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Higher Secondary Second Year Board Examination – March 2023

Physics – Key Answers

Total Marks: 70

Part – I

Q.No	OPTION	TYPE - A	Q.No	OPTION	TYPE - B
1	c	$\lambda_p \propto \lambda_e^2$	1	b	Shape memory alloy
2	c	$\frac{3}{8}$ I	2	c	900 V m^{-1}
3	c	900 V m^{-1}	3	c	4.5 Ω
4	c	4.5 Ω	4	b	Water
5	d	Yellow - Vi - Or - Sil	5	a	−40 V
6	d	h/π	6	a	+ z direction
7	b	2 D	7	c	Energy density
8	c	Energy Density	8	b	2D
9	a	+ z direction	9	d	1.1 eV
10	b	30°	10	c	3/8 I
11	c	Voltage regulator	11	b	30°
12	a	−40 V	12	d	Y - V - O - S
13	b	Water	13	d	h/π
14	d	1.1 eV	14	c	Voltage regulator
15	b	Shape memory alloy	15	c	$\lambda_p \propto \lambda_e^2$

Part - II

(Question No:24Compulsorily)

16	The electric field at a point at a distance from the point charge is defined as the force that would be experienced by a unit positive charge placed at that point OR $\vec{E} = \frac{\vec{F}}{q_0} = \frac{kq}{r^2}\hat{r} = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}\hat{r}$ (Any ONE)	2 1	2
17	Q-factor is defined as the ratio of voltage across L or C at resonance to the applied voltage OR Q-factor $= \frac{I_m X_L}{I_m R} = \frac{X_L}{R} = \frac{1}{R}\sqrt{\frac{L}{C}}$ (Any ONE)	2 1	2
18	The line integral of magnetic field over a closed loop is μ_0 times net current enclosed by the loop OR $\oint_C \vec{B}.d\vec{l} = \mu_0 I_{enclosed}$	2 1	2

19.	Diamond appears dazzling because of the total internal reflection of light that happens inside the diamond. For diamond $n = 2.417$ $i_c = 24.4^\circ$ Before getting out no. of total internal reflections from many faces	2	2
20.	$\frac{I_1}{I_2} = \frac{a_1^2}{a_2^2}$ $\frac{a_1}{a_2} = \sqrt{\frac{I_1}{I_2}}$ $\frac{a_1}{a_2} = \sqrt{\frac{36}{1}} = \frac{6}{1}$	1 1	2
21.	The minimum energy needed for an electron to escape from the metal surface is called the work function of a metal Unit: eV or J	1½ ½	2

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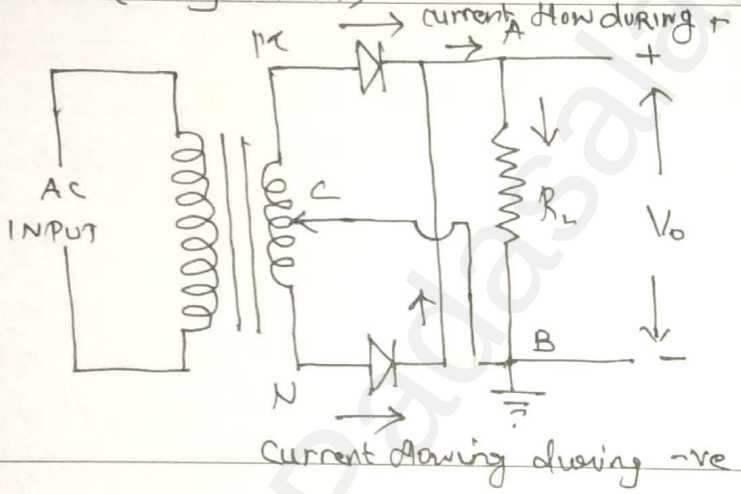
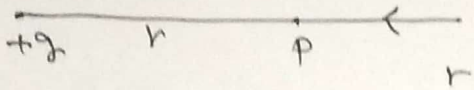
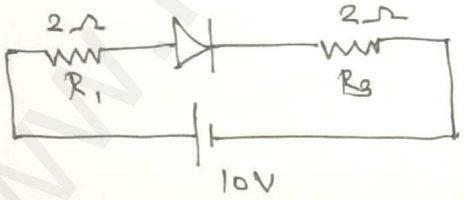
22.	Activity or decay rate is the number of nudei decayed per second. OR $R = \left\lvert \frac{dN}{dt} \right\rvert = \lambda N_0 e^{-\lambda t} = R_0 e^{-\lambda t}$ $= \lambda N$ (Any ONE)	2 1	2
23		2	2
24.	$R_T = R_0 [1 + \alpha (T - T_0)]$ $= 3 [1 + 0.004 (80)]$ $= 3.96\ \Omega$	1 ½ ½	2

Part – III

(Question No:33Compulsorily)

