DIRECTORATE OF GOVERNMENT EXAMINATIONS, CHENNAI- 6 HIGHER SECONDARY SECOND YEAR EXAMINATION - MARCH – 2024 PHYSICS KEY ANSWER

NOTE:

- 1. Answers written with Blue or Black ink only to be evaluated.
- 2. Choose the most suitable answer in Part A from the given alternatives and write the option code and their corresponding answer.
- 3. For answers in Part II, Part III, Part IV like reasoning, explanation, narration, description and listing of points, students may write in their own words but without changing the concepts and without skipping any point.
- 4. In numerical problems if formula is not written, marks should be given for the remaining correct steps.
- 5. In graphical representation, physical variables for X-axis and Y-axis should be marked.

TOTAL MARKS: 70

PART-I

Answer all the Questions:

15×1=15

Q.NO	OPTION	TYPE-A	Q.NO.	OPTION	TYPE-B
1	а	Photo Voltaic action	1 1	C	1.1 eV
2	C	900 Vm ⁻¹	2	С	480 W
3	C	480 W	3	а	Q/√2
4	а	3	4	d d	3750 A ⁰
5	C	Polarisation	5	d	6 µF
6	а	Q/√2	6	а	Photo Voltaic action
7	· d	3/π P _m	7	d	Its Wavelength
8	d	Its Wavelength	8	C	900 Vm ⁻¹
9	b	$\pi/4$	9	d	3/π P _m
10	а	More than before	10	b	π/4
11	d	6 μF	11	a	More than before
12	d	3750 A ⁰	12	а	3
13	а	Plane polarized	13	С	Polarisation
14	а	Albert Einstein	14	а	Plane polarized
15	С	1.1 eV	15	а	Albert Einstein

	ANSWER		
Q.No		MA	RKS
16	The Phenomenon of lagging of magnetic induction behind the	2	
	magnetic field. (or)		2
	Hysteresis means 'lagging behind'		4
17	When a beam of plane polarized light of Intensity Io is incident on	1_	
1 "	an analyser, the intensity of light I transmitted from the analyser	1	
	varies directly as the square of the cosine of the angle θ between	2	
	the transmission axes of polarizer and analyser.	14.	2
	(or)		
	$I = I_0 \cos^2 \theta \qquad \text{(Equation only)}$	1	
18	Electric potential at a point is equal to the work done by an external	2	
	force to bring a unit positive charge with constant velocity from infinity to the point in the region of the external Electric field.		- 1.2
	(or)		2
	HT (18 - 19 10) (18 - 19 12 - 19 13 - 19 14 - 19 15 - 19 15 - 19 15 - 19 16 16 16 16 16 16 16 16 16 16 16 16 1	The Assert	
	$V_p = -\int_{\infty}^p \overrightarrow{E} \cdot \overrightarrow{dr}$ (or) $V = \frac{1}{4\pi\varepsilon_0} \frac{q}{r}$	1	
19	$d\phi$	1/2	
	$arepsilon=rac{d\phi}{dt}$	/2	
	-4×10^{-3}	1/2	
	$=\frac{4\times10}{0.4}$		2
	어느 하다 내가 하는 이 경우를 다면 보고 있으니 이 이렇게 하나가 하는 이렇게 되어 가장 하는 것이 하는 것이 하는 것이 되었다.		
	$= 10 \times 10^{-3} V (or) 10 mV$	1	
	(If unit is not mentioned reduce ½ mark)		
20	1. Thermo electric generators	8	
en de	In automobiles to increase fuel efficiency	0	
i Te galaini. Andrea — Angria	3. Thermocouples and thermopiles	2	2
24	(Any two points)		
21	$\lambda = \frac{0.6931}{\pi}$		
	$T_{rac{1}{2}}$	1/2	
	0.6931		
	$\overline{5.01 \times 24 \times 60 \times 60}$	1/2	
Consultation of the	$= 1.6 \times 10^{-6} s^{-1}$		
		1	
	(or)		
	_ 0.6931	1/2	2
	$T_{\underline{1}}$	/2	
		-	
	0.6931	1/2	
	5.01 <i>days</i>	1	
	0.1383ndaysnīd me your key Answers to our email id - padasalai.net@gmail.com		
	(If unit is not mentioned reduce ½ mark)		
	(II UIIILIS HOLIHIGHIGG 1944-1944)	121	

