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 Tolerence only (or) give 1/2 score Colour Code of resislance 1/2 Score		1
2		 (or)		1
3	a	Figure not necessary. Direction of either $\vec{E}$ or $\vec{P}$ give 1 score	1	2
		If fig is drawn in reverse order of charge give 1 score for correct answer		
	b	$\vec{E} = \frac{1}{4\pi\varepsilon_0}\frac{\vec{P}}{r^3}$ / $\frac{1}{4\pi\varepsilon_0}\frac{\vec{P}}{(r^2+(\frac{d}{2})^2)^{3/2}}$	1	
4		$C = 4\pi\varepsilon_0 R$ (1) $C = 710.8\ \mu f$ (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	2
	(b)	$(I - I_g)S = I_g G / S = \frac{I_g G}{I - I_g}$ (Derivation or any one eqn 1 Score)	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
7		$\tan p = n$ $\frac{\sin P}{\sin r} = n$ $r + p = 90°$ (or) Snell's Law - statement / eqn (1) Brewsters Law - statement / eqn (1)	1 ½ ½	2
8		No. of atoms in 16g of $O_8^{16} = N_A$ 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 2 score (like no. of protons, electrons or neutrons)	½ ½ 1	2
9	(a)	X - Transmitter Y - Receiver	½ ½	2
	(b)	Definition of amplification (or) attenuation	1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
10		$d = \sqrt{2Rh}$ Area = πd^2 Population = A x population density (7.72×10^6) (Or) (1½) $A = 2\pi Rh$ Numerical value of population not compulsory	1 ½ ½	2
11	a	$\oint E \cdot ds = \frac{3Q}{\varepsilon_0}$ $E \times 4\pi r^2 = \frac{3Q}{\varepsilon_0}$ or $E = \frac{1}{4\pi\varepsilon_0}\frac{3Q}{r^2}$	1 1	3
	b	1 : 3 (Or) Gauss's theorem - statement or eqn give 3 score	1	
12	a	positive	1	3
	b	negative	1	
	c	Spherical (Or) For any one part give 1½ Score	1	

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		3
	c	The frequency of micro waves matches with the natural frequency of water/ Resonance / frequency calculation / $\lambda = \frac{c}{\nu}$ - 1 Score * For any three answers give 3 score		
14	a	: figure	1	
	b	$\frac{1}{f_1} = \frac{1}{v'} - \frac{1}{u}$ $\frac{1}{f_2} = \frac{1}{v} - \frac{1}{v'}$ $\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2}$	½ ½ 1	3
15	a	$\frac{\sin i}{\sin r} = \frac{BC}{AC} \Big/ \frac{AD}{AC}$ $\frac{\sin i}{\sin r} = \frac{v_1 t}{v_2 t} = \frac{v_1}{v_2} = \frac{n_2}{n_1}$	1 1	

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
		(or) Any correct figure and proof give 2 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	$\frac{dN}{dt} = -\lambda N$ $\therefore \ln \frac{N}{N_0} = -\lambda t$ $N(t) = N(0) e^{-\lambda t}$	½ ½ 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	½	
		$qvB = \frac{mv^2}{R}$	1	4
		$T = \frac{2\pi r}{v} = \frac{2\pi m}{qB}$	½	
		$\nu = \frac{1}{T} = \frac{qB}{2\pi m}$	1	
		(or) Figure of cyclotron. only give 1 score		
18	a	definition or any one properly	1	
	b	Ob - retentivity Oc - coercivity	1	4
	c	$H = nI = \left(\frac{NI}{l}\right) = 2\times10^{3}\ Am^{-1}$	1	
		$B = \mu_0\mu_r H = 1\ T$	1	
		(or) For any one part correct - B or H give 2 score. Eqn only give 1 score		

Qn. No	Sub Qns	Answer Key/Value Points	Score	Total
19	a	$\phi = BAN$ $= \mu_0 \frac{N}{l} I \times AN$ $\phi = \frac{\mu_0 N^2 A I}{l}$ $\phi = LI$ $L = \frac{\mu_0 N^2 A}{l}$ (or) $\phi = BAN$ give $\frac{1}{2}$ 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	
	b	Max. KE = $h\nu - \phi_0$ Substitution KE = 0.345eV / 0.551×10^{-19} J.	1 1 1	4

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. $V_0 = 0.345\ V$		
21	a	Name of any four series $4 \times 1/2$	2	4
	b	Energy level diagram	2	
		(or) Energy level diagram with transitions of 4 series give 4 score.		
22	a	Principle ($E \propto l$, $\frac{E_1}{E_2} = \frac{l_1}{l_2}$)	1	5
	b	Balancing length decreases	1	
		(or) 'a' or 'b' correct give 2 score.		
	c	$E \propto l_1$	1	
		$V = \frac{ER}{R+r} \propto l_2$	1	

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		$d = (i_1 - r_1) + (i_2 - r_2)$ $= (i_1 + i_2) - (r_1 + r_2)$	1	5
		$d = (i_1 + i_2) - A$	1	
	b	graph - id curve	1	
	c	$n = \frac{\sin\left(\frac{A+D}{2}\right)}{\sin\left(\frac{A}{2}\right)}$	1	
		Substitution	1/2	
		$D = 48.19^\circ$	1/2	
25	a	rectifier diode	1	5
	b	VI characteristics	2	
	c	$I = I_z + I_L$ or $V = V_z + IR$	1	
		$R = \frac{V}{I} = \frac{4}{24 \times 10^{-3}} = 166.67\ \Omega$	1	
	d	100 Hz		

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

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