



- 5 (a) By reference to energy, explain what is meant by *electromotive force* (e.m.f.).

..... [1]

- (b) A power supply of e.m.f. E and internal resistance r is connected to two resistors S and T and a voltmeter as shown in Fig. 5.1.

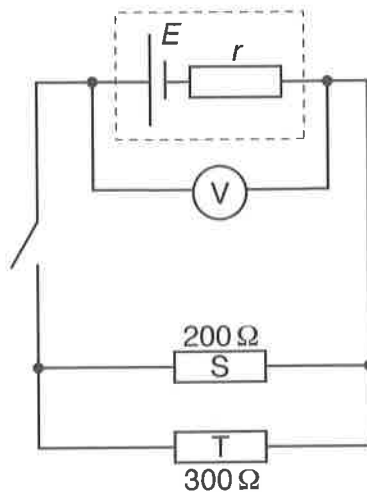


Fig. 5.1

The voltmeter has infinite resistance.

Resistors S and T have resistances of $200\ \Omega$ and $300\ \Omega$, respectively.

When the switch is open the voltmeter reading is 12.0 V .

When the switch is closed the voltmeter reading is 10.8 V .

- (i) Determine the values of E and r .

$$E = \dots\dots\dots \text{ V}$$

$$r = \dots\dots\dots \Omega$$

[5]



- (ii) With the switch closed, calculate the energy dissipated in the power supply in a time of 5.0 minutes.

energy = J [2]

- (iii) Resistor T is replaced by an NTC thermistor. Initially the resistance of the thermistor is $300\ \Omega$. The switch is closed. The temperature of the thermistor is then increased.

State and explain the change, if any, to the voltmeter reading when the switch is closed.

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..... [3]

[Total: 11]