22	Electromagnetic waves are non-mechanical waves which move with speed equals to the speed of light in vacuum. (or) If any one property of electromagnetic waves is mentioned	2	2
23	Biasing means providing external energy to charge carriers to overcome the barrier potential and make them move in a particular direction.	1	
	Two types of biasing 1) Forward bias 2) Reverse bias (or)	1	2
	The application of suitable DC Voltages across the transistor terminals is called biasing.	1	
	Modes of biasing 1) Forward active 2) Saturation 3) Cut off	1	
24	$P = \frac{1}{f}$ $P = \frac{1}{15} \text{(or)} \frac{1}{150 \times 10^{-2}} \text{(or)} P = \frac{10}{150}$	1/2	
	$P = 0.67 D$ (or) $P = \frac{2}{3} D$	1	2
	(If unit is not mentioned reduce ½ mark)		

PART III

Answer Any Six Questions : Q.No. 33 is Compulsory

6×3=18

n <u>. 1.11</u>	Answer		Marks	
Q.No 25	Atomic number decreases by one and mass number remains same ${}^{A}_{Z}X \rightarrow {}_{Z-1}{}^{A}Y + e^{+} + \nu$	1 1/2 1/2		
Š.	$P \rightarrow n + e^+ + \nu$ (or) Explanation			
2	$^{22}_{11}Na \rightarrow ^{22}_{10}Ne + e^+ + \nu$ (or) Sodium is converted into neon through β^+ decay (or) any other correct example	-1	3	
26	$I = neAV_d$ (or) $V_d = \frac{1}{nAe}$	1		
	0.2	1	3	
	$= \frac{1}{8.4 \times 10^{28} \times 1.6 \times 10^{-19} \times 0.5 \times 10^{-6}}$	1		
	$V_d = 0.03 \times 10^{-3} ms^{-1}$ (If unit is not mentioned reduce ½ mark)	(3).		

