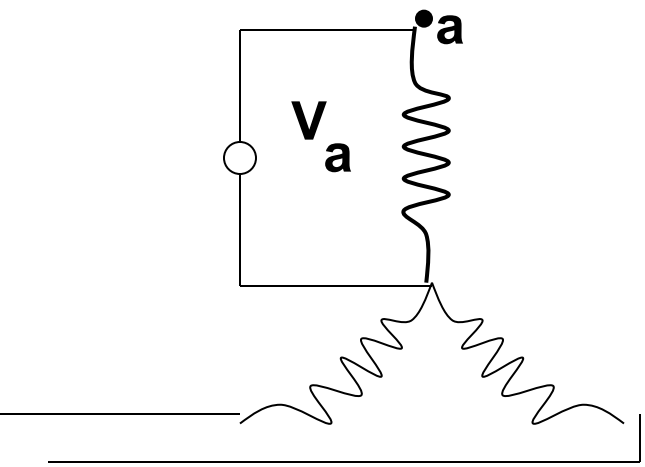
# Lecture 4

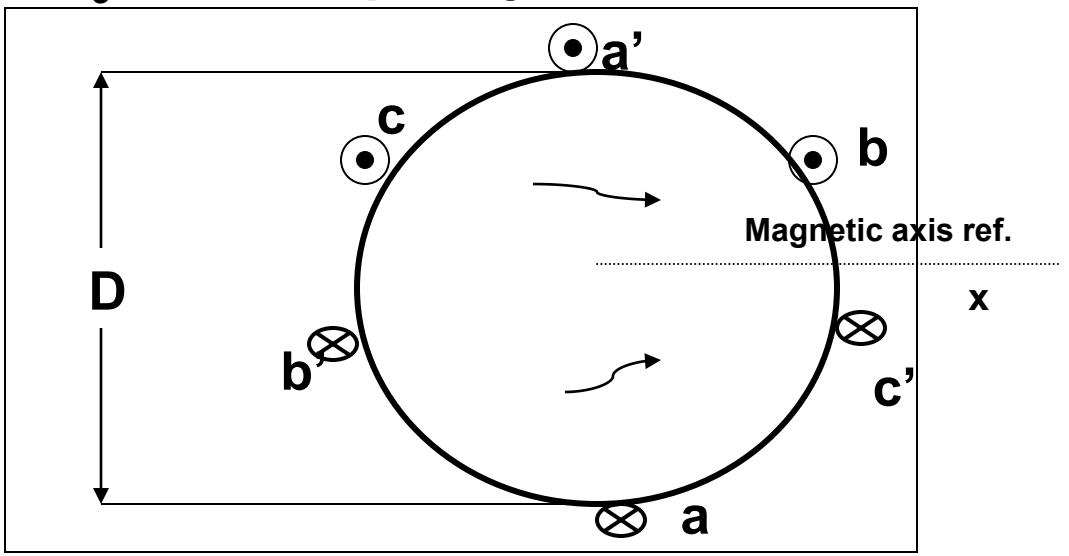
# The Rotating Magnetic Field

**Principle of Machine Operation:**

- **If a three-phase set of currents, each with equal magnitude and differing in phase by 120 degrees, flows in an armature winding, then it will produce a rotating magnetic field of <u>constant magnitude.</u>**

**The flux wave will travel in the air gap at the speed of** $n_{sync} = \frac{120 f_e}{P}$ **where** $f_e$ **is the frequency of the three phase currents.**



# Induced Emf in a synchronous machine

- E(average)=PZNø/60A
- E(rms)/E(average)=1.11
- E(rms)=2.22PøNT/60 (Z=2T)
- N=120f/P
- 2f=PN/60
- E=2.22øT*2f
- E=4.44øfT