SUB. - 306 3rd test
Electric Machine - IInd
Electrical

Q.1. Write the power eqn of synchronous motor.

Q.2. Write short Note on LIM.

Q.3. Explain the synchronous Motor with constant load & varying excitation.

Ans. 2. LIM :→

इस प्रकार की motor का use more efficiency तथा कम लागत में linear speed प्राप्त करने के लिये किया जाता है।

- linear speed प्राप्त करने के लिए एक thrust लगाया जाता है।

Construction :-

- यदि I.M. को चित्रानुसार cut करें तो वह linear I.M. की size ले लेती है। linear induction motor में stator एवं Rotor क्रमश: primary व secondary हैं।

→ Primary में core एवं wdg होती है, जिसकी length होती है। जबकि sec. में Al. sheet condr का

का प्रयोग किया जाता है।

Principle →

जब L.I.M. की 3-ϕ Wdg को 3-ϕ supply से connect किया जाता है, तो एक linear travelling field उत्पन्न होता है। जिसकी velocity निम्न प्रकार है

$$V_s = 2f\tau$$

τ = Pole Pitch.

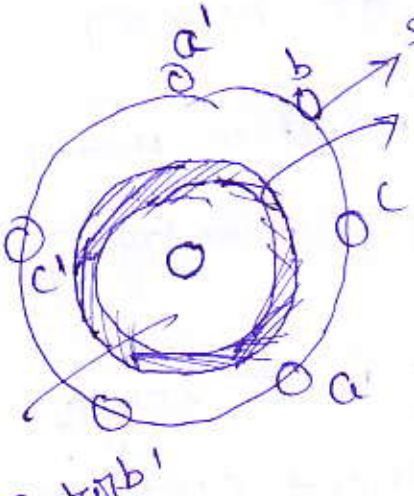
f = frequency.

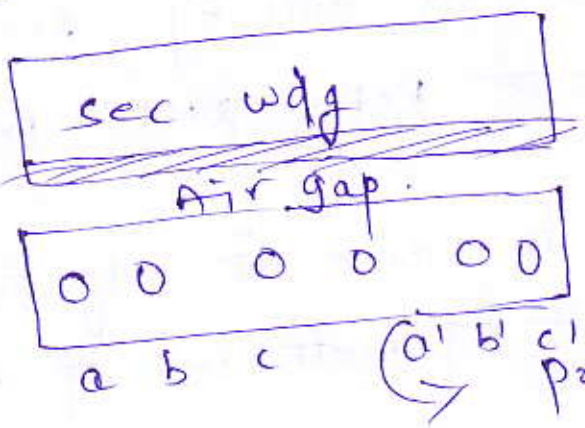
- इस velocity की value squirrel cage I.M. में n_s $(120f/p)$ की तरह होती है।
- इस travelling field के कारण sec में एक current उत्पन्न होती है। जिसकी value -

$$V_r = V_s(1-s)$$

s = slip

V_s = Sy. velocity





...ue & power equation of synchronous motor.