$\frac{1}{v} - \frac{1}{u} = \frac{1}{f_1}$ $\frac{1}{v} - \frac{1}{v} = \frac{1}{f_2}$ $\frac{1}{v} - \frac{1}{v} = \frac{1}{f_1} + \frac{1}{f_2}$ $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$ $\frac{1}{f_2} = \frac{1}{f_1} + \frac{1}{f_2}$ $$	27 Diagram with Explanation		
$\frac{1}{v} - \frac{1}{v'} = \frac{1}{f_2}$ $\frac{1}{v} - \frac{1}{u} = \frac{1}{f_1} + \frac{1}{f_2}$ $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$ $\frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac$	$\left \frac{1}{v'} - \frac{1}{v} = \frac{1}{\varepsilon} \right $	1	
$\frac{1}{v} - \frac{1}{u} = \frac{1}{f_1} + \frac{1}{f_2}$ $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$ $\frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2}$ $\frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2}$ $\frac{1}$	1 1 A A	1/2	er,-
$ \frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} $ $ \frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2} $ $ \frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2} $ $ \frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2} $ $ \frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2} + \frac{1}{f_2} $ $ \frac{1}{f_2} = \frac{1}{f_2} + \frac{1}{$		1/2	10 E. X. 1
The deflection produced per unit current flowing through the galvanometer. Current sensitivity of galvanometer increased by 1. Increasing number of turns N 2. Increasing magnetic induction B 3. Increasing the area of the coil A 4. decreasing couple per unit twist of the suspension wire K (Equation only: $I_s = \frac{\theta}{I} (or) \frac{NAB}{K} (or) \frac{I}{G}$) 1 $I_s = \frac{P\lambda}{I} (or) \frac{NAB}{K} (or) \frac{I}{G}$ 1 $I_s = \frac{50 \times 10^{-3} \times 640 \times 10^{-9}}{6.626 \times 10^{-34} \times 3 \times 10^{8}}$ 1 $I_s = \frac{50 \times 10^{-3} \times 640 \times 10^{-9}}{6.626 \times 10^{-34} \times 3 \times 10^{8}}$ 1 $I_s = \frac{50 \times 10^{-3} \times 640 \times 10^{-9}}{6.626 \times 10^{-34} \times 3 \times 10^{8}}$ 1 $I_s = \frac{1}{I} (or) \frac{I_s}{I} (o$		1/2	3
2. Increasing number of turns N 2. Increasing magnetic induction B 3. Increasing the area of the coil A 4. decreasing couple per unit twist of the suspension wire K (Equation only: $I_s = \frac{\theta}{l}$ (or) $\frac{NAB}{K}$ (or) $\frac{l}{g}$) $N = \frac{IB}{E} = \frac{P\lambda}{hc}$ $= \frac{50 \times 10^{-3} \times 640 \times 10^{-9}}{6.626 \times 10^{-34} \times 3 \times 10^{8}}$ $N = 1609.8 \times 10^{14} s^{-1}$ (or) $N = 1.61 \times 10^{17} s^{-1}$ 1 30 Diagram (or) explanation $B = \mu_0 ni$ (or) $\phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Ali$ $N\phi_B = Li$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$	28 The deflection production	1/2	
4. decreasing couple per unit twist of the suspension wire K (Equation only: $I_S = \frac{\theta}{I}$ (or) $\frac{NAB}{K}$ (or) $\frac{I}{G}$) $N = \frac{29}{E} = \frac{P\lambda}{hc}$ $= \frac{50 \times 10^{-3} \times 640 \times 10^{-9}}{6.626 \times 10^{-34} \times 3 \times 10^{8}}$ $N = 1609.8 \times 10^{14} s^{-1}$ (or) $N = 1.61 \times 10^{17} s^{-1}$ 1 3 Diagram (or) explanation $B = \mu_0 ni \text{ (or) } \phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Al i$ $N\phi_B = L i$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$	2. Increasing magnetic induction B		
29 $N = \frac{g}{E} = \frac{P\lambda}{hc}$ 1	4. decreasing couple per unit build a full	4×1/2	3
29 $N = \frac{\mathcal{E}}{E} = \frac{P\lambda}{hc}$ 1	(or)		3
$N = \frac{1}{E} = \frac{N}{hc}$ $= \frac{50 \times 10^{-3} \times 640 \times 10^{-9}}{6.626 \times 10^{-34} \times 3 \times 10^{8}}$ $N = 1609.8 \times 10^{14} s^{-1}$ (or) $N = 1.61 \times 10^{17} s^{-1}$ $B = \mu_{0} ni \text{ (or) } \phi_{B} = BA = (\mu_{0} ni)A$ $N \phi_{B} = \mu_{0} n^{2} Al i$ $N \phi_{B} = L i$ $L = \mu_{0} n^{2} Al$ (or) $L = \mu n^{2} Al$	(Equation only: $I_s = \frac{\theta}{r} (or) \frac{NAB}{r} (or) \frac{I}{r}$		
	$N = \frac{\mathcal{R}}{F} = \frac{P\lambda}{hc}$		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$-50 \times 10^{-3} \times 640 \times 10^{-9}$		D 10
$N = 1609.8 \times 10^{14} s^{-1}$ (or) $N = 1.61 \times 10^{17} s^{-1}$ $Diagram (or) explanation$ $B = \mu_0 ni (or) \phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Al i$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$ 1 3 $V = 1.61 \times 10^{14} s^{-1}$ 1 1 1 1 1 1 1 1 1 1	$6.626 \times 10^{-34} \times 3 \times 10^{8}$		
(or) $N = 1.61 \times 10^{17} s^{-1}$ Obligation $B = \mu_0 ni \text{ (or) } \phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Al i$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$ (If unit is not mentioned reduce ½ mark) 1 1 1 1 1 1 1 1 1 1 1 1 1	$N = 1609.8 \times 10^{14} s^{-1}$		2
Diagram (or) explanation $B = \mu_0 ni \text{ (or) } \phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Al i$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$ $(1 \text{ unit is not mentioned reduce } \frac{1}{2} \text{ mark}$ $\frac{1}{2} \text{ mark}$	(or)		3
$B = \mu_0 ni \text{ (or) } \phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Al i$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$	$N = 1.61 \times 10^{17} s^{-1}$		
$B = \mu_0 ni \text{ (or) } \phi_B = BA = (\mu_0 ni)A$ $N\phi_B = \mu_0 n^2 Al i$ $L = \mu_0 n^2 Al$ (or) $L = \mu n^2 Al$	(If unit is not mentioned reduce ½ mark)	1.	
$N\phi_{B} = \mu_{0}n^{2}Al i$ $N\phi_{B} = L i$ $L = \mu_{0}n^{2}Al$ (or) $L = \mu n^{2}Al$	$B = \mu_0 ni$ (or) $\phi_B = BA = (\mu_0 ni)A$	1.	
$N\phi_{B} = L i$ $L = \mu_{0}n^{2}Al$ (or) $L = \mu n^{2}Al$ (or)	$N\phi_B = \mu_0 n^2 A l i$	1/2	
$L = \mu_0 n^2 A l$ (or) $L = \mu n^2 A l$			
$L = \mu n^2 A l$ (or)		/2	3
$L = \mu n^2 A l$	[THE FIRST CONTROL OF SELECTION OF THE SERVICE OF SELECTION OF SERVICE OF SE	1/2	i e i di
1/2 1/2	그 그 나는 아이들이 아는데, 그 것으로 그리고 하는데, 아이들은 이 아이들은 이 아이들이 중에 하는 것이 되는데, 하는데 이 사람이 되었다면 하는데 모르겠다면 그 그 그 없다.		
		1/2	125

