THE HASHMITE UNIVERSITY
ELECTRICAL ENGINEERING DEPARTMENT
ELECTRICAL MACHINES LAP

Lab Sheet

Induction Motor – II

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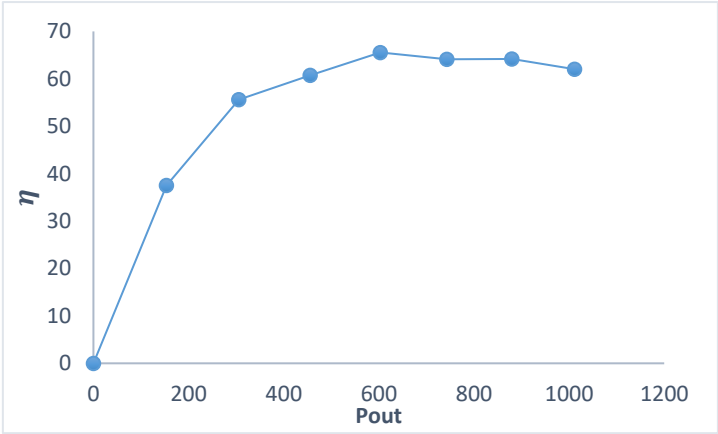
Induction Motor - II

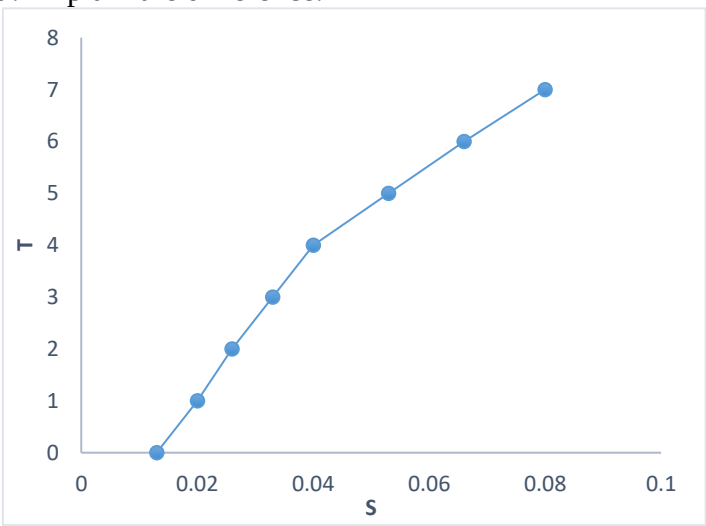
Measurement of efficiency characteristic and torque characteristic

Table (9.3)

MEASURED VALUES					CALCULATED VALUES			
V (v)	I1 (A)	T (NM)	N (r.p.m)	Pin (w)	Poutput (w)	η (%)	$\cos\theta$	S
220V	2.67	0	1480	410	0	0	0.216	0.013
220V	2.78	1	1470	410	153.93	37.54	0.494	0.02
220V	2.92	2	1460	550	305.78	55.59	0.494	0.026
220V	3.24	3	1450	750	455.53	60.73	0.607	0.033
220V	3.54	4	1440	920	603.18	65.56	0.682	0.04
220V	4.02	5	1420	1160	743.51	64.09	0.757	0.053
220V	4.49	6	1400	1370	879.64	64.2	0.801	0.066
220V	5.13	7	1380	1630	1011.6	62.06	0.833	0.08

1. Draw the graphs ($\boldsymbol{\eta}$ **= f(P**$_{\mathbf{out}}$**)** for measurements at Table (9.3).
2. 

3. Draw the graphs **T** = f(**s**) for measurements at Table (9.3). Extrapolate the graphs to **T** = 0. What should be the slip for **T** = 0? Explain the difference.



The difference is due to friction with the air, the motor will rotate at faster speed than the synchronous speed and that is when the torque is zero.

