7 **(a)** Distinguish between the electromotive force (e.m.f.) of a cell and the potential difference (p.d.) across a resistor.

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....

....

.... [3]

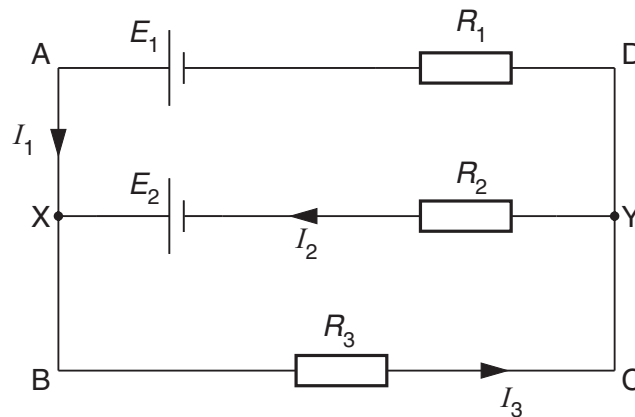**(b)** Fig. 7.1. is an electrical circuit containing two cells of e.m.f. E_1 and E_2.

Fig. 7.1

The cells are connected to resistors of resistance R_1, R_2 and R_3 and the currents in the branches of the circuit are I_1, I_2 and I_3, as shown.

(i) Use Kirchhoff's first law to write down an expression relating I_1, I_2 and I_3.

.... [1]

(ii) Use Kirchhoff's second law to write down an expression relating

1. E_2, R_2, R_3, I_2 and I_3 in the loop XBCYX,

.... [1]

2. E_1, E_2, R_1, R_2, I_1 and I_2 in the loop AXYDA.

.... [1]

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