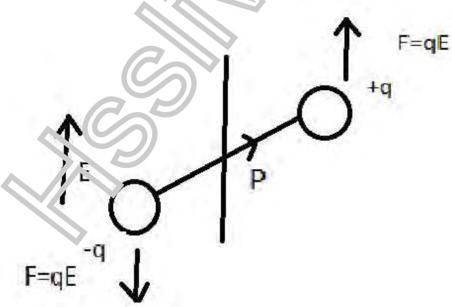
SECOND YEAR HIGHER SECONDARY EXAMINATION MARCH 2020

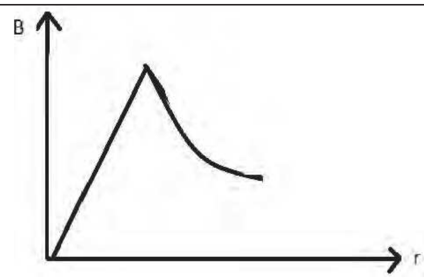
PART III

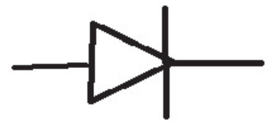
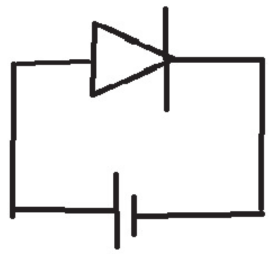
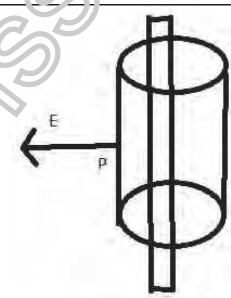
SUBJECT PHYSICS

CODE SY-24

TOTAL SCORE – 60

Qn.no	Sub qn	Answer key	Score	Total
1		(c) doubled		1
2		(a) Straight line		1
3		(a)1000V		1
4		(a)light ray is travelling from denser medium to rarer medium		1
5		(b)total internal reflection		1
6		(b)not different from		1
7	(a)	 Correct marking of direction / equation F=qE (score 1 for any part)	1	2
	(b)	$\boldsymbol{\tau} = \mathbf{p x E}$ or $\tau = pE\sin\theta$	1	
8	(a)	$\oint \boldsymbol{B}.\boldsymbol{dl} = \boldsymbol{\mu_0}\mathbf{I}$ or defintion	$1\,{}^{1}/_{2}$	2

<table>
<tr><td></td><td>(b)</td><td>
OR
If any part of either (a) or(b) is correct give 1 $^1/_2$ score</td><td>$^1/_2$</td><td></td></tr>
<tr><td>9</td><td></td><td>Non uniform field OR any related attempt</td><td></td><td>2</td></tr>
<tr><td>10</td><td></td><td>$\mathbf{B}=\frac{\mu_0}{4\pi}\frac{m}{r^3} = 10^{-7}\text{x}\frac{0.4}{0.5^3} = 3.2\text{x}10^{-7}$ T (2 score)
OR
$\mathbf{B}=\frac{\mu_0}{4\pi}\frac{2m}{r^3} = 6.4\text{x}10^{-7}$ T (2 score)
Any one equation 1 mark solution 1 mark unit not necessary
(if 2 equations are correct give 2 mark)</td><td></td><td>2</td></tr>
<tr><td rowspan="2">11</td><td>(a)</td><td>n= 1.47</td><td>1 $^1/_2$</td><td rowspan="2">2</td></tr>
<tr><td>(b)</td><td>No
OR
(if any one part of (a)or(b) is correct give 1 $^1/_2$ score)</td><td>$^1/_2$</td></tr>
<tr><td>12</td><td></td><td>Blue scatters more / By Rayleigh's scattering law /
Blue has shorter wavelength / $\mathbf{I}\ \alpha\ \frac{1}{\lambda^4}$</td><td></td><td>2</td></tr>
<tr><td>13</td><td></td><td><table><tr><td></td><td>A</td><td>B</td></tr><tr><td>i</td><td>Nuclear fission</td><td>Generally possible for nuclei with high atomic number</td></tr><tr><td>ii</td><td>Nuclear fussion</td><td>Nuclei with low atomic number</td></tr><tr><td>iii</td><td>Transition between atomic energy levels</td><td>Hydrogen spectrum</td></tr></table></td><td></td><td>2</td></tr>
</table>

		iv | Electron emission from nucleus | Beta decay		
14	(a)	 OR Rectifier circuit	1	2
	(b)	 Resistor may be included	1	
15	(a)	A- ground wave, B – space wave ,C- sky wave	$1\frac{1}{2}$	2
	(b)	Ionosphere cannot reflect these signals / high frequency / small wavelength / penetrate through ionosphere / any related answer	$\frac{1}{2}$	
16	(a)	 Gaussian surface or direction 1 score	1	3
	(b)	$\oint \boldsymbol{E.ds} = \frac{q}{\epsilon_0}$ / Gauss's law 1 score $\mathbf{E \times 2\pi rl = \lambda\frac{l}{\epsilon_0}}$ ($\frac{1}{2}$ score) $\mathbf{E}= \frac{\lambda}{2\pi\epsilon_0 r}$ ($\frac{1}{2}$ score)	2	
17	(a)	Figure 1 – parallel , figure 2 - series	1	3

