Experiment-5

No Load & Blocked Rotor Test on 3-Phase Induction Motor

Group: W02

AIM:

To determine the equivalent circuit parameters of an induction motor from No load and Blocked Rotor Tests.

Precautions:

1)Make sure the connections were made properly.

2)Do not touch the rotor while it is rotating with a high RPM.

3)To limit the inrush current, use an autotransformer between the grid and the induction motor.

4) Do not wear loose clothes or hang the hair loose while conducting the experiment.

Machine Specifications:

3 Phase AC squirrel cage induction motor

- Rated Voltage: 415±10%

- Rated Current: 1.82 A

- Power Factor: 0.72

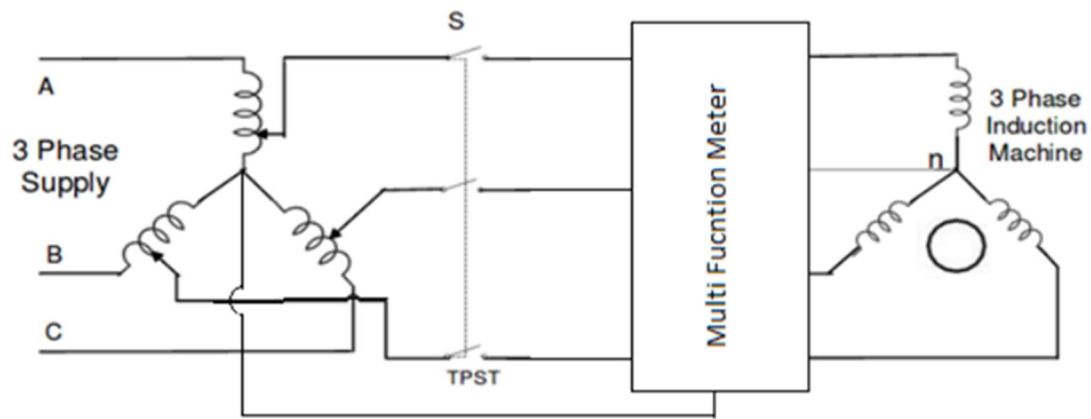- RPM:1410

- Rated Power:0.75kW

Connection Diagram
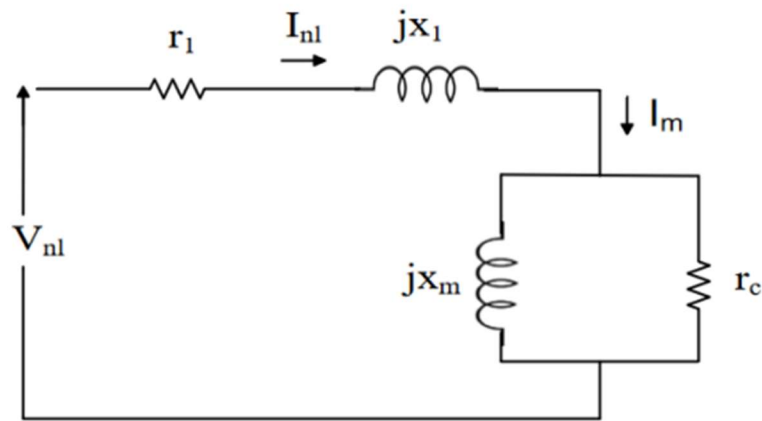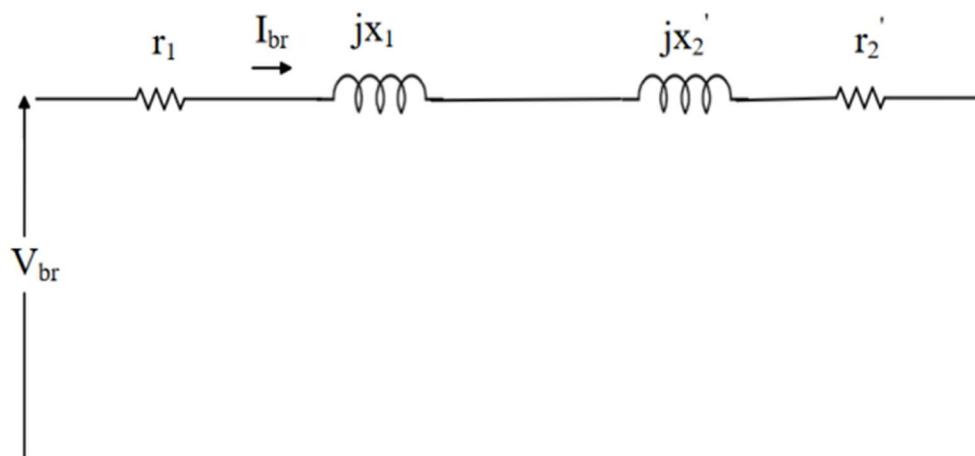

Fig 1: Connection diagram for No Load and Blocked Rotor Test

No load test:

Block-load test:

Observations:

For the No-load test

Voltage(v)	Current(A)	Power(kW)	KVA
416.7 (L1-L2)	1.316(L1)		
417.2 (L2-L3)	1.326(L2)	0.136 kW	0.955 KVA
415.5 (L3-L1)	1.353(L3)		

For the Block-Load Test

Voltage(v)	Current(A)	Power(kW)	KVA
121.6 (L1-L2)	1.831(L1)		
121.2(L2-L3)	1.820(L2)	0.198 kW	0.384 KVA
122.4 (L3-L1)	1.835(L3)		

Calculations:

$$R_S = \frac{1-S}{S}$$

For no-load test:

R_s is large as compared to X_m.

$$Z_{nl} = V_{nl}/I_{nl} = \frac{415.5}{1.353} = 308.94\Omega$$

$$R_{nl} = P_{nl}/I^2_{nl} = 0.136k/(1.353)^2 = 74.29\ \Omega$$

$$X_{nl} = X_l + X_m = (Z^2_{nl} - R^2_{nl})^{\wedge}0.5 = 299.87\ \Omega$$

For blocked-rotor test:

$$Z_{ol} = V_{ol}/I_{ol} = 121.2/1.82 = 66.59\ \Omega$$

$$R_{ol} = P_{ol}/I^2_{ol} = 0.198k/(1.82)^2 = 59.77\ \Omega$$

$$X_{ol} = X_l + X_m = (Z^2_{ol} - R^2_{ol})^{\wedge}0.5 = 29.35\ \Omega$$

$$X_S = 29.35*0.5 = 14.67\ \Omega$$

$$X_m = 299.87 - 14.67 = 285.19\ \Omega$$

Results and conclusion:

→ We did this experiment to check the efficiency of the motor and get parameters (like constant losses and variable losses) with which we can get some formula and design a machine based on that which will calculate parameters without actually doing the experiment practically.

→ From the observations and calculations of this experiment, we can justify that the practical values and the theoretical values are in the same range.

→ We got an understanding of what are constant losses and what are variable losses practically by working with the motor.

→ We also did No Load and Blocked rotor test where we controlled the tension on the rotor provided to motor where we learned that even though in blocked rotor, we have fixed rotor but air plays some role in it.

→ Got hands on experience of working with motor.