31				y Tues	
		Interference	Diffraction		
	T-	Equally spaced bright and dark fringes	Central bright is double the size of other fringes		
	2	Equal intensity for all bright fringes	Intensity falls rapidly for higher order fringes	3×1	3
	3	Large number of fringes are obtained	Less number of fringes are obtained		
32	Diagr	am (or) explanation		1/2	
	$\phi_{\rm E} = 9$	$\oint \vec{E} \cdot \vec{dA} \text{ (or) } \phi_{E} = \oint E dA \cos \theta$		1/2	
	φ _E =	$\oint E dA (or) \phi_E = E \oint dA$	(3. 1	1/2 1/2	3
	$\phi_E = \frac{1}{2}$	$\frac{1}{4\pi\varepsilon_0} \frac{Q}{r^2} \times 4\pi r^2$ (or) $E = \frac{Q}{4\pi\varepsilon_0 r^2}$ and	$\oint dA = 4\pi r^2$	/2	
	$\phi_{\rm E} = \frac{1}{2}$	$\frac{Q}{\varepsilon_0}$		1.	
33	1	$\frac{hc}{\lambda}$ (or) $\lambda = \frac{hc}{E_a}$		1/2	
	2 -	$\frac{\cancel{6.6} \times 10^{-34} \times \cancel{3} \times 10^{8}}{1.875 \times 1.6 \times \cancel{10^{-1}}}$		1/2	3
	$\lambda = 6$	60nm (If unit is not mention	ned reduce ½ mark)	1	
	Red	colour light is emitted		1 1	

PART – IV

Answer all the Questions

5×5=25

Q. No	ANSWER	Marks
34 (a)	Simple microscope Explanation Near point focusing - Diagram Explanation Upto $m = 1 + \frac{D}{f}$ Normal focusing - Diagram Explanation Upto $m = \frac{D}{f}$	1 1/2 1/2 1 1 1/2 1/2
	(OR)	

..(5)..

(b)	Diagram Explanation		1 1	
	$\frac{P}{Q} = \frac{R}{S} = \frac{r. AJ}{r. JB}$ $\frac{P}{Q} = \frac{AJ}{JB} = \frac{l_1}{l_2}$	Meet sour	1	
	$\frac{P}{O} = \frac{AJ}{IB} = \frac{l_1}{l_2}$		1	
	$P = Q. \frac{l_1}{l_2}$		1	
35 (a)	Diagram Explanation of Diagram and component	Name : Market	1	
	splitting		1/2+1/2	
F	$d\vec{B} = \frac{\mu_0}{4\pi} \frac{Id\vec{l} \times \hat{r}}{r^2}$ (or)			
- <u>-</u>	$dB = \frac{\mu_0}{4\pi} \frac{Idl \sin \theta}{r^2}$	المرافع المام الما	1	
	If $\theta = 90^{\circ} dB = \frac{\mu_0}{4\pi} \frac{Idl}{r^2}$			=
			e jed	
	From $\vec{B} = \frac{\mu_0 I}{4\pi} \int \frac{dl}{r^2} \sin \emptyset \hat{k}$. (
	upto $\vec{B} = \frac{\mu_0 I}{2} \frac{R^2}{(R^2 + Z^2)^{3/2}} \hat{k}$			
	(OR)		1	
F	보다 때 생동으로 있다고 있다. (15 To A A A A A A A A A A A A A A A A A A			
	$\vec{B} = \frac{\mu_0 NI}{2} \frac{R^2}{(R^2 + Z^2)^{3/2}} \hat{k}$			
Į "	$Z = 0, \vec{B} = \frac{\mu_0 NI}{2R} \hat{\gamma}$			
	(OP)		1	
b)	Diagram and Explanation	Bill State Statement Comment of the State Statement Statement of the State Statement Statement of the State Statement of the		
- 11 (upto $d = (i_1 + i_2) - (r_1 + r_2)$ upto $d = (i_1 + i_2) - A$		1	H ,
	(11 1 12) - A	19 19	1/2	
		B manufacture of the second C	arall.	
1	$f i_1 = i_2 = i, r_1 = r_2 = r$ (or) Graph	con		
escribility a	소프로 - TT : "HET TO	Continued of the second of the	1/2	5
	$=\frac{A+D}{A}$		10 Ha	
	$=\frac{A}{2}$	20 as es gg Angle of tackdenos()	1	
	By applying in Snell's law			
	$= \frac{\operatorname{si} \left(\frac{A+D}{2}\right)}{\operatorname{sin} \left(\frac{A}{2}\right)}$			
	(/2)		1	

