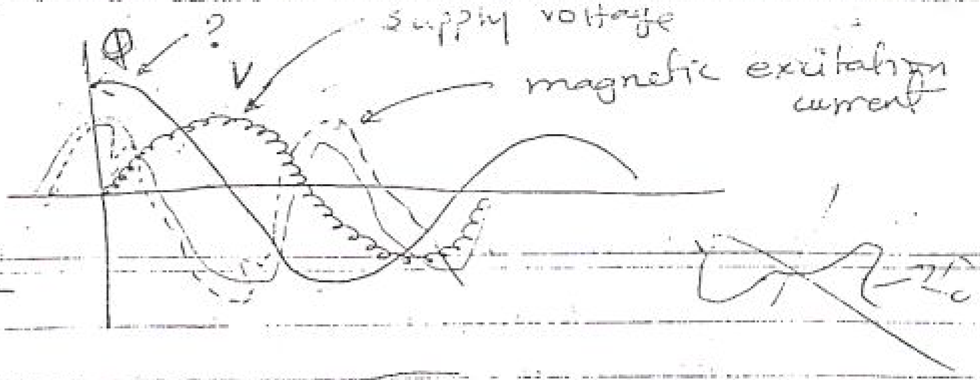
Dictator



$V_g = \frac{V_{max} - V_{min}}{V_{min}}$

- st ; V = 3-5 %   Reg. اتصال

- one of the following is non-self start motor :-
  الجواب : Synchronous

- أي ماتور يستخدم لتحسين الـ PF في الصناعة
  الجواب : ~~Induction~~ Synchronous حسن أكثر

- كم أنواع ماتورات دي كي طريقه للتحكم بالاتجاه والسرعة

  DC series → voltage
  DC sep-excited → field weakage , R_a, E_a
  Induction → (phase sequency) الـ عكس
  Synchronous → "

- type of following transformer ?

Core   Shell

- VARIAC ≡ variable AC transformer   power supply

- for transformer experiment :-

  V_1 & V_2 is leading ✗
  lagging ✗
  inphase ✓

  φ lag V by 90°

  V_c in phase with φ

- Φ Lag V_1 by 90

$\Rightarrow$ Φ and i are inphase

(Proof)

$$iN = \Phi R_m$$
$$\Rightarrow \Phi = i \left(\frac{N}{R_m}\right) \to \text{(constant)}.$$

- Φ Lead e_1 by 90.

* $V_1 \simeq 4.44 N_1 f \Phi_m$.

$E_1 = 4.44 N_1 f \Phi_m$.

$a = \frac{N_1}{N_2} \equiv$ Turns Ratio.

$a_T = \frac{E_1}{E_2} \approx \frac{V_1}{V_2} \equiv$ Transformation ratio

in general $a_T \simeq a$.

* if the load is inductive (Lag PF). $\Rightarrow I_2 \angle -$
" " " " capacitive (Lead) $\Rightarrow I_2 \angle +$
" " " " resistive (nutral) $\Rightarrow I_2 \angle 0$

$S_L = V_2 * I_2^*$

$S_L = P \pm jQ$.

$= \sqrt{P^2 + Q^2} \angle \tan^{-1}\frac{Q}{P}$.

- if jQ is +ve
$\Rightarrow$ inductive load.
- if jQ is -ve
$\Rightarrow$ capasitive load

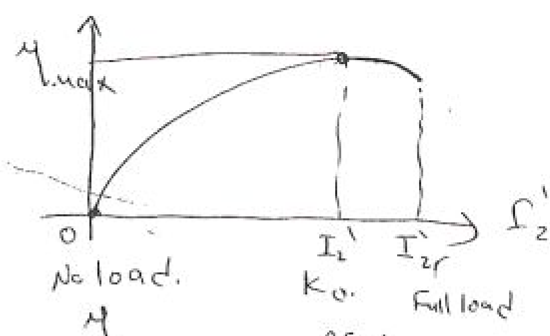
efficency

$$\eta = \frac{P_o}{P_{in}} * 100\%.$$

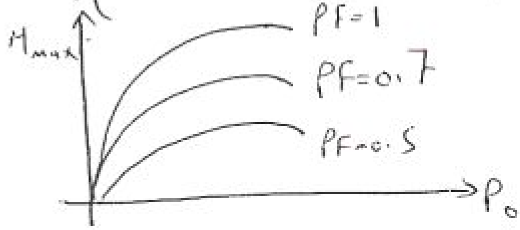
$$\eta = \frac{P_o'}{P_{in}} = \frac{V_2' I_2' \cos \Phi_{out}}{V_2' I_2' \cos \Phi_{out} + P_{cu} + P_c}$$

$P_{cu} \to I_2'^2 R_{eq}$.