	(b)	Figure 1 – parallel	$^1/_2$	
	(c)	Derivation of parallel combination	$1\ ^1/_2$	
18	(a)	Any one law or equation 1 score(1+1)	2	3
	(b)	Both proportional to square of respective field strength OR Any equation of energy $\frac{1}{2}cv^2$ or $\frac{1}{2}Li^2$ OR energy density $\frac{\epsilon_0 E^2}{2}$ or $\frac{B^2}{2\mu_0}$ (If (b) part alone is correct give 1 $^1/_2$ score)	1	
19	(a)	$E_x = E_0 \sin(kz - \omega t)$ $B_y = B_0 \sin(kz - \omega t)$	1	3
	(b)	Radio waves are produced by accelerated motion of charges / Radio waves are used for radio, TV or communication system / micro waves are produced by special vacuum tubes / any one use like oven or aircraft control (any one answer above 1 score)	2	
20	(a)	Object distance - OO , Image distance - OQ_1	1	3
	(b)	$\frac{1}{u} - \frac{1}{v} = \frac{1}{f}$ (1 score) $1 - \frac{v}{u} = \frac{v}{f}$ m= $1+\frac{D}{f}$ (1 score) OR m= $\frac{D}{f}$ / m= $\frac{v}{u}$ (1 score)	2	
21		Lyman,Balmer,Paschen		3
22	(a)	i) 176 ii) 72	1	3
	(b)	Statement or equation of radioactive decay law	1	
	(c)	T_h= 0.693 T_m OR $T_h = T_m \ln 2$ T_h - half life , T_m – mean life	1	

23	(a)	Definition of modulation / figure showing modulation	1	3
	(b)	Any two reasons like i) Power is inversely proportional to square of wavelength ii) Insufficient antena length iii) Mixing up of signals ,etc	2	
24	(a)	Farad	$^1/_2$	4
	(b)	(Both series and parallel can be considered as in english and malayalam version of question) In series C = $\frac{12}{13}$ pF / In parallel C = 9 pF	$^1/_2$	
	(c)	In series Q = Cv = $\frac{12}{13}$ x 10^{-12} x 100 = $\frac{12}{13}$ x 10^{-10} F OR In parallel $Q_1 = C_1$v = 2x 10^{-10} F , Q_2 = 3x 10^{-10} F , Q_3 = 4x 10^{-10} F (1 $^1/_2$ may be given to (b) part if no score for (c))	3	
25	(a)	Derivation (Equation like τ = m x B / τ = mBsin θ / τ = NIABsin θ Figure (give 1 score))	2 $^1/_2$	4
	(b)	If number of turns doubles current sensitivity doubles as $\frac{\mathbf{nAB}}{\mathbf{c}}$ But voltage sensitivity remains constant since resistance doubles - $\frac{\mathbf{nAB}}{\mathbf{cR}}$ (definition of current sensitivity or voltage sensitivity can give 1 score)	1 $^1/_2$	
26	(a)	Minimum energy needed for the electron to escape from metal surface	1	4
	(b)	$\mathbf{h\upsilon = \emptyset_0 + \frac{1}{2} mv^2}$ / Any such equation including **E = hυ** (1 score) $\frac{1}{2}$ mv^2 = hυ - $\emptyset_0$ = 0.344 eV / = 0.55 x 10^{-19} J (Solving without writing 1st equation can give full score)	1 $^1/_2$	
	(c)	$\mathbf{\frac{1}{2} mv^2 = eV_0}$	1 $^1/_2$	

		$V_0 = \frac{0.55 \times 10^{-19}}{1.6 \times 10^{-19}} = 0.34$ V (equation only give 1 score , answer only 1 score)		
27	(a)	Derivation of $\frac{R_2}{R_4} = \frac{R_1}{R_3}$ / $\frac{R_1}{R_2} = \frac{R_3}{R_4}$ OR Any correct derivation using other symbols (figure only one mark)	4	5
	(b)	Metre bridge	1	
28	(a)	Any one factor like resistance ,capacitance ,inductance, frequency of applied AC	1	5
	(b)	Impedance diagram OR Phasor diagram OR cos Ø OR cos Ø = $\frac{R}{Z}$	1	
	(c)	Any correct equation 1 score Z = $\sqrt{9+16}$ = 5 0hm (Answer only give 1 score,unit not necessary)	3	
29	(a)	Width of band decreases from the center / any related explanation	1	5
	(b)	If yellow light is used band width increases OR the pattern expands / any related explanation	1	
	(c)	$X_n = \frac{n\lambda D}{d}$, $\lambda = \frac{X_n d}{nD} = \frac{10^{-2} \times 0.03 \times 10^{-2}}{4 \times 1.5}$ = 500 nm (Any correct related equation like $\beta = \frac{D\lambda}{d}$ give 1 score) (if (d) part is not considered 3 score can be given to (c) part)	2	
	(d)	Any definition of limit of resolution	1	
30	(a)	I – cut of region , II – active region , III – saturation region	1 $^1/_2$	5
	(b)	Region I	$^1/_2$	
	(c)	$\beta = \frac{I_c}{I_b}$ (1 score) $I_c = \frac{2}{2000}$ = 1 mA $I_b = \frac{I_c}{\beta} = \frac{1\ mA}{100} = 10^{-5}$ A	2	

		(for any correct equation for β give 1 score If part (d) is not correct give 3 score to (c)part)		
	(d)	(if there is errors in previous parts of this question, working of transistor with figure can give 2 score and 1 score if there is figure only) Forward biased emitter base junction send majority carriers from emitter to base and reverse biased collector can collect these majority carriers from base	1	

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