5 (a) Define *magnetic flux linkage*.

....

....

....[2]

(b) A solenoid of diameter 6.0 cm and 540 turns is placed in a uniform magnetic field as shown in Fig. 5.1.
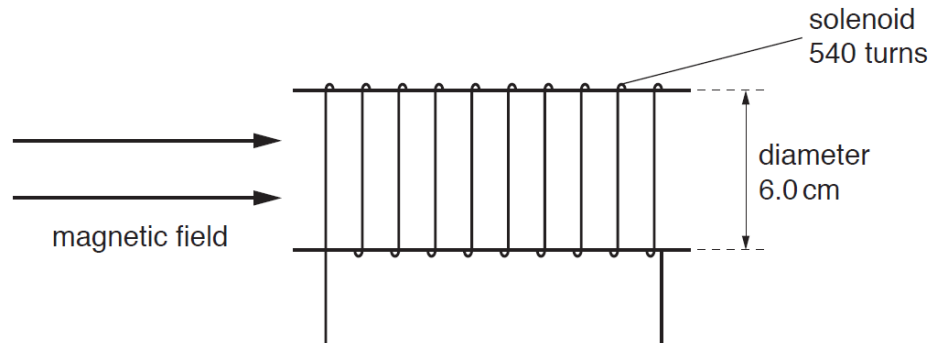

Fig. 5.1

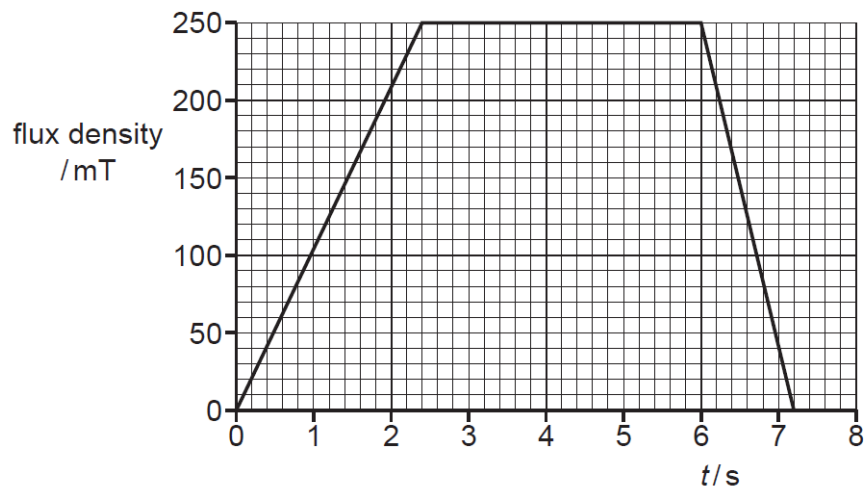The variation with time *t* of the magnetic flux density is shown in Fig. 5.2.

Fig. 5.2

Calculate the maximum magnitude of the induced electromotive force (e.m.f.) in the solenoid.

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

(c) A thin copper sheet X is supported on a rigid rod so that it hangs between the poles of a magnet as shown in Fig. 5.3.
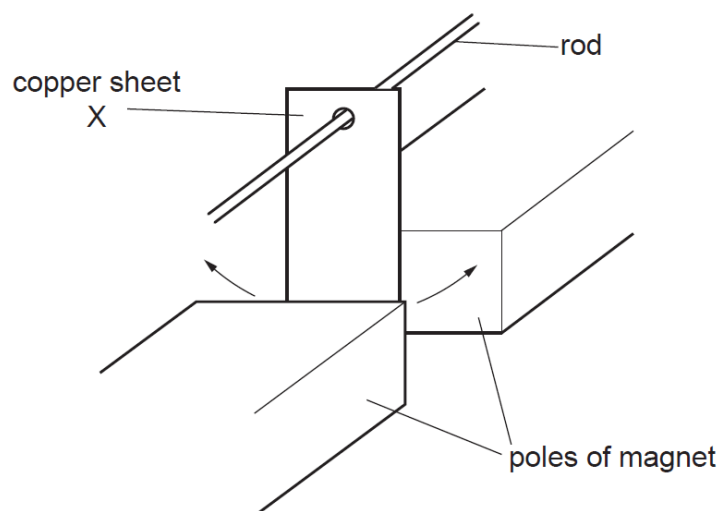

Fig. 5.3

Sheet X is displaced to one side and then released so that it oscillates. A motion sensor is used to record the displacement of X.

A second thin copper sheet Y replaces sheet X. Sheet Y has the same overall dimensions as X but is cut into the shape shown in Fig. 5.4.
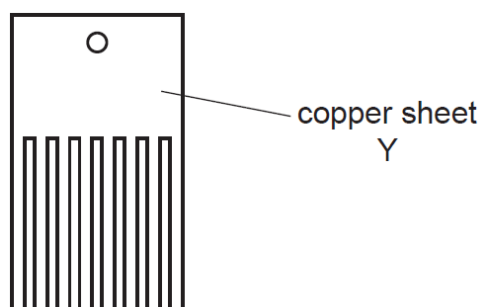

Fig. 5.4

The motion sensor is again used to record the displacement.

The graph in Fig. 5.5 shows the variation with time t of the displacement s of each copper sheet.
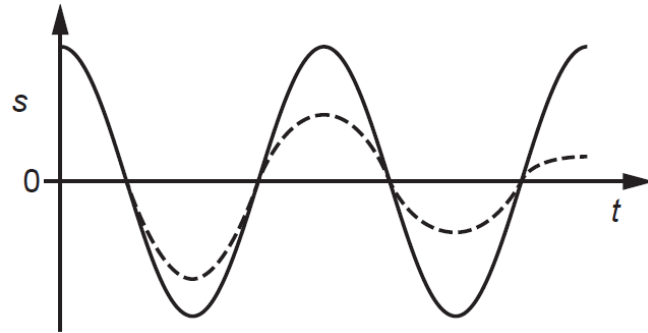

Fig. 5.5

(i) State the name of the phenomenon illustrated by the gradual reduction in the amplitude of the dashed line.

....[1]

(ii) Deduce which copper sheet is represented by the dashed line.
Explain your answer using the principles of electromagnetic induction.

....

....

....

....

....

....

....

....[4]

[Total: 10]