

- 7 (a) A solenoid of diameter 9.0 cm and 560 turns is placed in a uniform magnetic field as shown in Fig. 7.1.

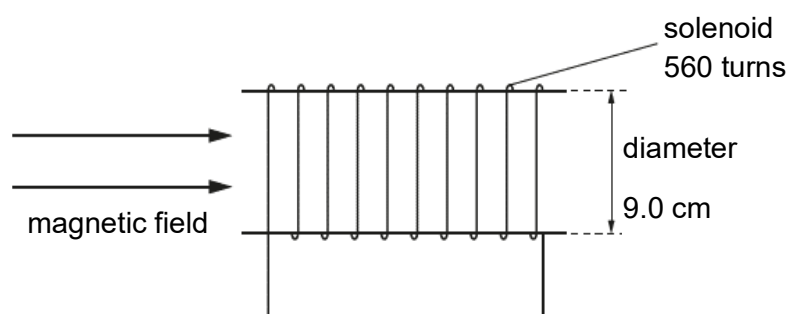


Fig. 7.1

The variation with time  $t$  of the magnetic flux density is shown in Fig. 7.2.

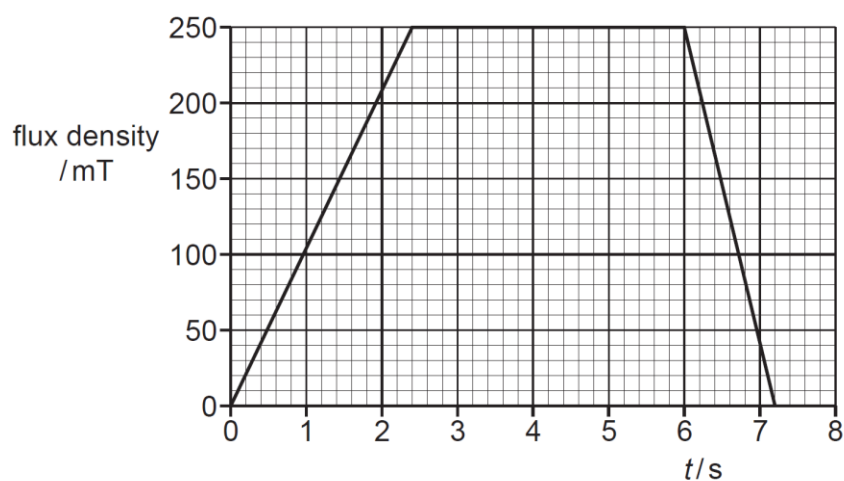
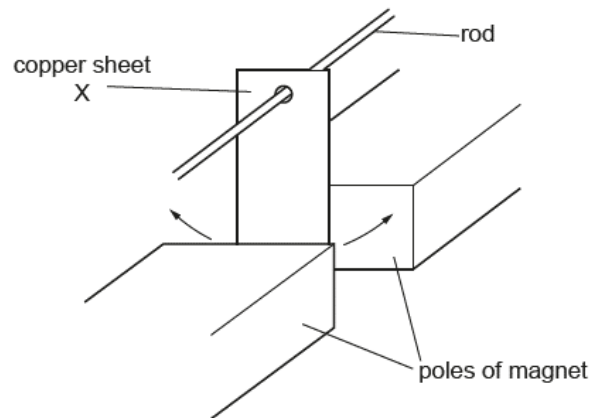


Fig. 7.2

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

e.m.f. = ..... V [2]

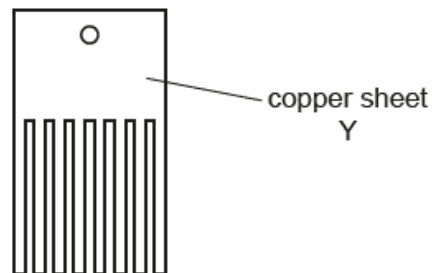
- (b) A thin copper sheet X is supported on a rigid rod so that it hangs between the poles of a magnet as shown in Fig. 7.3.



**Fig. 7.3**

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.

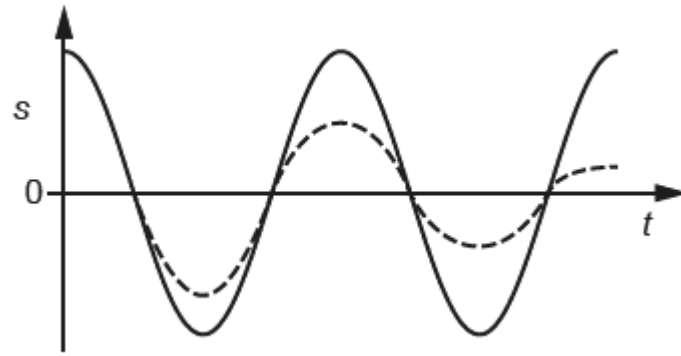
A second thin copper sheet Y replaces sheet X. Sheet Y has the same overall dimensions as X but is cut into the shape shown in Fig 7.4.



**Fig. 7.4**

The motion sensor is again used to record the displacement.

The graph in Fig. 7.5 shows the variation with time  $t$  of the displacement  $s$  of each copper sheet.



**Fig. 7.5**

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

.....

.....

.....

.....

.....

.....[4]

[Total: 6]

