5 **(a)** Define the tesla, the unit of magnetic flux density.

.....

.....

..... [2]

(b) The aluminium frame ABCD of a window measures 85 cm × 60 cm, as illustrated in Fig. 5.1.

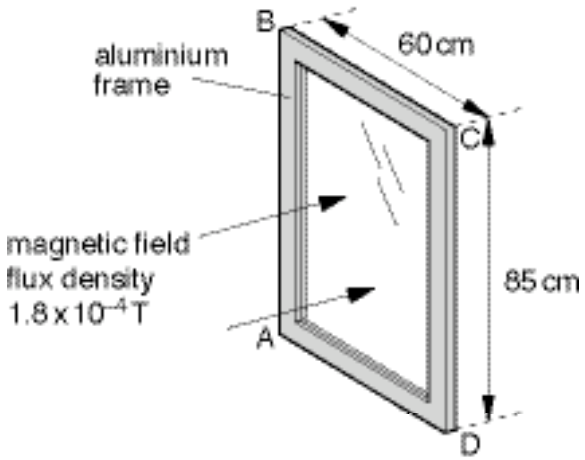

Fig. 5.1

The window is hinged along the edge AB.

When the window is closed, the horizontal component of the Earth's magnetic field, of flux density 1.8×10^{-4} T, is normal to the window.

(i) Calculate the magnetic flux through the window.

magnetic flux = ... Wb [2]

(ii) The window is now opened in a time of 0.20 s. When open, the plane of the window is parallel to the Earth's magnetic field.

For the opening of the window,

1. state the change in flux through the window,

change = ... Wb

2. calculate the average e.m.f. induced in side CD of the frame.

e.m.f. = ... V
[3]

(iii) Suggest, with a reason, whether the e.m.f. calculated in **(ii)2** gives rise to a current in the frame ABCD.

.....

..... [1]