Electromagnetic Induction

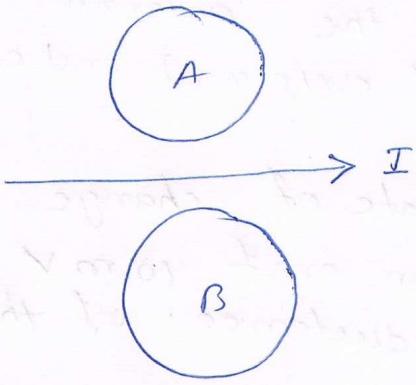
1) Name the SI units of (i) magnetic flux and
ii) self inductance.

2) State the Law that gives the polarity of the induced emf.

3) A conductor rod of length 'l' moves with velocity 'v' normal to the uniform magnetic field 'B'. what is the induced emf in the rod?

4) State Faraday's law of electromagnetic induction.

5) Predict the direction of induced currents in metal rings A and B lying in the same plane where current I in the wire is increasing steadily.



6) Define mutual inductance. Give SI unit.

7) write the use of eddy currents.

8) what will be the dimensions of L/R.

9) Derive an expression for the induced emf produced by changing the area of a rectangular coil placed perpendicular to a magnetic field.

10) what is electromagnetic damping? How is a galvanometer made dead beat?

11) State Lenz's Law. On which Law of conservation it is based?

12) The magnetic flux through a coil perpendicular to the plane is ~~moving~~ varying according to the relation:

$$\phi = (3t^3 + 4t^2 + t - 3)\ \text{wb}.$$

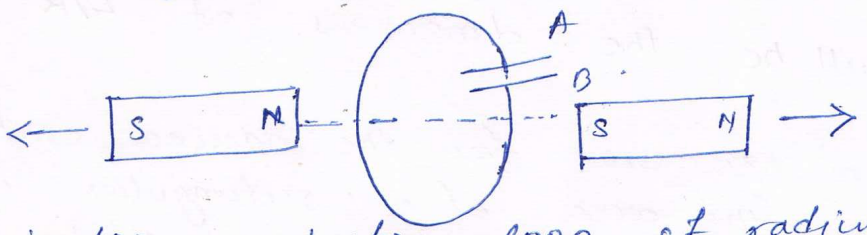
Calculate the induced current through the coil at $t = 2\,s$, resistance of coil is $10\,\Omega$.

13) An aircraft with a wing span of 40m flies with a speed of $1080\ \text{km h}^{-1}$ in the ~~north~~ westward direction at a constant altitude in the northern hemisphere, where the vertical component of earth's magnetic field $1.25 \times 10^{-5}\ T$. Find the emf that develops between the tips of the wings.

14) A fan blade of length 'l' rotates with frequency 'f' Hz., perpendicular to a magnetic field B. Find the potential difference between the centre of axis and end of blade.

15) If a rate of change of current of $4\ \text{As}^{-1}$ induces an emf 10 mV in a solenoid, what is the inductance of the coil?

16) Predict the polarity of the capacitor when the two magnets are suddenly away.



17) A circular conductor loop of radius 'a' and resistance R is placed with its plane perpendicular to a magnetic field $B = B_0 \sin \omega t$. Find the expression of induced current in the loop.