

### Marking scheme

1	Pole strength of a magnetic dipole	1
2	Microwaves	1
	OR	
	Equal to 1	1
3	Straight line path	1
4	No	1
5	$3.65 \times 10^{-7} \text{ m}$	1
	OR	
	$1.23 \times 10^{-7} \text{ m}$	1
6	Ultra-violet rays	1
7	X – positron or $(+1e)$	1
	OR	
	1amu is equivalent to 931 MeV	1
8	Zero	1
	OR	
	p-type semiconductor	1
9	Decreases	1
10	1:1	1
11	(a)	1
12	(c)	1
13	(a)	1
14	(d)	1
15	(i) (a)	1
	(ii) (c)	1
	(iii) (c)	1
	(iv) (b)	1
	(v) (a)	1
16	(i) (a)	1

	(ii) (d)		1
	(iii) (d)		1
	(iv) (c)		1
	(v) (a)		1
17	$I = e/T = e \omega / 2\pi$		1
	$B = \mu_0 I / 2r = \mu_0 e \omega / 4\pi r$		1
18	$\frac{1}{f} = (n - 1) \left[ \frac{1}{R} - \frac{1}{-R} \right] = (n - 1) \left[ \frac{2}{R} \right]$		1
	$\frac{1}{f'} = (n - 1) \left[ \frac{1}{R} - \frac{1}{\infty} \right] = (n - 1) \left[ \frac{1}{R} \right]$	$f' = 2f$	1
	OR		
	$\frac{1}{f} = (n - 1) \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$		½
	$\frac{1}{12} = (n - 1) \left[ \frac{1}{10} + \frac{1}{15} \right]$		1
	$n = 3/2$		½
19	$\phi = E_1 \cdot A \cos 180^\circ + E_2 \cdot A \cos 0^\circ$		1/2
	$= 10 \times 0.01 \times (-1) + 15 \times 0.01 \times 1$		1
	$= 0.05 \text{ Nm}^2 \text{C}^{-1}$		½
	OR		
	$0 = k(-q)(+Q)/r + k(+Q)(-q)/r + k(-q)(-q)/2r$		1
	$0 = -2kqQ/r + kq^2/2r$		½
	$Q/q = ¼$		½
20	circuit diagram		1
	Wave forms		1
21	$E_o = NBA\omega = 20 \times 3 \times 10^{-2} \times (22/7) \times (0.07)^2 \times 50$		1
	$= 0.46 \text{ V}$		½
	$I_o = 0.46/10 = 0.046 \text{ A}$		½
22	$x = n_1 \beta_1 = n_2 \beta_2$		
	$n \cdot 650 = (n+1) \times 520$		½
	$n = 4$		½
	$x = 4 \times 1.2 \times 650 \times 10^{-9} / (2 \times 10^{-3}) = 1.56 \text{ mm}$		1

23	circuit diagram	1
	Characteristics	1
24	$\frac{1}{f} = (n - 1) \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$	
	$\frac{1}{20} = (1.5 - 1) \left[ \frac{1}{R_1} - \frac{1}{R_2} \right]$	1/2
	$\frac{1}{f} = \left( \frac{1.5}{1.65} - 1 \right) \left[ \frac{1}{10} \right]$	
	F = -110 cm	1
	n = 1.5	1/2
25	$N_1 \times 2\pi R = N_2 \times 2\pi R/2$	1/2
	$N_2 = 2N_1$	1/2
	$M_2/M_1 = 2N \cdot \pi(R/2)^2 / N \cdot \pi R^2 = 1/2$	1
	OR	
	$l = q/t = e/(2\pi r/v)$	1
	$ev/2\pi r$	1
26	$H = B_E \cos 60^\circ = 0.4 \times 10^{-4} \times 1/2$	
	$V = B_E \sin 60^\circ = 0.4 \times 10^{-4} \times \sqrt{3}/2$	1
	(i) $e = Vlv = 1.75 \text{ mV}$	1
	(ii) $e = Hlv = 1 \text{ mV}$	1
27	(i) A	1
	(ii) B	1
	(iii) slope = $v_d/V = e\tau/ml$	1
	OR	
	(i) E is halved and R is same	1
	(ii) E is doubled and R is halved	1
	(iii) E remains same and R becomes one-fourth	1
28	$K = hc(1/\lambda_1 - 1/\lambda_0)$	1
	$2k = hc(1/\lambda_2 - 1/\lambda_0)$	1
	$\lambda_0 = \lambda_1 \cdot \frac{\lambda_2 - \lambda_1}{\lambda_2 - \lambda_1}$	1
29	$hc/\lambda = 0 - E_1 = 13.6 \times 1.6 \times 10^{-19}$	1

	$\lambda = 91 \text{ nm}$	1
	it will ionose the atom and impart kinetic energy to emitted electron	1
30	(a) 6 fm	1
	(b) $2K = ke^2/2r$	1
	$K = 360 \text{ keV}$	1
31	Statement	1
	Derivation	3
	Graph	1
	OR	
	Definition and SI unit	2
	Diagram and expressions	3
32	X resistor, Y – inductor and Z – capacitor	3
	$Z = R$	1
	Graph	1
	OR	
	X is capacitor and $X_c = 1/\omega C$	2
	$X_c$ varies inversely to frequency and graph	1
	Graphs	1
	Phasor diagram	1
33	Diagram and formula	3
	Diagram and advantages	2
	OR	
	(a) Intensity pattern	1
	Central maxima = $2D\lambda/a$ and first secondary maxima = $D\lambda/a$	
	So width of central maxima = 2 width of first secondary maxima	2
	Two characteristics features	2