25.		1	
	Upto $V = -\frac{1}{4\pi\varepsilon_0}\int_{\infty}^{r}\frac{q}{r^2}\hat{r}\,\vec{dr}$	1	3
	Upto $V = \frac{1}{4\pi\varepsilon_0}\cdot\frac{q}{r}$	1	
26	I : The algebric sum of the currents at any junction of a circuit is zero	1	
	II : In a closed circuit the algebric sum of the products of the current and resistance of each part of the circuit is equal to the total emf included in the circuit	2	3
27	A galvanometer is converted into an ammeter by connecting a low resistance in parallel with the galvanometer	1	
	Diagram + Explanations	1	3
	$S = \frac{I_g R_g}{I - I_g}$ $I_g = \frac{S I}{S + R_g}$	1	

28	Diagram + Explanations Upto Area ABCD $= l(v\,dt)$ $\frac{d\phi_B}{dt} = Blv \quad \varepsilon = \frac{d\phi_B}{dt}$ $\varepsilon = Blv$	1 1 1	3
29	Fraunhofer lines - Definition Identification of elements present in the Sun	2 1	3
30	D_1 RB D_2 Forward Bias  $I = \frac{V}{R_1 + R_2} = \frac{10}{4} = 2.5\,A$	1 1 1	3

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31	Optical Path - Definition $d' = nd$ $d' \rightarrow$ distance travelled by a light in vacuum $n \rightarrow$ refrative index of medium $d \rightarrow$ distance travelled by a light in medium	1 1 1	3
32	Volume II Unit 8 Out of 7 Laws ANY 3 (Each 1 Carries 1 Mark)	1 1 1	3
33	235 g 6.02×10^{23} atoms 1 g 2.56×10^{21} atoms 1 kg 2.56×10^{24} atoms $Q = 2.56 \times 10^{24} \times 200$ MeV $= 5.12 \times 10^{26}$ MeV $Q = 5.12 \times 10^{26} \times 1.6 \times 10^{-13}$ J $= 8.192 \times 10^{13}$ J	1 1 1	3

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Part – IV

34 A	Coulomb's law - Statement Difference between Coulomb force and gravitation force (Any 3) Each one carries 1 Mark	2 3	5
B	Diagram Apparatus - Explanation Working $v = \frac{2d}{t}$ $\omega = \frac{\theta}{t}$ $\theta = \frac{\pi}{N}$ $\omega = \frac{\pi}{Nt}$ $t = \frac{\pi}{N\omega}$ $v = \frac{2dN\omega}{\pi}$ $v = 2.99792 \times 10^8\ ms^{-1}$	1 1 1 1 1	5

33	Principle	1	
a	Diagram + Construction	1	
	Working	1	
	$\frac{mv^2}{r} = qvB \quad r = \frac{mv}{Bq} \quad r \propto v$	1	5
	$f_{osc} = \frac{Bq}{2\pi m} \quad T = \frac{2\pi m}{Bq}$	1	
	$KE = \frac{q^2B^2r^2}{2m}$		
b	Figure 7.17 + Explanations	1	
	Figure 7.18 + Explanations	1	
	First Minimum $a \sin\theta = \lambda$	$1\frac{1}{2}$	5
	Second Minimum $a \sin\theta = 2\lambda$		
	Third Minimum $a \sin\theta = 3\lambda$	$1\frac{1}{2}$	
	n^{th} minimum $a \sin\theta = n\lambda$		
	$n = 1, 2, 3, ..$		

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36 b	Figure 8.17	1	
	Figure 8.18	1	
	Explanations	1	5
	From the known value of spacing of Ni, the wavelength of electron was experimentally calculated as 1.65 A°	1	
	$\lambda = \frac{12.24}{\sqrt{V}} A^\circ = \frac{12.27 A^\circ}{\sqrt{54}} = 1.67 A^\circ$	1	
a	Figure 4.46 + Figure 4.47 + Explanations	2	
	$V_m^2 = V_R^2 + (V_L - V_C)^2 \longrightarrow$ $Z = \sqrt{R^2 + (X_L - X_C)^2}$	1	5
	Figure 4.48	2	
	$\tan\phi = \frac{X_L - X_C}{R} = \frac{V_L - V_C}{V_R}$		

37 a	Diagram + Explanations Upto $I = n e A v_d$ Upto $\vec{J} = \sigma \vec{E}$	1 2 2	5
b	Diagram 9.17 + Explanations Determination of radius + Diagram 9.18 Determination of velocity + Diagram 9.19 (Graph)	1 2 2	5

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38 a i)	Out of 10 points ANY SIX (Each one carries 1/2 Marks)	6 x 1/2 = 3	5
ii)	$n = \sqrt{\varepsilon_r \mu_r}$	1	
	$= \sqrt{2.5 \times 2.25}$	1/2	
	$= 2.37$	1/2	
b	Figure 10.3b a Circuit Diagram	1	5
	b Wave forms	1	
	Explanations + $I_c = \beta I_B$ + $V_{CE} = V_{cc} - I_c R_c$	1	
	Working: During Positive Half Cycle	1	
	During Negative Half Cycle	1	

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