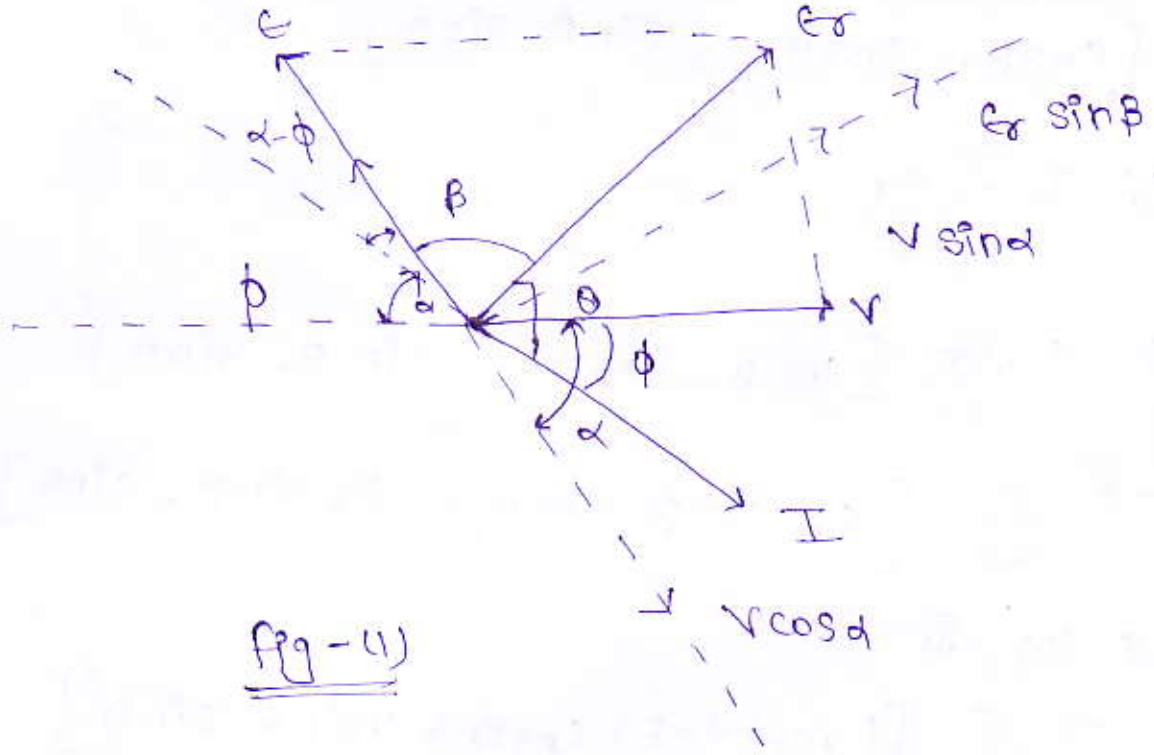


fig-(1)

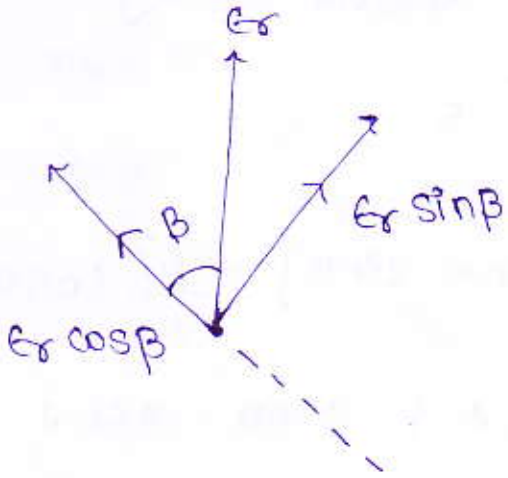


fig-(2)

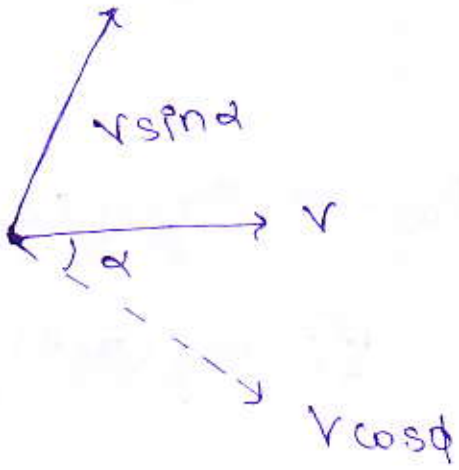


fig-(3)

By Balancing

$$E + E_r \cos\beta = V \cos\alpha$$

$$E_r \cos\beta = V\cos\alpha - E \quad -(1)$$

$EI \cos(180 - (\alpha - \phi))$

$EI \cos(\beta + \theta)$

$EI [\cos\beta \cdot \cos\theta - \sin\beta \sin\theta]$

$\because I = \frac{E_r}{Z_S}$

$P_M \Longrightarrow \epsilon \cdot \frac{E_r}{Z_S} [\cos\beta \cdot \cos\theta - \sin\beta \cdot \sin\theta]$

