(a) Fig 4.1 shows two identical resistors connected in series with a cell with unknown electromotive force (e.m.f) and unknown internal resistance.
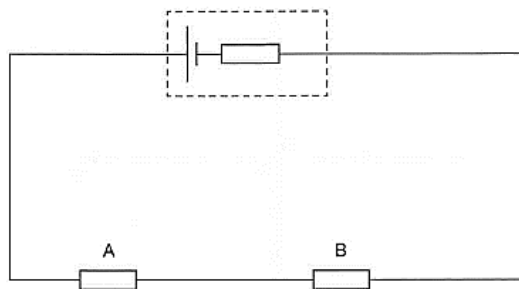

Fig. 4.1

The potential difference (p.d.) across resistor A is 5.90 V and the current in resistor A is 0.964 A.

A third resistor, half the resistance of A, is now connected in parallel with B. The p.d. across resistor A is now 8.48 V.

(i) Calculate the resistance of resistor A.

resistance of resistor A = ………………….. Ω [1]

(ii) Calculate the internal resistance of the cell.

Internal resistance of the cell = ………………….. Ω [5]

(b) Instead of a third resistor connected in parallel with B, a thermistor is now connected in parallel with resistor B.

    (i) Explain how the p.d. across resistor A will change when the temperature of the thermistor increases.

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………………………………………………………………………………………. [3]

    (ii) A buzzer of high resistance will sound when the p.d. across it increases beyond a certain threshold.
State the resistor across which the buzzer should be connected such that it sounds off when the temperature increases beyond a certain point.

………………………………………………………………………………………. [1]

[Total: 10]