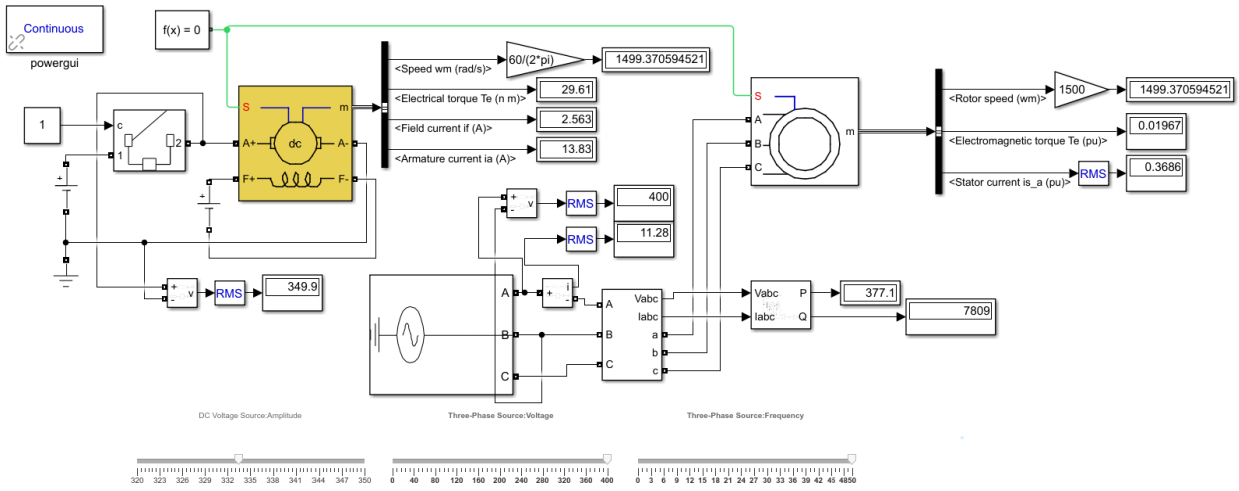
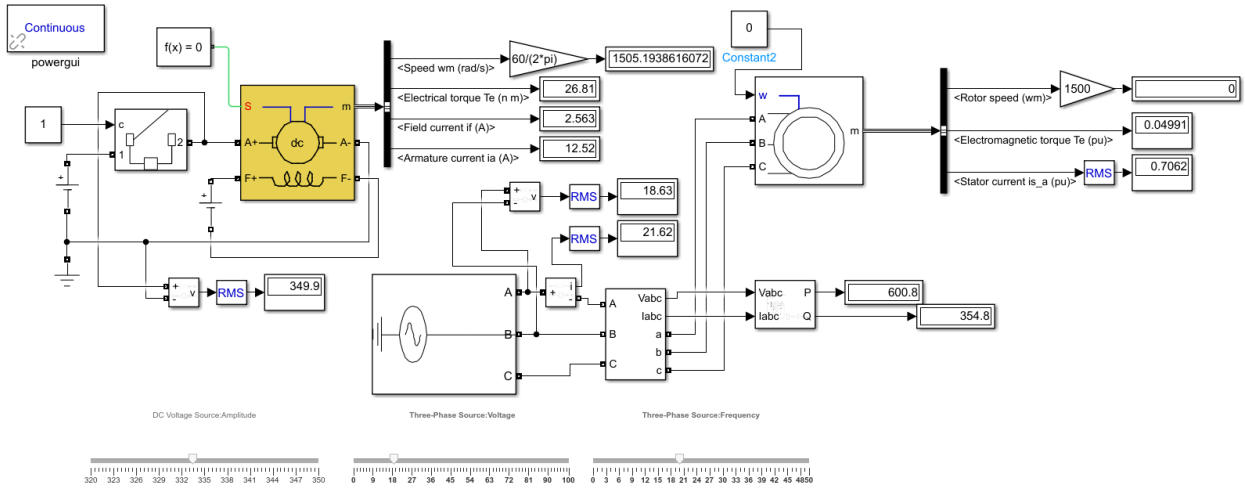
MANSI UNIYAL
19EE10039

