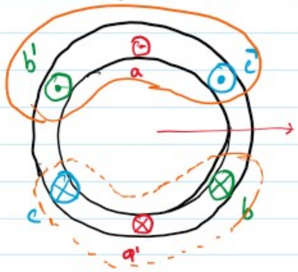
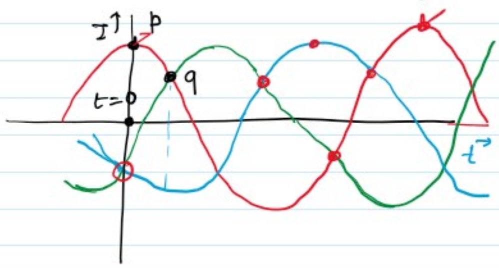
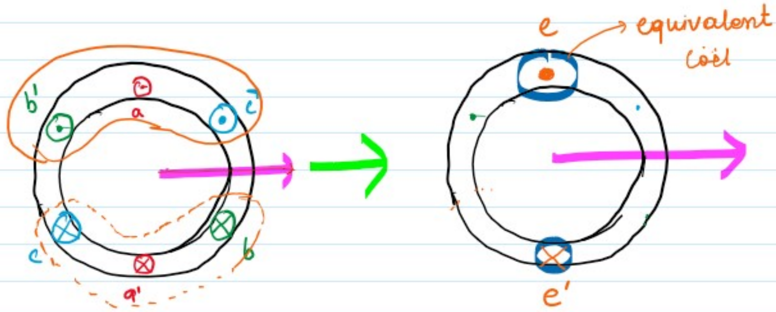
Rotating magnetic field which is created when coil or windings are

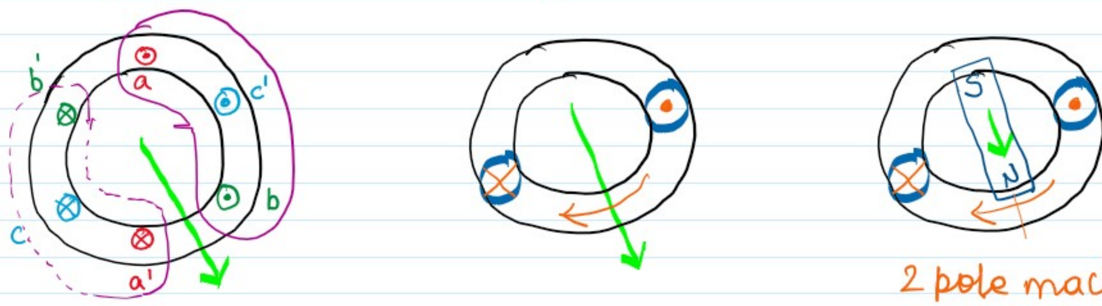
- mechanical displaced in space
- excited with electrical phase shifted currents / voltages





bunching or grouping conductors which have current in some direction





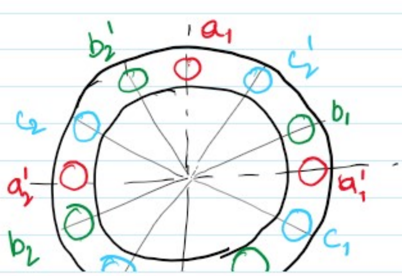
2 pole machine

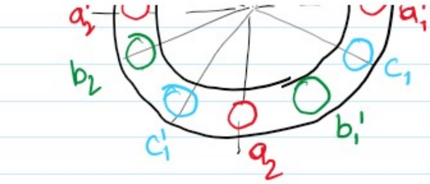
If we go through one complete electrical cycle then in this particular case under consideration we get one rotation of the field vector

$f_e = f_{mag}$ ⟶ mechanically we are tracing 360° when electrical signal goes through 360°

In this particular case, $\underline{f_e = f_m}$

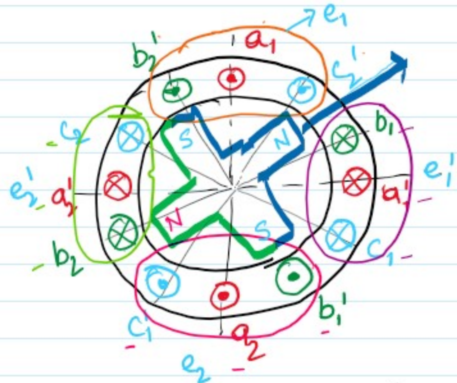
This structure has six coils on it. These coils are carrying 3 phase balanced currents (voltages are applied)

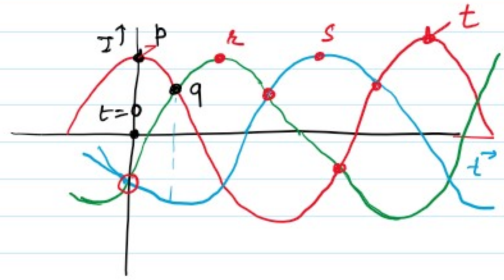




are applied)

Coils corresponding to phase are carrying current.



