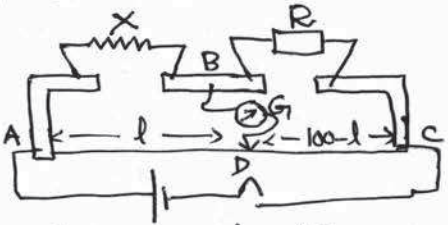
SECOND YEAR HIGHER SECONDARY EXAMINATION, MARCH 2016.
(Finalised Scheme of Valuation)

Subject: Part III Physics **Code No: 1015**

PHYSICS Second Year March 2016 Code no 1015

Qn.No	Scoring Indicators	Split Score	Total Score
1(a)	(iv), all of these	1	
(b)	(iv), sky wave propagation is useful only in the range of frequencies 30 – 40 MHz	1	2
2(a)	Zero	1	
(b)	(i) $\frac{1}{C_E} = \frac{1}{C_1} + \frac{1}{C_2}$ or $\frac{1}{C_E} = \frac{1}{20} + \frac{1}{C}$, $\frac{1}{C} = \frac{1}{C_E} - \frac{1}{20}$		
	$= \frac{1}{4} - \frac{1}{20} = \frac{4}{20} = \frac{1}{5}$ $\therefore C = 5\mu F$	1	
	(Eqn only ie $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$ or $C = \frac{C_1 C_2}{C_1 + C_2}$ ($\frac{1}{2}$ only)		
	(ii) Effective charge $= 4 \times 12 = 48\mu C$	1	5
	(iii) P.d. on $20\mu F = \frac{48}{20} = 2.4V$	½	
	P.d. on $5\mu F = \frac{48}{5} = 9.6V$	½	
	(Eqn. only ie $V = \frac{q}{C}$ or $q = CV$ ($\frac{1}{2}$ mark only)		
(c)	ii, Bulk will hold the same charge	1	
3(A) (a)	ii, Nichrome	1	
(b)	iv, 12.1 Ω	1	
(c)		2	
	Correct circuit diagram – (2 marks)		
	or		
	(If X and R only give 1 mark		
	If Cell and G only give 1 mark)		

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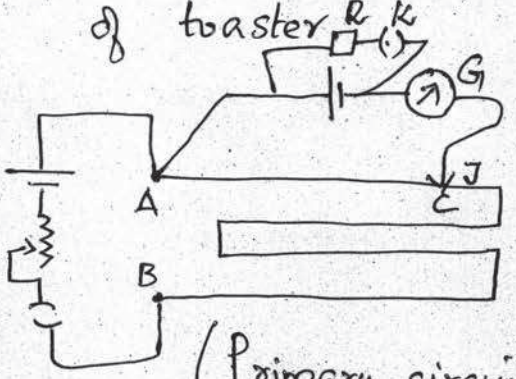
Qn.No	Scoring Indicators	Split Score	Total Score
	Explanation of expt using metre bridge circuit	1	6
	of Wheatstone's bridge circuit		
	Result like $X = \frac{R l}{(100 - l)}$	1	
3(B)	OR		
(a)	i, manganin	1	
(b)	iii, Resistance of bulb is greater than resistance of toaster	1	
(c)		2	6
	or (Primary circuit only 1 mark or Secondary circuit only 1 mark)		
	Statement of principle or eqn: like $\epsilon \propto l$	1	
	Derivation – ½ mark and final equation ½ mark	1	
4 (a)	(i) No.	1	
	(ii) Energy of one photon is less than work function or $h\nu < \phi_0$ or definition of work function	1	3
(b)	(i) $\lambda_e > \lambda_p$	1	
5 (a)	(i) Reduce eddy current / heat / Energy loss	2	
	(ii) Reduce hysterisis loss / Energy loss		
	Since answers are similar to both part, give 2 mark for either (i) or (ii)		

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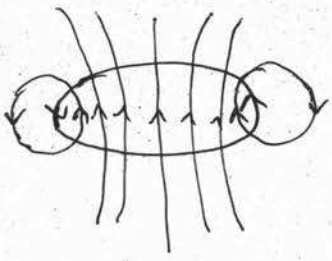
Qn.No	Scoring Indicators	Split Score	Total Score
(b)	$X_L = X_C$ or $L\omega = \frac{1}{C\omega}$ or Impidence is minimum or current is maximum or source frequency equals frequency of LCR circuit or Resonance curve or $f = \frac{1}{2\pi\sqrt{LC}}$	1	3
6 (a) (ii)	 or NAND gate	1	
(b)	Since rheostat is not included in the circuit, voltage cannot be varied. Hence drawing graph is not possible. So any relevant answer give full score	2	6
(c)	CE Amplifier circuit diagram	2	
	Eqn: of voltage gain like $A_V = \beta \frac{R_L}{R_i}$	1	
	or [Transistor alone in CE configuration diagram (give 1 mark only]		
7 (a)	One face north and the other face south or  or $m = IA$	1	
(b)		2	