36	Diagram Www.Padasalai.Net	www.1rb Inpsc.com	1	
(a)	Photon energy = work function+kinetic energy (or) Explanation	E = 50 > 5	1	
	$h\nu = \emptyset_0 + \frac{1}{2} mv^2$	Metal () (b) (b)	1	5
	At $v = v_0$ (threshold frequency), Kinetic energy of electron is Zero		1	
	$h\nu_0 = \emptyset_0$ $h\nu = h\nu_0 + \frac{1}{2} \text{ mv}^2$ (or) Equivalent Equation		1	
	$\frac{1}{10000000000000000000000000000000000$			
(b)	Diagram and Explanation	**************************************	1.	
(~)	V= V _m Sin ωt		1	
	$dt = \frac{v_m}{L} \sin \omega t \not \!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!$	y a Ym in of	1/2	5
	$i = \frac{v_m}{\omega t} \sin(\omega t - \frac{\pi}{2})$) polinija	
	(or)		1	
	upto i = $I_m \sin(\omega t - \frac{\pi}{2})$		1/2	- se
	Current lags behind voltage by $\pi/2$ or 90°		1/2+1/2	
37	Phasor Diagram and wave Diagram Merits	Pitting Sphare Shares Francis C. Careers H.		
(a)	 Decrease in noise [or] increase in signal noise rate. Operating range is large. High transmission efficiency. Broad bandwidth. Better quality. Limitations. Requires wider channel. FM transmitter and receiver are more complex. Costly. Compared to AM, FM covers less area. 	(Any Three) (Any Two)	3×1 2×1	5
	(OR)			alm the
(b)	Diagram or explanation $ \oint \vec{B} \cdot \vec{dl} = \mu_0 i_c $		1	
	Diagram or explanation		1	
	$\oint \vec{B} \cdot \vec{dl} = 0$			
	Diagram or explanation		1	F
	$\phi_E = \oint \vec{E} \cdot \vec{dA} = EA = \frac{q}{\epsilon_0}$			
	$upto \ i_d = \varepsilon_0 \frac{d\phi_E}{dt} \text{ or definition of displacement current}$	1	1	
	$ \oint \vec{B} \cdot \vec{dl} = \mu_0 (i_c + i_d) \text{(or)} $ $ = \mu_0 i_c + \mu_0 \varepsilon_0 \frac{d\phi_E}{dt} \text{(or)} $	一世里下	1	
	$= \mu_0 i_c + \mu_0 \varepsilon_0 \frac{d}{dt} \oint \vec{E} \cdot \vec{dA}$			7)
	$1-ui + us = - \Phi E dA$			(7)

38 (a)	Diagram and Explanation $\vec{E}_{+} = \frac{1}{4\pi\epsilon_{0}} \frac{q}{(r-a)^{2}} \hat{P}$ $\vec{E}_{-} = \frac{-1}{4\pi\epsilon_{0}} \frac{q}{(r+a)^{2}} \hat{P}$ $\vec{E}_{Tot} = \vec{E}_{+} + \vec{E}_{-}$ Upto $\vec{E}_{Tot} = \frac{q}{4\pi\epsilon_{0}} \left[\frac{4ra}{(r^{2}-a^{2})^{2}} \right] \hat{P}$ $\vec{E}_{Tot} = \frac{2\vec{P}}{4\pi\epsilon_{0}r^{3}}$	1 1 1 1 1	5
	$\vec{P} = 2aq\hat{P}$ (OR)	1/2	
(b)	Nuclear reactor Nuclear reactor is a system in which nuclear fission takes place in a self-sustained controlled manner.	2	
	Moderator It is a material used to convert fast neutrons into slow neutrons. Eg: water, D_2O , graphite (any one)	1	
	Control rods It is used to control the rate of the reaction. (or absorb excess neutrons produced in a reaction) Eg: Cadmium or Boron (any one)		5
	Cooling System Absorbs the heat – transfers to heat exchanger – steam produced – rotates turbine – produces electricity. Eg: water, heavy water, liquid sodium. (any one)	1	