

SECOND YEAR HIGHER SECONDARY EXAMINATION MARCH 2018

SUBJECT: PHYSICS

CODE. NO: 9015

Qn No	Sub Qns	Answer Key/Value Points	Score	Total
1		Orange, Violet, Red and Gold Tolerance only ^(or) give $\frac{1}{2}$ score Colour Code of resistance $\frac{1}{2}$ score		1
2				1
3	a	Figure not necessary. Direction of either $\vec{E}$ or $\vec{P}$ give 1 score If fig is drawn in reverse order of charge give 1 score for correct answer		2
	b	$\vec{E} = \frac{1}{4\pi\epsilon_0} \frac{\vec{P}}{r^3} \quad \bigg/ \quad \frac{1}{4\pi\epsilon_0} \frac{\vec{P}}{(r^2 + (\frac{d}{2})^2)^{3/2}}$	1	
4		$C = 4\pi\epsilon_0 R$ (1) $C = 710.8 \text{ Mf}$ (1) (or) Any relevant explanation (2)		2
5		Definition or eqn. of drift velocity $V_d = \frac{eE\tau}{m}$ $I = neAV_d$	1 1	2
6	a	Ammeter	1	
	(b)	$(I - I_g)S = I_g G / S = \frac{I_g G}{I - I_g}$ (Derivation or any one eqn 1 Score)	1	2

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
7		$\tan p = n$ $\frac{\sin P}{\sin n} = n$ $r + p = 90^\circ$ (Or) Snell's Law - statement / eqn ⁽¹⁾ Brewster's Law - statement / eqn ⁽¹⁾	1 1/2 1/2	2
8		No. of atoms in 16g of $^{16}_8\text{O} = N_A$ No. of protons or electrons = $8 \times N_A$ No. of neutrons = $(16-8) N_A$ $= 4.816 \times 10^{24}$ (Or) Any two of the above answer give <u>2</u> score (like no. of protons, electrons or neutrons)	1/2 1/2 1	2
9	(a) (b)	X - Transmitter Y - Receiver Definition of <u>amplification</u> (or) <u>attenuation</u>	1/2 1/2 1	2

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
10		$d = \sqrt{2Rh}$ $\text{Area} = \pi d^2$ $\text{Population} = A \times \text{population density } (7.72 \times 10^8)$ (Or) $A = 2\pi Rh$ (1 1/2) Numerical value of population not compulsory	1 1/2 1/2	2
11	a b :	$\oint E \cdot ds = \frac{3Q}{\epsilon_0}$ $E \times 4\pi r^2 = \frac{3Q}{\epsilon_0}$ or $E = \frac{1}{4\pi\epsilon_0} \frac{3Q}{r^2}$ 1 : 3 (Or) Gauss's theorem - statement or eqn give <u>3 Score</u>	1 1 1	3
12	a b c	positive negative Spherical (Or) For any one part give 1/2 score	1 1 1	3

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
13	a	i) Micro waves - 1 Score ii) x-rays - 1 Score b Charges in accelerated motion - 1 Score c The frequency of micro waves matches with the natural frequency of water/ Resonance / frequency calculation $f = \frac{c}{\lambda}$ - 1 Score * For any three answers give <u>3 score</u>		3
14	a	figure	1	3
	b	$\frac{1}{f_1} = \frac{1}{v'} - \frac{1}{u}$ $\frac{1}{f_2} = \frac{1}{v} - \frac{1}{v'}$ $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$	$\frac{1}{2}$ $\frac{1}{2}$ 1	
15	a	$\frac{\sin i}{\sin r} = \frac{BC}{AC} / \frac{AD}{AC}$ $\frac{\sin i}{\sin r} = \frac{v_1 t}{v_2 t} = \frac{v_1}{v_2} = \frac{n_2}{n_1}$	1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		(or) Any correct figure and proof give <u>2</u> score (or) Snell's Law - statement/eqn give - 1 score		3
	b	Speed decreases and frequency remains same	1	
16	a	Statement / eqn	1	
	b	$\frac{dN}{dt} = -\lambda N$ $\therefore \ln \frac{N}{N_0} = -\lambda t$ $N(t) = N(0) e^{-\lambda t}$	$\frac{1}{2}$ $\frac{1}{2}$ 1	3
17	a	q_1 - Helical q_2 - Circular / curved (or) figures	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
	b	figure $qvB = \frac{mv^2}{R}$ $T = \frac{2\pi r}{v} = \frac{2\pi m}{qvB}$ $\omega = \frac{1}{T} = \frac{qvB}{2\pi m}$ (or) Figure of cyclotron. only give <u>1</u> score	$\frac{1}{2}$ 1 $\frac{1}{2}$ 1	4
18	a	definition or any one properly	1	4
	b	Ob - retentivity Oc - coercivity	1	
	c	$H = nI = 2 \times 10^3 \text{ Am}^{-1}$ $\left(\frac{NI}{l} \right)$ $B = \mu_0 \mu_r H = 1 \text{ T}$ (or) For any one part correct - B or H give 2 score. Eqn only give 1 score	1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
19	a	$\phi = BAN$ $= \frac{\mu_0 N^2 I \times A N}{l}$ $\phi = \frac{\mu_0 N^2 A I}{l}$ $\phi = LI$ $L = \frac{\mu_0 N^2 A}{l}$ (OR) $\phi = BAN \text{ give } \frac{1}{2} \text{ score}$	$\frac{1}{2}$ $\frac{1}{2}$ 1	4
	b	Definition of eddy current : Any one application	1 1	
20	a	A or B / relevant answer	1	4
	b	Max. KE = $h\nu - \phi_0$ Substitution $KE = 0.345 \text{ eV} / 0.551 \times 10^{-19} \text{ J}$	1 1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		(or) $h\nu = h\nu_0 + \frac{1}{2}mv^2$ - 1 Score KE or stopping potential correct give full score. $V_0 = 0.345 \text{ V}$		
21	a b	Name of any four series $4 \times \frac{1}{2}$ Energy level diagram (or) Energy level diagram with transitions of 4 series : give 4 score.	2 2	4
22	a b c	Principle ($E \propto \frac{1}{l}$, $\frac{E_1}{E_2} = \frac{l_1}{l_2}$) Balancing length decreases (or) 'a' or 'b' correct give 2 score. $E \propto \frac{1}{l_1}$ $V = \frac{ER}{R+r} \propto \frac{1}{l_2}$	1 1 1 1	5

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		$r = R \left(\frac{L_1 - L_2}{L_2} \right)$	1	
23	a	resistor	1	5
	b	graph (sine curve)	2	
	c	Phasor diagram or vector diagram	2	
24		$d = (i_1 - r_1) + (i_2 - r_2)$ $= (i_1 + i_2) - (r_1 + r_2)$ $d = (i_1 + i_2) - A$	1 1 1	5
	b	graph - id curve	1	
	c	$n = \frac{\sin \left(\frac{A+D}{2} \right)}{\sin \left(\frac{A}{2} \right)}$ Substitution $D = 48.19^\circ$	1 $\frac{1}{2}$ $\frac{1}{2}$	
25	a	rectifier diode	1	5
	b	VI characteristics	2	
	c	$I = I_z + I_L$ or $V = V_z + IR$ $R = \frac{V}{I} = \frac{4}{24 \times 10^{-3}} = 166.67 \Omega$	1 1	

d 100 Hz

(or) If d part is correct give 1 score for both b & d.