

- 5 (a) Define the *tesla*.

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[2]

- (b) A long solenoid has an area of cross-section of 28 cm^2 , as shown in Fig. 5.1.

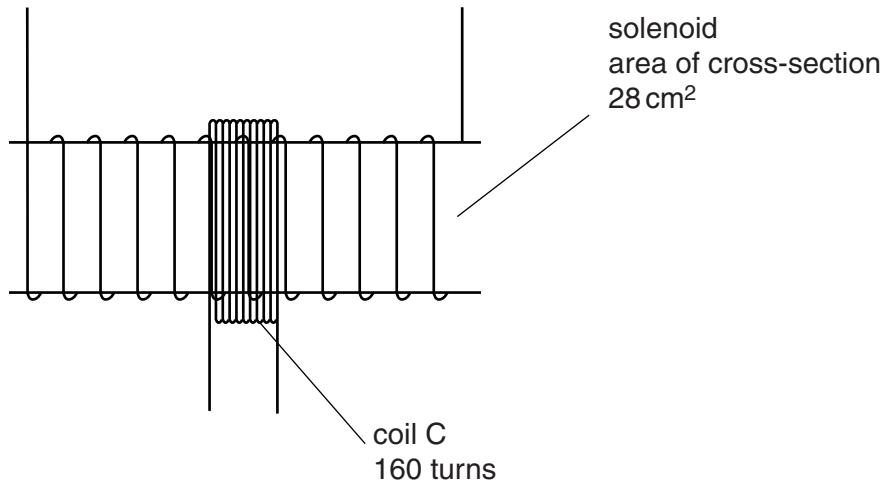


Fig. 5.1

A coil C consisting of 160 turns of insulated wire is wound tightly around the centre of the solenoid.

The magnetic flux density B at the centre of the solenoid is given by the expression

$$B = \mu_0 n I$$

where I is the current in the solenoid, n is a constant equal to $1.5 \times 10^3 \text{ m}^{-1}$ and μ_0 is the permeability of free space.

Calculate, for a current of 3.5 A in the solenoid,

- (i) the magnetic flux density at the centre of the solenoid,

flux density = T [2]

- (ii) the flux linkage in the coil C.

flux linkage = Wb [2]

- (c) (i) State Faraday's law of electromagnetic induction.

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- (ii) The current in the solenoid in (b) is reversed in direction in a time of 0.80 s.
Calculate the average e.m.f. induced in coil C.

e.m.f. = V [2]