5 **(a)** Define *resistance* of a circuit component.

……

…… [1]

(b) Fig. 5.1 shows a potential divider circuit consisting of two resistors of resistances *A* and *B*.

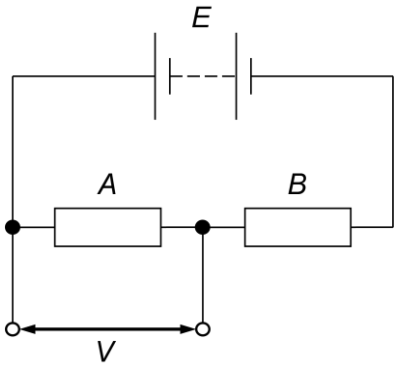

Fig. 5.1

The battery has an e.m.f. *E* and negligible internal resistance.

By considering the current in circuit, show that the potential difference *V* across the resistor of resistance *A* is given by the expression

$$V = \frac{A}{A+B}E$$

[1]

For Examiner's Use

(c) The resistances *A* and *B* are 1500 Ω and 4000 Ω respectively. A voltmeter is connected in parallel with the 1500 Ω resistor and a thermistor is connected in parallel with the 4000 Ω resistor, as shown in Fig. 5.2.

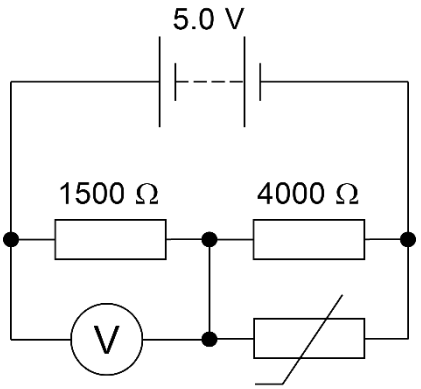

Fig. 5.2

The battery has an e.m.f. of 5.0 V and the voltmeter is ideal.

(i) State and explain the change in the reading of the voltmeter as the temperature of the thermistor is raised.

……

……

……

……

…… [3]

(ii) The resistance of the thermistor at 20 °C is 2700 Ω.

Calculate the reading on the voltmeter when the temperature of the thermistor is 20 °C.

voltmeter reading = …… V [3]

For Examiner's Use

(iii) For the same change in temperature, state and explain how the change in the voltmeter reading will be different if the battery has significant internal resistance.

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.....

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..... [2]

[Total: 10]