Multiple Choice Answers

Q34: A

Q35: D

Q36: D

Q37: C

5(a)	sum of current(s) into junction = sum of current(s) out junction **or** (algebraic) sum of current(s) at a junction is zero
5(b)(i)	line with negative gradient
	line from 0 °C to 100 °C, starting at (0, R_0) with negative gradient throughout and never reaching $R = 0$
5(b)(ii)	(resistance of T decreases so) total resistance (of circuit) decreases
	current in cell increases (so p.d. across internal resistance increases)
	terminal p.d. decreases (and resistance of R is constant) so current in R decreases
5(c)(i)	p.d. across r = 1.50 – (6.00 × 0.200) (= 0.30 V)
	current in cell = 0.30 / 0.12 = 2.5 A
5(c)(ii)	current in thermistor = 2.5 – 0.200 (= 2.3 A)
	resistance of T = (6.00 × 0.200) / 2.3 = 0.52 Ω

5(a)	sum of current(s) into junction = sum of current(s) out junction **or** (algebraic) sum of current(s) at a junction is zero
5(b)(i)	(V =) $E - Ir$
	(V =) 5.0 – (38 × 10^{-3} × 4.7) = 4.8 (V)
5(b)(ii)	$R_{(Z)}$ = 120 Ω
	I_2 = 38 × 10^{-3} – (4.8 / (100 + 120))
	I_2 = 0.016 A
	or
	$R_{(Z)}$ = 120 Ω
	$R_{(EXT)}$ = 4.8 / 38 × 10^{-3} (= 126 Ω) 1 / $R_{(Y)}$ = 1 / 126 – 1 / (120 + 100) ($R_{(Y)}$ = 297 Ω) I_2 = 4.8 / 297
	I_2 = 0.016 A

5(b)(iii)	$P = IV$ **or** $P = I^2R$ **or** $P = V^2 / R$
	$P = 0.016 \times 4.8$ **or** $P = 0.016^2 \times (4.8 / 0.016)$ **or** $P = 4.8^2 / (4.8 / 0.016)$ $P = 0.077$ W
5(b)(iv)	resistance of the LDR / Z increases (as light intensity decreases)
	total resistance (of the circuit) increases **or** current in the battery decreases
	(potential difference across the internal resistor decreases so) the terminal potential difference increases

1	**Defining the problem**
	vary v and measure I **or** v is the independent variable and I is the dependent variable
	keep A and R constant
	Methods of data collection
	labelled diagram of workable experiment including: • fan positioned in line with the turbine so that blades of both fan and turbine overlap • fan on bench • fan labelled and one other label from bench, turbine, blade(s) (of turbine), terminals, L
	workable circuit diagram showing resistor connected to an ammeter in series with the terminals of the turbine using correct circuit symbols
	method to vary v, e.g. change speed of fan / change distance between fan and blades / vary current in or p.d. across fan
	method to determine temperature T, e.g. use a thermometer
	Method of Analysis
	plot a graph of I^2 against v^3 or equivalent (e.g. lg I against lg v or 2 ln I against ln v)
	relationship valid if a straight line is produced passing through the origin (For lg I against lg v: relationship valid if a straight line with gradient = 1.5 is produced)
	$Q = \frac{2TR \times \text{gradient}}{AP}$ (For lg I against lg v: $Q = \frac{2TR \times 10^{2 \times y\text{-intercept}}}{AP}$)

1	**Additional detail including safety considerations**	
	D1	precaution with reason linked to (moving) fan blades / turbine blades, e.g. keep away from the fan to avoid (moving) blades **or** use a screen around the fan / turbine to avoid (moving) blades **or** precaution with reason linked to prevent air / dust particles in eye, e.g. use goggles to avoid air stream (into eye)
	D2	clamp turbine / fan to bench
	D3	keep P and T constant
	D4	$T = t + 273$
	D5	method to determine A: use a rule(r) / calipers to measure L **and** $A = \pi L^2$
	D6	repeat measurements of L in different positions / different blades **and** average
	D7	method to measure v, e.g. use an anemometer or air speed meter **or** method to measure P, e.g. use a manometer or barometer or pressure gauge
	D8	wait for steady / constant air flow / movement of blades / current
	D9	method to determine R, e.g.: separate circuit showing ohmmeter connected to R only **or** terminals of turbine connected correctly to resistor and ammeter and voltmeter across resistor **and** $R = V / I$ **or** separate workable circuit with power supply resistor, ammeter and voltmeter across R **and** $R = V / I$
	D10	method to check temperature / pressure is constant, e.g. measure temperature / pressure several times / before and after

Multiple Choice Answers

Q36: D