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Qn.No	Scoring Indicators	Split Score	Total Score
7 (c) (i)	Particle accelerator	1	5
(ii)	$\nu = \frac{qB}{2\pi m}$ or	1	
	Give one mark for similar field line for 7 (b) and 3 marks for explanation cyclotron in 7(c)		
8 (a)	Any one limitation like applicable to hydrogen atom only / cannot be applied to atoms with higher atomic number / cannot explain fine structure or intensity variation of spectral lines	2	3
(b)	(iii) $2\pi r_n = 4\lambda$	1	
9 (a)	mass energy of reactants − mass energy of products or $Q = \Delta m\, c^2$ or $Q = \Delta m$ in U × 931 MeV or Explanation nuclear fission or fusion reactions or Energy released in nuclear reactions	1	4
(b)	$Q = (m_x - m_y - m_{He})\, c^2$ or Eqn: of α-decay	1	
	[Since the above two answers are similar 2 marks can be given if either (a) or (b) is correct)		
(c)	$R = R_0 A^{1/3}$ or $R \propto A^{1/3}$	1	
	$\frac{R_1}{R_2} = \left[\frac{A_1}{A_2}\right]^{1/3} = \left[\frac{1}{64}\right]^{1/3} = \frac{1}{4} = 1:4$	1	
	(If answer only give 2 marks)		

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Qn.No	Scoring Indicators	Split Score	Total Score
10 (a)	(i) 10^{13} times	1	3
(b)	$\phi = \frac{q}{\varepsilon_0} = 2.25 \times 10^5 \, Nm^2/C$ OR [Eqn: only – 1 mark if calculated for one face as $\phi = \frac{1}{6} \times \frac{q}{\varepsilon_0}$ give 1 mark]	2	
11. (a)	Statement / eqn: $\oint \vec{B} \cdot d\vec{s} = 0$	1	
(b)	Statement / eqn: $\oint \vec{E} \cdot d\vec{s} = \frac{q}{\varepsilon_0}$	1	3
(c)	magnetic monopole does not exist OR magnetic field lines forms closed path OR net flux is zero in magnetism OR net flux is $\frac{q}{\varepsilon_0}$ in electrostatics for closed surfaces	1	
12	(i) X-rays — Cancer treatment (ii) Infra red — Remote switch (iii) Microwave — Radar. (iv) Ultraviolet — Water purifier	2	2
13 (a)	(iii) Inductance	1	
(b)	$M = \frac{\mu_0 N_1 N_2 A}{l} = \frac{4\pi \times 10^{-7} \times 2000 \times 500 \times \pi \times 3^2 \times 10^{-4}}{2}$ $= 1.77 \times 10^{-3} H.$ [Eqn only – 1 mark, substitution and answer – 1 mark]	2	3

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14(A)			
(a)	$\tan i_p = n$	1	
	$i_p = \tan^{-1}(1.5) = 56.3^\circ$	1	5
(b)	Proof of Snell's law using Huygen's principle	3	
	Or		
	[Explanation of Huygen's principle — 1 mark Snell's law or Eqn — 1 mark]		
	OR		
14(B)			
(a)	$I = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\phi$		
	$= I + 2I + 2\times\sqrt{I\times 2I}\cos 60$	2	
	$= I(3 + 2\sqrt{2}\cos 60)$		
	$= 4.414\, I$		
	Or ($I \propto A^2$ — 1 mark or)		5
	Or ($R = \sqrt{a^2+b^2+2ab\cos\phi}$ — 1 mark)		
(b)	figure —	1	
	Proof —	2	
	Or [Result only $\beta = \frac{D\lambda}{d}$ — 1 mark]		
15(A)			
(a)	$\frac{1}{f} = (n-1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$	1	
	$\frac{1}{12} = (n-1)\left(\frac{1}{10} + \frac{1}{15}\right)$ — ½ mark		
	$n = 1.5$ — ½ mark	1	

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Qn.No	Scoring Indicators	Split Score	Total Score
(b)	Ray diagram of compound microscope	2	7
	$m_o = \frac{L}{f_o}$ — 1 mark		
	$m_e = 1 + \frac{D}{f_e}$ — 1 mark	3	
	$m = m_o \times m_e = \left(1 + \frac{D}{f_e}\right)\frac{L}{f_o}$ — 1 mark		
	or		
	In normal adjustment $m = \frac{D}{f_e} \times \frac{L}{f_o}$		
	OR		
	(Ray diagram – 3 marks, explanation using the eqn: $m = \frac{D}{f_e} \times \frac{L}{f_o}$ – 2 marks)		
15 (B)			
(a)	figure or explanation with core of higher ref. index and cladding of lower ref. index	2	
(b)	figure or explanation of total internal reflection	2	
	or		
	(Principle – total internal reflection – 1 mark)		7
(c)	figure –	1	
	Proof	1	
	Result / final equation	1	