

Name of the Student: _____

Max. Marks : 26 Marks

Time : 26 Minutes

Mark Schemes

Q1.

(a)

	total resistance in circuit
X open, Y closed	R (given)
X closed, Y open	$\frac{2}{3} R$
X open, Y open	$2R$
X closed, Y closed	$R/2$

3

(b) energy dissipation is V^2/R or approach using both $I = V/R$ and $P = VI$

B1

highest resistance gives least energy

or X open, Y open or their highest tabulated resistance

B1

2

(c) electrons collide with ions

M1

transferring energy to them/giving them or increasing their vibrational/kinetic energy

A1

2

(d) voltage across load **lower** or load voltage = $\frac{R}{(R+r)}V$

B1

or load current reduced or load current = $\frac{V}{R}$

thermal energy output will decrease (in any stated circuit)

or identifies lowest resistance in table as being most affected

M1

since $P = \frac{V^2}{R}$ or since power = $I^2 R$

A1

3

(e) (i) resistance = $\frac{\rho L}{A}$ or substitution or $A = 1.16 \times 10^{-7} \text{ (m}^2\text{)}$

C1

$1.93 \times 10^{-4} \text{ (m)}$ 0.193mm

A1

(ii) **two** properties from

high resistance/resistivity (low electrical conductivity)

B1

high melting point

B1

low thermal capacity/specific heat capacity

B1

4

[14]

Q2.

(a) use of power = V^2/R **(1)**

300 Ω **(1)**

2

(b) (i) quotes potential divider formula or uses ratios **(1)**

correct substitution **(1)**

329 (330) Ω **(1)**

(ii) power dissipated proportional to resistance or calculates powers **(1)**

52% **(1)**

5

(c) power increases so current increases **(1)**

overheating/melting can occur (in wires or fuse) **(1)**

possible fire or fuse blows **(1)**

3

(d) current = 2.86 A **(1)**

time for which it operates = 0.45 hs **(1)**

2

[12]