Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

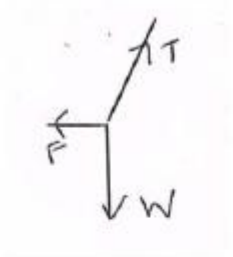
Q1.

Question Number	Acceptable answers	Additional guidance	Mark
(i)	An answer which makes reference to: • Diode only lets current through in one direction (1) • (In positive half cycle of input) D2 and D4 conduct (1) **Or** In positive half cycle of input D2 conducts **Or** (In negative half cycle of input) D3 and D1 conduct (1) **Or** negative half cycle D3 conducts • Current towards X **Or** down through *R* **Or** X to Y		3
(ii)	• Read off corresponding values of *V* and *t* from graph (1) • Use of $lnV = lnV_o - \frac{t}{RC}$ (1) • $C = 3.5 \times 10^{-5}$ F (1) range 2.7×10^{-5} F to 3.5×10^{-5} F Alternate method • Use of $I = V/R$ • Use of $Q = It$ and $C = \Delta Q/\Delta V$ • $C = 2.7 \times 10^{-5}$ F to 3.5×10^{-5} F	eg this can be any *t* (in ms) and corresponding *V* Example of calculation $ln3.5 = ln4 - \frac{0.008\ s}{2200\ \Omega \times C}$ $C = 2.7 \times 10^{-5}$ F Alternate: $I = 3.8$ V / 2.2 kΩ = 1.73 mA $Q = 1.73$ mA ×8 ms = 13.8×10^{-6} C $C = 13.8 \times 10^{-6}$ C / 0.4 V = 3.4×10^{-5} F	3

Q2.

Question Number	Answer	Mark
	D	1

Q3.

Question Number	Answer		Mark
(a)(i)	*W*/*mg* and *T* correct *F*/*E*/ electric force correct Example of diagram  	(1) (1)	2
(a)(ii)	See $T\cos\theta = W$ See $T\sin\theta = F$ **Or** Draws a correct triangle of forces Correctly labels θ (if a triangle is drawn it must be a closed polygon with correctly orientated direction of arrows)	(1) (1) (1) (1)	2
(b)(i)	Records 1pair of values from graph Records 2nd pair of values from graph Use of $F r^2$ Shows that $F_1 r_1^2 = F_2 r_2^2$ (accept answers with or without the powers of ten included) Example of answer Ignoring powers of 10 $115\ \text{N} \times 20^2\ \text{m}^2 = 46000$ $51\ \text{N} \times 30^2\ \text{m}^2 = 45900$	(1) (1) (1) (1)	4
(b)(ii)	Uses constant from (b) ignoring powers of ten errors **Or** uses a pair of values from graph Use of $F = kQ_1 Q_2 / r^2$ with 1.6×10^{-19} C $Q = 7.2 \times 10^{-9}$ C Example of answer $100\ Q^2 = 46000 \times 10^{-9}\ \text{N m}^2 / 8.99 \times 10^9\ \text{N m}^2\ \text{C}^{-2}$ $Q^2 = 5.12 \times 10^{-17}\ \text{C}^2$ $Q = 7.2 \times 10^{-9}$ C	(1) (1) (1)	3
	Total for question		11