7(a)	$V_C = V_R$
7(b)(i)	$C = Q / V$
	$= (7.2 \times 10^{-3}) / 12$ $(= 6.0 \times 10^{-4}$ F)
	$= 600\ \mu$F
7(b)(ii)	$R = V / I$
	$= 12 / (1.5 \times 10^{-3})$ $(= 8000\ \Omega)$
	$= 8.0$ kΩ
7(b)(iii)	$\tau = RC$
	$= 8000 \times 6.0 \times 10^{-4}$
	$= 4.8$ s
7(c)	*Any two points from:* • charge and current are both (directly) proportional to voltage • charge is (directly) proportional to current • current is the rate of change of charge
	Q is proportional to the rate of change of Q (so exponential variation)

6(a)(i)	conversion (from a.c.) to d.c.
6(a)(ii)	half-wave: voltage in one direction is removed
	full-wave: voltage in one direction is reversed
6(b)(i)	one gap connected by a single diode and other gap connected directly
	diode drawn (in a circuit) with correct circuit symbol
6(b)(ii)	smoothing
6(c)(i)	$E = \frac{1}{2}CV^2$
	$C = 2 \times 0.041 / 12^2 = 5.7 \times 10^{-4}$ F $= 570\ \mu$F
6(c)(ii)	$8.0 = 12.0 \exp(-0.010 / RC)$
	$\ln(8.0 / 12.0) = -0.010 / (R \times 5.7 \times 10^{-4})$
	$R = 43\ \Omega$

6(a)	• p.d. across capacitor proportional to charge on capacitor • p.d. across capacitor = p.d. across resistor • current in resistor proportional to p.d. across resistor • current in resistor = rate of decrease of charge on capacitor *Any two points, 1 mark each*
	charge proportional to current so rate of decrease of current decreases as current decreases (therefore exponential shape)
6(b)(i)	$R = V / I$
	$= 12 / (0.13 \times 10^{-3})$
	$= 9.2 \times 10^4\ \Omega$
6(b)(ii)	correct read-off of at least one pair of values for I and t
	attempted read-off of t when $I = 0.048$ mA **or** substitution of a correct pair of values of I and t into $I = 0.13 \exp(-t / \tau)$
	$\tau = 4.3$ s
6(c)	$\tau = RC$
	$C = \tau / R = 4.3 / (9.2 \times 10^4)$
	$= 4.7 \times 10^{-5}$ F

5(a)(i)	correct circuit symbol for a diode shown correctly connected in series with the wires leading into and out of the dotted box
5(a)(ii)	smoothing / V_{OUT} is smoothed
5(b)(i)	frequency $= 1 / 0.04$ $= 25$ Hz
5(b)(ii)	$V = V_0 \exp(-t / RC)$ **and** $\tau = RC$ **or** $V = V_0 \exp(-t / \tau)$
	$3.25 = 5.50 \exp(-0.020 / \tau)$ leading to $\tau = 0.038$ s
5(b)(iii)	$\tau = RC$
	capacitance $= 0.038 / 14000$ $= 2.7 \times 10^{-6}$ F
5(c)	V_{IN} has constant magnitude in both positive and negative directions
	(so) V_{OUT} is (now) constant / V_{OUT} does not vary with time