$P_m \longrightarrow \frac{\epsilon}{Z_S} [E_r \cos\beta \cdot \cos\theta - E_r \sin\beta \cdot \sin\theta]$

eqn (1) & (2) से

$P_m \longrightarrow \frac{\epsilon}{Z_S} [(V\cos\alpha - E)\cos\theta + V\sin\alpha \sin\theta]$

$P_m \longrightarrow \frac{\epsilon}{Z_S} [V\cos\alpha \cdot \cos\theta + V\sin\alpha \sin\theta] - \frac{\epsilon^2}{Z_S} \cos\theta$

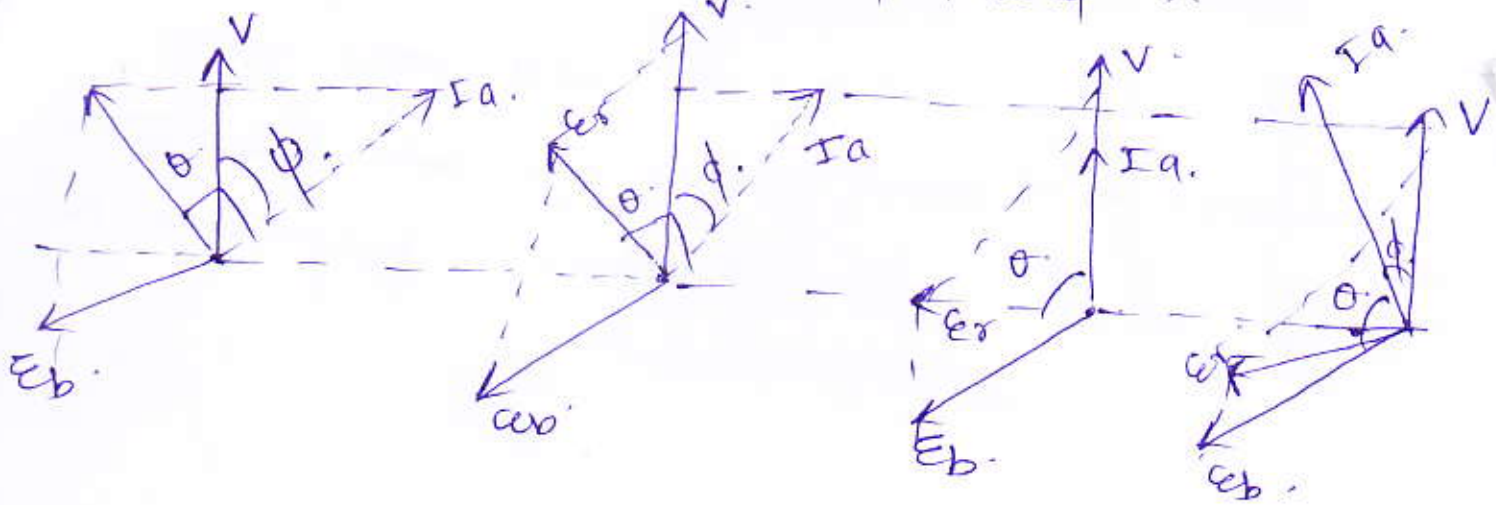
$P_m \longrightarrow \frac{\epsilon V}{Z_S} [\cos\alpha \cos\theta + \sin\alpha \sin\theta] - \frac{\epsilon^2}{Z_S} \cos\theta$

$\because \cos(\theta - \alpha) = \cos\theta \cos\alpha + \sin\theta \sin\alpha$

$$\left[P_m \Longrightarrow \frac{\epsilon V}{Z_S} \cos(\theta - \alpha) - \frac{\epsilon^2}{Z_S} \cos\theta \right]$$

this is power eq^n of sy. motor.

effect of changing field excitation At constant load →



case (i)

Under excitation.

When $E_b < V$, Ia lag V.

~~unity~~

case (ii) $V = E_b$ Normal excitation.

→ reduced angle B/W V & Ia.

→ Ia minimum.

→ p.f. unity.

case (iii)

$E_b > V$ over excitation

→ Ia leading, अत: sy. motor different excitation पर work करते हैं

→ p.f. leading