6 **(a)** A uniform wire AB of length 150 cm and radius 0.45 mm is connected in series with a cell E of e.m.f. 6.0 V with negligible internal resistance as shown in Fig. 6.1.

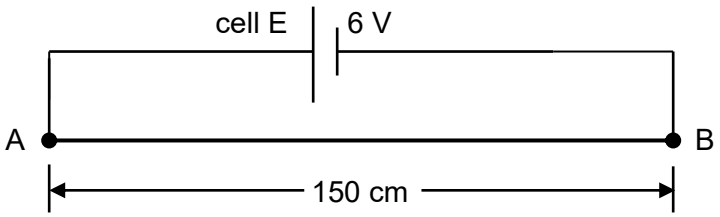

Fig. 6.1

The resistivity of the wire is $1.1 \times 10^{-6}\ \Omega\,\text{m}$.

Determine the resistance of the wire.

[2]

resistance = ……..……..…….…… Ω

(b) A cell C of e.m.f. 1.5 V with internal resistance *r* is connected to the circuit of Fig. 6.1, as shown in Fig. 6.2.

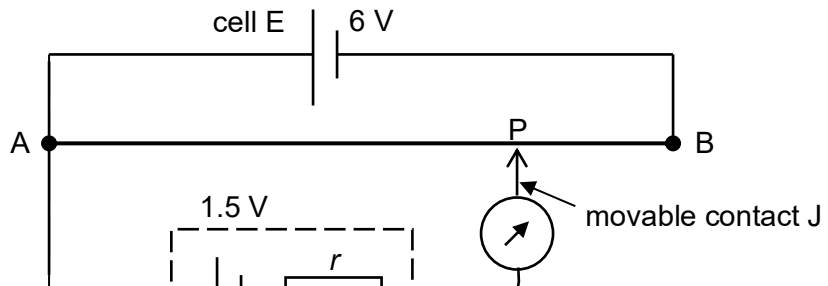

Fig. 6.2

The movable contact J can be connected to any point along the wire AB.

(i) Determine the length AP required to produce zero current in the galvanometer.

[2]

length AP = ……...…… m

(ii) An additional resistor, *R*, of resistance 2.0 Ω is now connected between the terminals of cell C as shown in Fig. 6.3, and it produces a balance length of 25 cm from A.

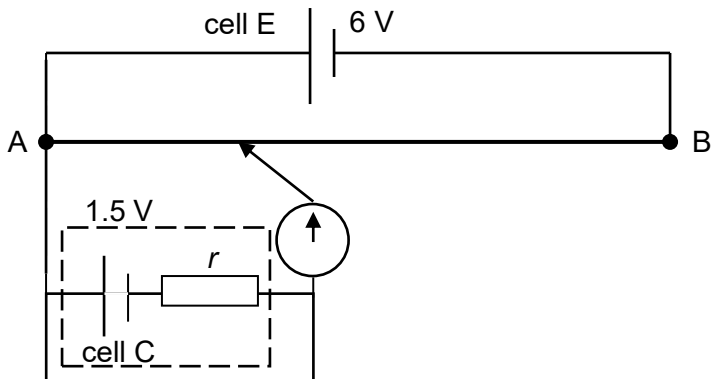

Fig. 6.3

Determine the internal resistance of cell C.

[3]

internal resistance = ……..…….. Ω

(iii) After prolonged use, the internal resistance of cell E may increase and become significant.

State and explain how the balance length mentioned in part **(b)(ii)** will change.

……..……..

……..……..…… [2]

……

……..……..……..……..

[2]