x$	
	$0.3 = 3x$	
	$x = 0.1m$	
32	(a) Ray diagram	**½**
	Derivation	**2**
	(b) Ray diagram	**½**
	Derivation	**2**
	OR	**1**
	(a) Ray diagram	**1**
	(b) Draw a graph showing variation of angle of deviation with angle of incidence.	**3**
	(c) Deduce the expression for the refractive index of glass in terms of angle of prism and angle of minimum deviation.	
33	(a) Working	**1**
	Principle	**1**
	Theory	**1**
	(b) (i) Ip= Power / $\mathcal{E}$p = 10 x1000 / 200 = 50 A	**1**
	(ii) $\mathcal{E}$s = (Ns / Np) $\mathcal{E}$p= (1000/200) 200= 1,000 V	**1**
	OR	
	a) Derivation	**2½**
	b) i = V/Z = V/R = 100 V/100 Ω = 1A.	**½**
	Q = 1/R √(L/C)	
	= 1/100 √($1x10^{-3}/1x10^{-9}$) = 10.	**2**