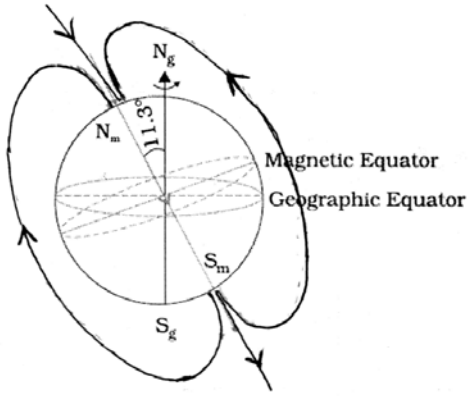
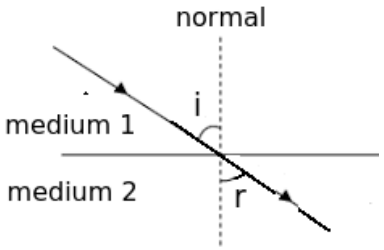
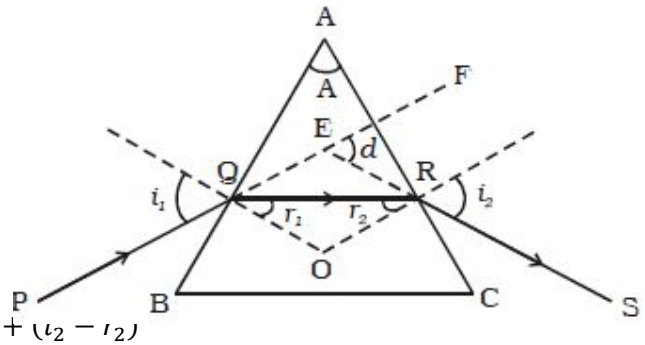
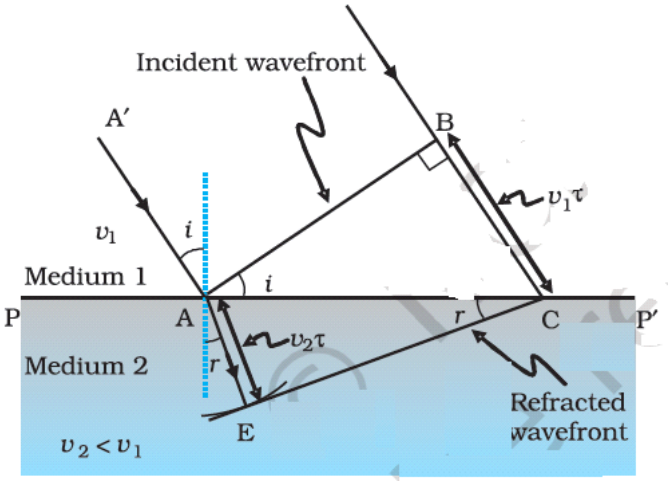
Higher Secondary Education
Half Yearly Examination 2017-18
PHYSICS

HSE II **Maximum Score 60**

Qn No		Scoring Indicators	Score	Total
Answer any seven questions from Qn No 1 to 8				
1	(a)	$C = \frac{C_1 C_2}{C_1 + C_2}$	1	2
	(b)	(i) When a charge is given to the system it gets equally shared by the capacitors.	1	
2		$F = Bil\sin\theta$ $F = 0.15 \times 8 \times sin30^0 = 0.6\ N/m$	1 1	2
3	(a)	Figure (2)	1	2
	(b)	Any two properties of paramagnetic material.	1	
4		Eddy currents – Induction furnace Magnetic flux – tesla metre^2 Lenz's Law – Conservation of energy Self inductance – Electromagnetic analogue of mass	½x4	2
5		$v = v_m sin\omega t$ $v = v_{rms} \times \sqrt{2} sin2\pi ft$=311.1 sin 314t volt	1 1	2
6	(a)	Negative X direction.	1	2
	(b)	$E = Bc = 2 \times 10^{-7} \times 3 \times 10^8 = 60 Vm^{-1}$ $\overrightarrow{E_z} = 60sin(0.5 \times 10^3 x + 1.5 \times 10^{11} t)\hat{k}\ Vm^{-1}$	1	
7	(a)	velocity	1	2
	(b)	Gamma rays, X rays, Micro waves, Radio waves	1	
8	(a)	0.15 A	1	2
	(b)	$i = \epsilon_0 \frac{d\emptyset_E}{dt}$	1	
Answer any five questions from Qn No 9 to 14				
9	(a)		2 1	3
	(b)	zero		

