5 **(a)** **(i)** Define magnetic flux.

....

....

.... [1]

(ii) Hence define magnetic flux linkage for a coil of N turns.

....

....

.... [1]

(b) A square copper coil of five turns moves at a constant speed of 2.5 cm s^{-1} from initial position X to final position Y as shown in Fig. 5.1. The length of each side of the square coil is 5.0 cm. There is a square region of uniform magnetic field, B = 2.0 T placed in between X and Y. The length of each side of the magnetic field is 10 cm.

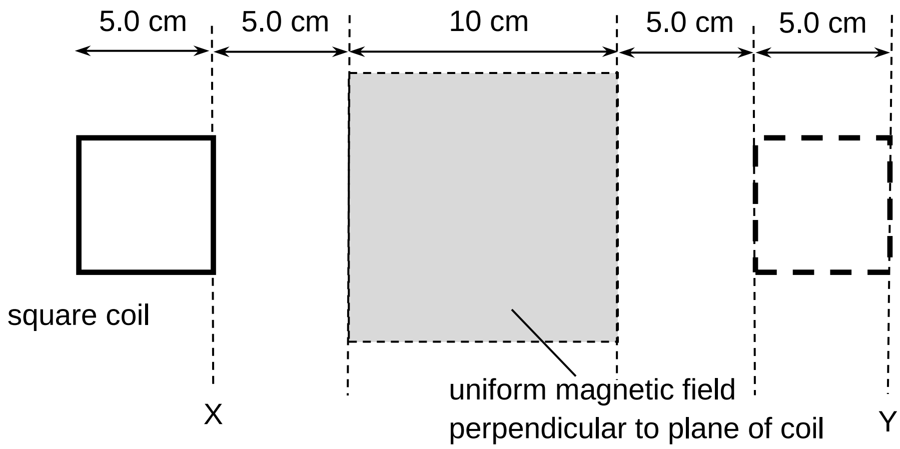

Fig. 5.1 (top view)

(i) Calculate the maximum e.m.f. E_{max} induced in the coil.

E_{max} = ... V [2]

(ii) On Fig. 5.2, sketch a graph of how induced e.m.f. *E* in the coil varies with time *t* as the coil moves from initial position X to final position Y.

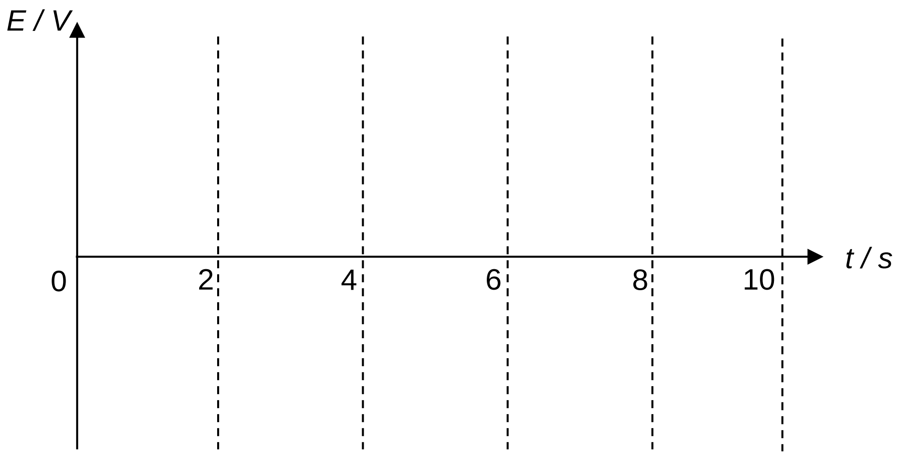

Fig. 5.2

[2]

(iii) The copper coil is now replaced by a solid copper disc of the same size.

It is found that more work is needed to push the copper disc to enter the magnetic field at the same speed.

Explain the observation.

....

....

....

.... [2]