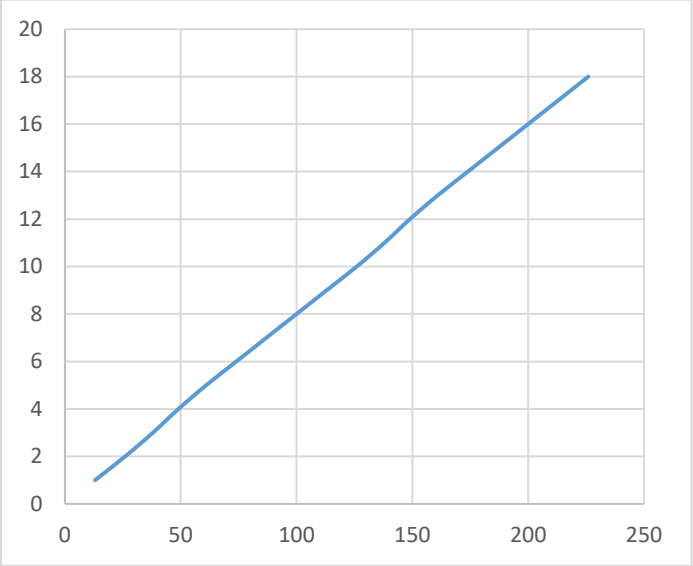
Starting Current

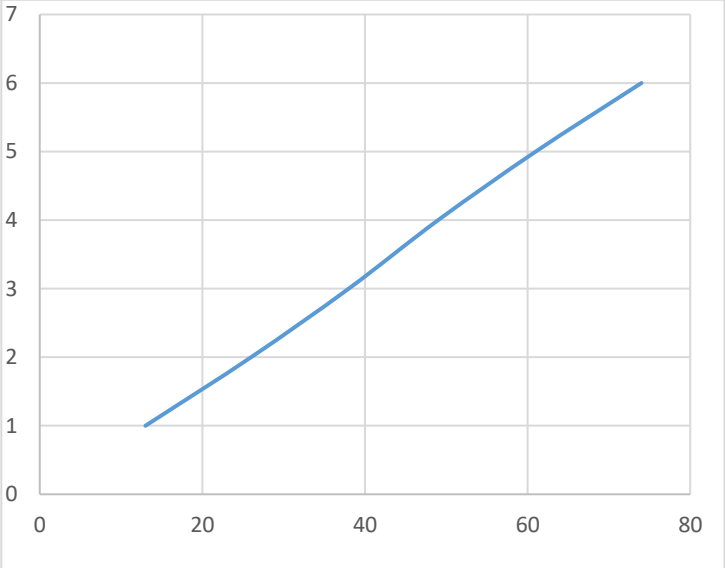
Table (9.4)

	"Δ" Rated current ( )A					"Y" Rated current ( )A		
U(V)	**13**	**26**	**38**	**49**	**61**	**38**	**76**	**113**
I_1(A)	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**

Questions:

1. Using the results from table (9.4), draw the graph I_1= f (V), the starting current as a function of the stator voltage. The V axis must run to 220 V. Extend the curve and read the starting current at rated voltage,





The starting current for Delta Connection is = 18.3 A
The starting current for Star Connection is = 10.4 A

2. Calculate the ratio between starting current, for delta and star connection. What is the theoretical value?

$$\beta_{start} = \frac{I_{start}}{I_{Rated}}$$

$$\beta_{start(\Delta)} = 3.81$$

$$\beta_{start(Y)} = 3.714$$

So, ratio = 1.76
And theoretical value = 1.732

3. Calculate the percentage of no-load currant in relation to the rated current.

$$\beta_o = \frac{I_o}{I_{Rated}}$$

No load current =2.67
Rated current =4.8
The ratio = 0.55625

Conclusions:

1) We note from the lab that, if we increase the torque for induction motor the will effect to the speed inversely (it will decrease).

2) We note from the lab that, it is hard to control of speed in induction motor.

3) In induction motor at low loads, the power factor drops to very low values.

4) Induction motors are maintenance free motors unlike dc motors and synchronous motors due to the absence of brushes, commutators and slip rings.