- η depend on
(1) Load Power or current (I_2').
(2) Load PF.



$$\eta_{max} = \frac{K_0 S_r \cos \Phi_{out}}{K_0 S_r \cos \Phi_{out} + K_0^2 P_{cur} + P_c}$$



$$\eta = \frac{K * S_r * PF_{out}}{K * S_r * PF_{out} + K^2 P_{cur} + P_c}$$

- if K = constant

max. η is at $PF_{out} = 1$ (Unity PF)

... resistive load Provides the max. Possible efficiency ... (T) shunt Gen لا نعتبر ال $I_{sc} = I_{residual} = \frac{E_{residual}}{R_a}$

$N_s = \frac{120 f}{P}$

$w_m = \frac{2\pi N_m}{60}$

$N_m =$

- Induction Motor — ست دوائر حل

slip @ starting = 1 — محطوط

كبيرة (5-10) I_n line current ? $V_R = ?!$ $S = \frac{N_s - N_m}{N_s}$

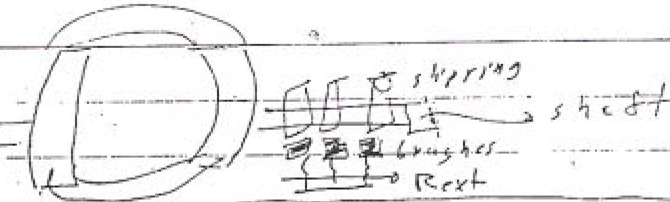
$N_s = ?!$

- DC motor

اذا كانت بقية ال parameter ثابتة — ماذا يحصل لل → I_f (اذا غيرنا (قللنا، سكرنا) ... I_{arm} ... يقل

وماذا يحصل بالسرعة؟ زيد بزيادة I_f

- حدد الاجزاء المبينة
  6 دوائر



- انواع المولدات ومواصفاتها (تو صيل على ما أطلب) (مشتركة)

2 # of slip rings & # of brushes

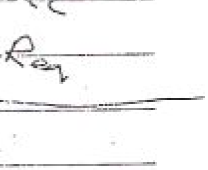
synch → 2 slip, 2 bru
Induction → 3 slip, 3
DC → 2 bru, 0
synch → 2
Induction → 6

- Tests of Tr :-

O.C.T :- $P \propto ?$ → $P \propto V_{oc}^2 / R_c$

S.C.T :- $P \propto ?$ → $P \propto I_{sc}^2 R_{eq}$

- below / (above ratings of it) ماتور بدي اقلل سرعته
  V_t — Field weakening ← ما هي الطريقة الانسب



- DC motor → ندخل عند التشغيل R_{ar} لماذا نضيف
  الجواب: ① لأن ... ② I_{st} قيمها عالية ③ لأن I_{st} قيمه عالية
  ③ كي نقلل ω ④ لاحتمال ...

- Induction or Synchronous
  أي التوصيلات احسن

؟ Dory

عن البنية تأخذ ...
والحد لا ...

