Tut-3 ED_2

(Q-1) The magnetic field inside a long solenoid of radius 'a' is given by: $B(t) = B_0 \cos(\omega t)\,\hat{z}$. A circular loop of radius '$\frac{a}{2}$' is placed inside the solenoid and co-axial with it.

(i) Find the voltage induced in the loop

(ii) What is the current of the loop if resistance is 'R'?

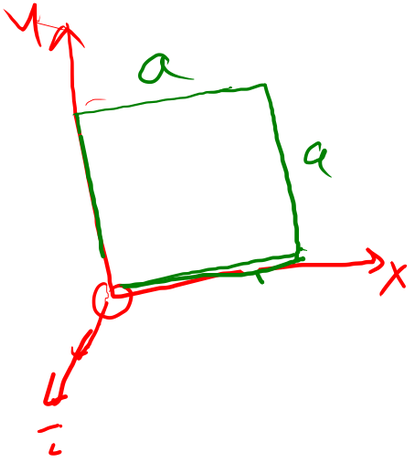
Hints: (i) $|\mathcal{E}_{emf}| = \left|\frac{d\Phi}{dt}\right|$; total magnetic flux $\Phi = \iint_S \vec{B}\cdot\vec{ds}$

$S \rightarrow$ area

(ii) $I = \frac{\text{Voltage}}{\text{resistance}}$

(Q-2) A square loop of wire lies in the first quadrant of the xy-plane with one corner at origin. The side length 'a'.

If a non-uniform time dependent magnetic field $\vec{B}(y,t) = ky^3 t^2 \hat{z}$ is applied, Find the emf induced in the loop. k is a constant



Hints: $|\mathcal{E}_{emf}| = \left|-\frac{d\Phi}{dt}\right|$, $\Phi = \oiint_S \vec{B}\cdot d\vec{s}$

$d\vec{s} = \hat{x}\,dy\,dz + \hat{y}\,dx\,dz + \hat{z}\,dx\,dy$ [In general form]