10	(a) (b)	The rate of change of magnetic flux is equal to the emf induced. $e = \frac{d\Phi_B}{dt}$ As the loop moves into the field the flux through it increases. By Lenz's law the induced current should flow in a such a direction that the flux decreases. For this the Side PS should experience a force opposite to the direction of notion. By left hand rule this is possible when current flows from P to S. So current in the loop should be along the path PSRQ/Anti clockwise.	1 2	3
11	(a) (b) (c)	inductor by inserting an iron rod into P any other correct response like change the number of turns, change the area, length etc (1 score) Maximum energy is wasted across the resistor as heat.	1 1 1	3
12	(a) (b) (c)	Statement of Snell's law. No. because the light travels from rarer to a denser medium.  	1 1 1	3
13	(a) (b)	Hypermetropia /farsightedness $u = -25\ cm \quad v = -75\ cm$ $p = \frac{1}{f} = \frac{1}{v} - \frac{1}{u} = -\frac{1}{0.75} + \frac{1}{0.25} = 2.66D$ $f = 37.5\ cm$ (1 $score$)	1 2	3
14	(a) (b)	90^0 $n = \tan p = tan\ 52^0 = 1.28$	1 2	3
Answer any four questions from Qn No 15 to 19				
15	(a) (b) (c)	8 ohm and 32 ohm Let i is the current through the branch PAQ $i(2 + 24 \parallel 12) = (8 - i) \times 40$ $i(2 + 8) = (8 - i) \times 40$ $i = (8 - i) \times 4$ $i = 6.4\ A$ (iv) zero (Hint: Balanced Wheatstone's bridge)	1 1 1 1	4
16	(a)	$e = Blv$	1	4

	(b)	$e = Blv = 0.3 \times 10^{-4} \times 10 \times 5 = 1.5mV$	3	
17	(a)		2	4
	(b)	$d = (i_1 - r_1) + (i_2 - r_2)$ $d = (i_1 + i_2) + (r_1 + r_2)$ $d = (i_1 + i_2) + A$ $d + A = i_1 + i_2$	2	
18	(a)	$\frac{1}{f} = \frac{1}{f_1} + \frac{1}{f_2} = \frac{1}{15} - \frac{1}{20} = 60$ cm	2	4
	(b)	$p = \frac{1}{f} = \frac{1}{0.6} = 1.67\ D$	1	
	(c)	iv) 1.8	1	
19	(a)	Statement of Huygen's Principle.	1	4
	(b)		1	
		$\sin i = \frac{v_1\tau}{AC}$ $\quad$ $\sin r = \frac{v_2\tau}{AC}$	1	
		$\frac{\sin i}{\sin r} = \frac{v_1}{v_2}$	1	

		$\frac{\sin i}{\sin r} = \frac{n_2}{n_1}$		
Answer any three questions from Qn No 20 to 23				
20	(a) (b) (c)	Young's Double slit experiment. Correct derivation of $\beta = \frac{\lambda D}{d}$ Single slit diffraction pattern.	1 3 1	5
21	(a) (b) (c)	Since the circuit is in resonance $Z = R = 10\ \Omega$ $f = \frac{1}{2\pi\sqrt{LC}}$ $C = \frac{1}{4\pi^2 f^2 L} = 50\mu F$ (i) 110 V (ii) zero	1 2 2	5
22	(a) (b) (c)	correct derivation of $\frac{1}{f} = \left(\frac{n_2}{n_1} - 1\right)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ $\frac{1}{12} = (n-1)\left(\frac{1}{10} + \frac{1}{15}\right)$ $n = 1.5$ ii) diverging	2 2 1	5
23	(a) (b) (c)	Definition of electric dipole moment Correct derivation of the equation $\vec{E} = \frac{1}{4\pi\varepsilon_0} \times \frac{2pr}{(r^2-a^2)^2}\hat{p}$ 120^0	1 2 1	5