3 Fig. 3.1 shows a cell connected in series with a resistor R.

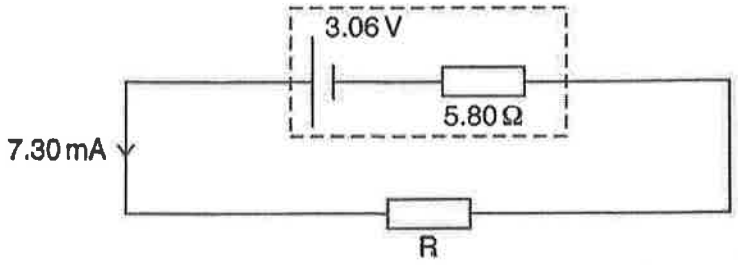

Fig. 3.1

The cell has an e.m.f. of 3.06 V and an internal resistance of 5.80 Ω. The current in the circuit is 7.30 mA.

(a) Calculate,

(i) the resistance of the resistor R,

resistance = ... Ω [2]

(ii) the power supplied to the resistor R.

power = ... W [2]

(b) The electrical energy that can be supplied by the cell to the resistor R during its working life is 286 J.

(i) Calculate the time that it takes to supply this quantity of energy.

time = ... s [1]

(II) An identical cell is used in a similar circuit to provide a current of 7.30 mA in pulses of duration 0.010 s. Only one pulse is produced every second.

Calculate the number of days this cell will last.

number of days ..... [1]

(III) In practice, the internal resistance of the cell increases as time passes.

Suggest two effects this will have on the pulses produced by the circuit in **(b)(II)**.

1 .....

2 .....

[2]

[Total: 8]