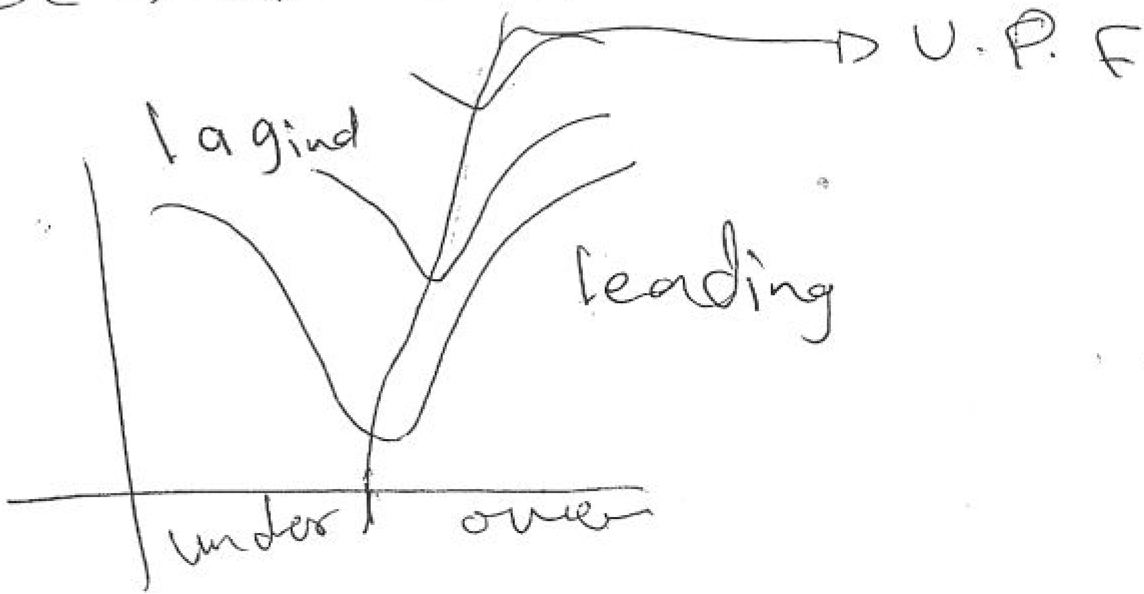
Dc -series → Armature Voltage control

Dc - seperatly excited → field weaking method

synch.
~~Induction~~ → variable freq Control.

induction
~~Synchronous~~ → adding Rext for wound rotor

DC -shunt → Armature resistance control



V-curve of synchronous

lead or lag ← pf=1 المنطقة على يمين الـ

over or under excitation ← المنطقة تحت ويمين

O.C.T

- $I_0 \cong (1-5)\% \ I_1$ rated

اصغر التيار على الـ

- I_c inphase with E_2

I_m lag E_1 by 90°

- $\frac{V_{sc}}{V_r} * 100\% = 5-13\%$ → $V_{sc} = (5-13)\% \ V_r$

$I_0(r) = (1-5)\% \ I_r$

$I_0(sc) = \frac{V_{sc}}{V_r} (1-5)\% \ I_r$

$\frac{5}{100} * \frac{3}{100}$ $\frac{5}{100} * \frac{5}{100}$

$\boxed{I_0(s.c) = \frac{0.005}{0.004} \ \frac{I_r}{I_{sc}}}$

Groups	1	2	3	4
	0°	180°	-30°	+30°

V_{AB} V_{ab}

Vab lag

مقوم dc

الـ commutator يعتبر mechanical Rectifier

~~Rect of Reactor~~ ?

في حالة الـ Generator

في حالة الـ motor Invertor ← يعتبر

Seperately excited & shunt

Large no of N

$\omega_m = \frac{2\pi n_m}{60}$ in DC

• salient → non of the above

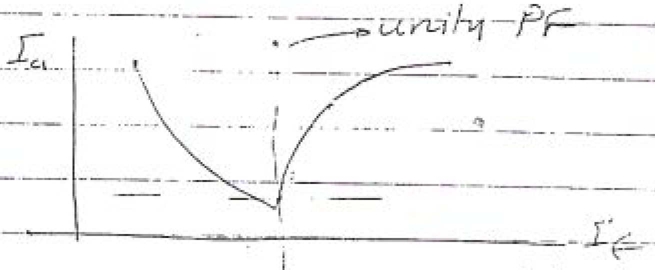
$T_a = \frac{P_a}{\omega_m} = \frac{E_a I_a}{\omega_m}$

$E_a = K_a \phi_f \omega_m$, $\phi_f = K_f I_f$

$E_a = V_t - I_a R_a$

~~$E_a = V_t$~~ $E_a = K\phi\omega = V_t + I_a R_a$

$I_{a(st)} = (6-15)\, I_{a(rated)}$

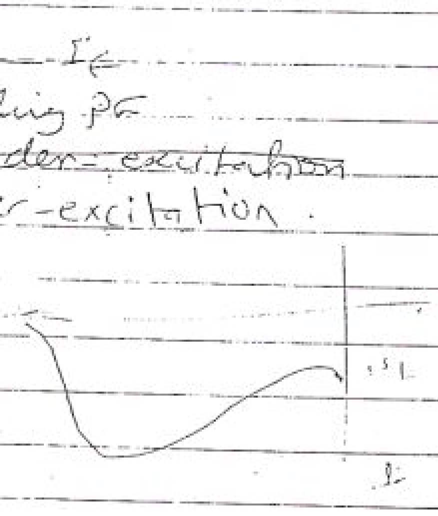


lag PF ← → leading PF

~~over excitation~~ ~~under-excitation~~

under-excitation over-excitation

100% rated



x-axis ? → I_f

y-axis ? → I_a

PF after 100 rated ?

acting over excited, normally, or under excited?

• the connection of the Rotor is Δ, Y, or neither
induction synch

• $I_0 = (1-5)\%\, I_{rated}$ stator → Δ or Y is true

In SCT → $V = (5-13)\%\, V_{rated}$

$R_c = \frac{V_{oc}}{I_c}$ at OCT when R_c ↑ , I_0 ??

• [illegible] constant: power, Torque, Both

• [illegible] DC قوة direction اتجاه

[illegible] synch [illegible]