1 Magnetic fields:

1.1 Total flux equation:

$$\phi = \mathrm{B}A \qquad \text{(Wb)}$$

2 Tesla

The flux density of the field that exerts a **force** of 1N on a 1m long wire, placed at **right angles** to the field and carrying a **current** of 1A.

$$F = BIl \qquad \text{(T)}$$

Where B is the component of the field that is **perpendicular** to the current, I the **current** (A) in the system and l the **length** (m).

3 Lorentz Force:

$$F = Bqv \qquad \text{(N)}$$

Where F is the force on a moving charge in a magnetic field, B is the **total flux** (Wb) in the magnetic field, q is the **charge** (C) of the moving particle and v its **velocity** ($\mathrm{m\,s^{-1}}$).

4 The Laws of Electromagnetic Induction:

4.1 Faraday's Law

An e.m.f. is induced in a conductor whenever the magnetic flux taht links with that conductor changes. The size of the e.m.f. is equal to the rate of change of the flux linkage.

4.2 Lenz's Law

The direction of the induced e.m.f./current is always such as to oppose the change causing it.

4.3 Equation:

$$E = \frac{\Delta N\phi}{\Delta t} \qquad \text{(V)}$$

Where E is the **induced e.m.f.** (V), the product $N\phi$ is the **flux linkage** (Wb), N is the number of turns of the coil and ϕ is the **magnetic flux** (Wb).

4.4 Conductor Cutting Lines of Flux:

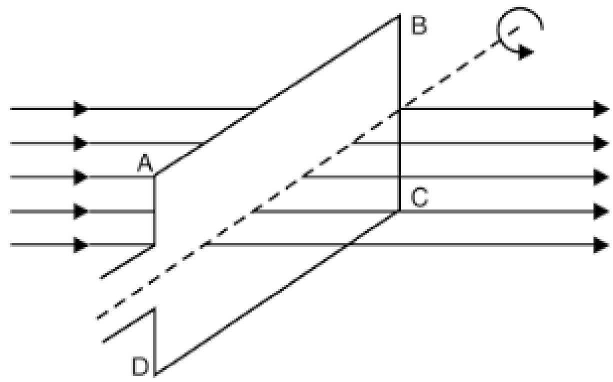
$$E = Blv \qquad \text{(V)}$$

Where E is the induced e.m.f. l is the length of the conductor cutting the field and v is the speed at which the conductor cuts the field.

5 A.C. Generation:

5.1 Rotating rectangular coil:

5.1.1 Diagram :



perpendicular $\implies$ peak e.m.f. parallel $\implies$ no e.m.f.

5.1.2 Induced e.m.f. formula:

$$E = 2\pi f \cdot BAN \cdot \sin(2\pi f t) \qquad \text{(V)}$$

5.1.3 Peak induced e.m.f formula:

$$E_0 = 2\pi f BAN \qquad \text{(V)}$$

6 R.M.S. value of an A.C. current:

$$I_{RMS} = \frac{I_0}{\sqrt{2}} \qquad (1)$$