4 **(a)** Two resistors X and Y are connected to a power supply of e.m.f. of 8.0 V with negligible internal resistance. The circuit is earthed at point B between the two resistors as shown in Fig. 4.1.

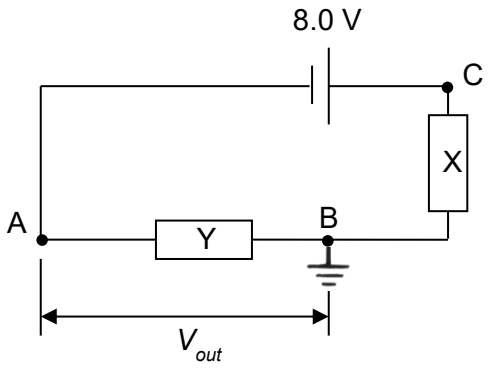

Fig. 4.1

The resistance of Y is 80 Ω.

The current in X is 40 mA.

The potential difference across Y is V_{out}.

(i) Determine the potential at point A.

potential at point A = …… V [2]

(ii) Calculate the resistance of resistor X.

resistance = …… Ω [2]

(b) An NTC thermistor is now connected across resistor Y as shown in Fig. 4.2.

The resistance of the thermistor is 100 Ω when it is at room temperature.

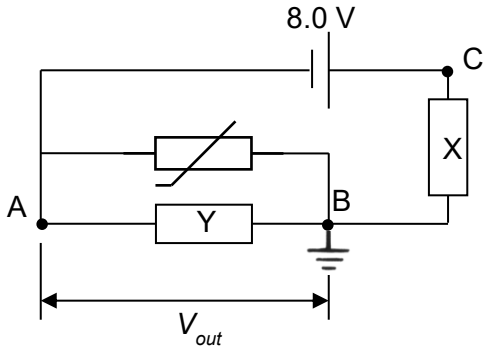

Fig. 4.2

(i) Calculate V_{out} at room temperature.

V_{out} = …… V [3]

(ii) State and explain whether a fan should be connected across AB or BC so that it turns on when the temperature gets hotter.

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……………………………………………………….…………………… [3]