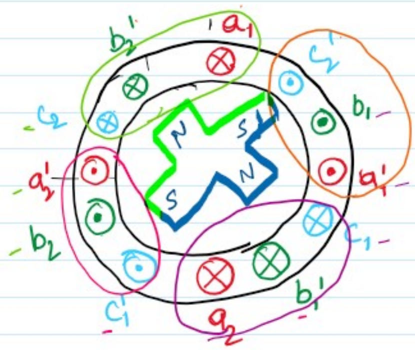


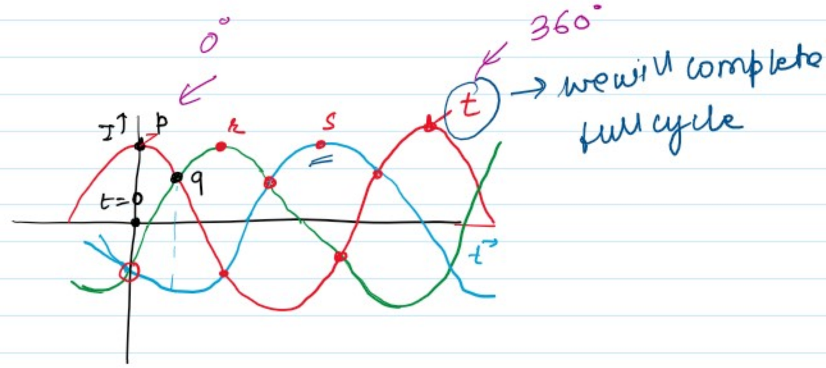
In this case we can create two equivalent coils

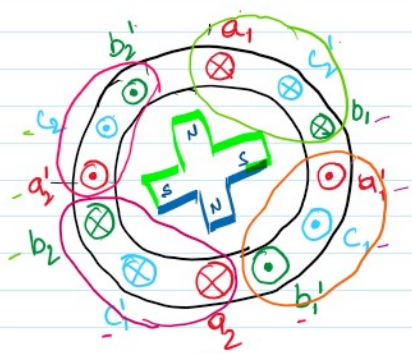
⇓

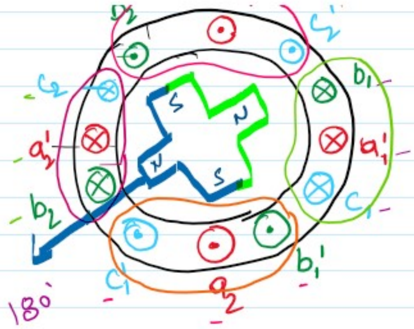
If there are two equivalent coils then the resultant magnets should 4 (four) poles (two pole pairs)

four pole machine

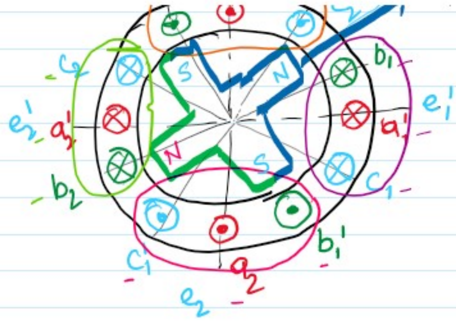








corresponds to point 't'



corresponds to 'p'

We went through one complete electrical cycle (360° rotation)

but, mechanically we have gone through only half cycle (180° rotation)

$$\boxed{f_e = 2 f_m}$$

$$360^\circ = 2(180^\circ)$$

$$\theta_e = 2\theta_m$$

$$\boxed{\theta_m = \frac{\theta_e}{2}}$$

Four pole system (4 poles on magnetic field)

$$f_e = 2 f_m = \frac{4}{2} f_m$$

$$\boxed{f_e = \frac{P}{2} f_m} \qquad \boxed{\theta_e = P/2\ \theta_m}$$