NO LOAD TEST



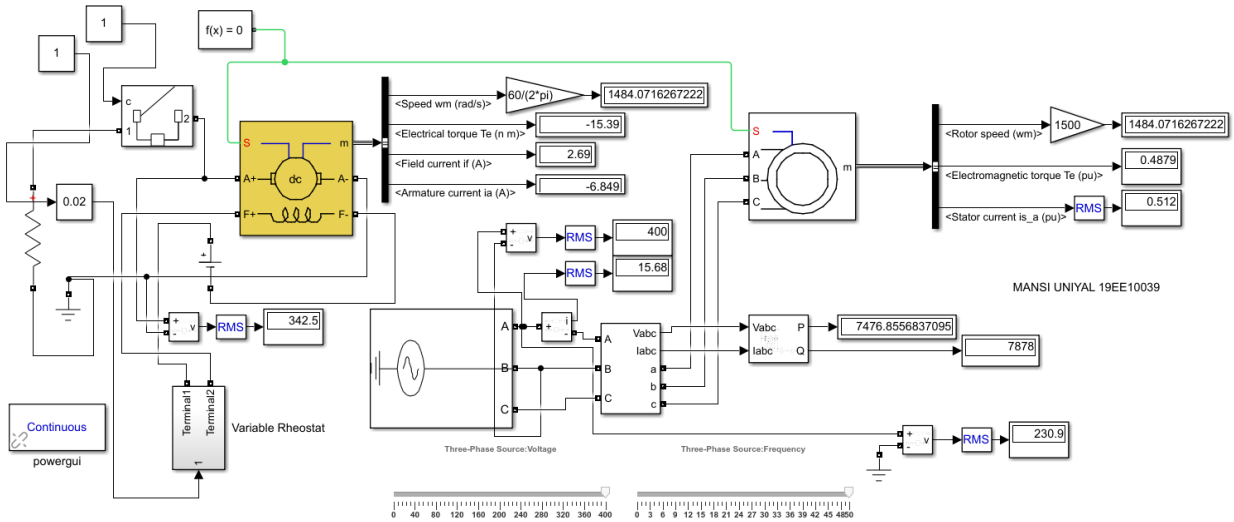
VS,line	IS,line	Pin(3 − φ)	Qin(3 − φ)	Nr
400	11.28	377.1	7809	1499.3706

BLOCK ROTOR TEST



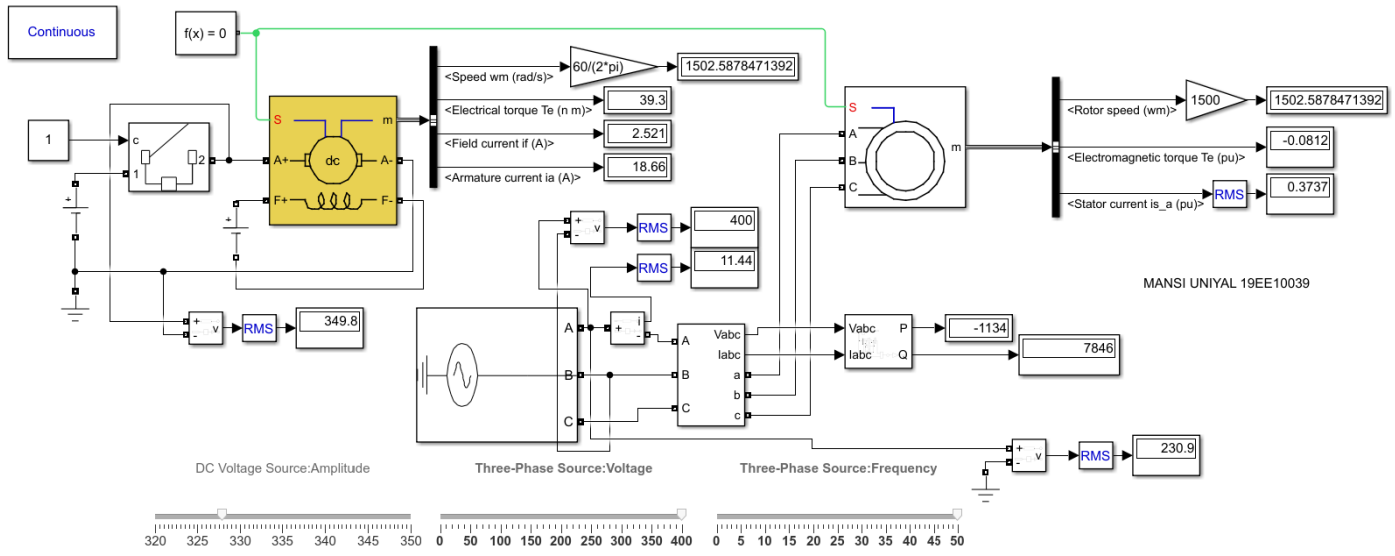
VS,line	IS,line	Pin(3 − φ)	Qin(3 − φ)
18.63	21.62	600.8	354.8

LOAD TEST



	Induction Motor					DC Motor	
Rload	Vph	Iph	Nr(rpm)	Pout(watt)	Te(Nm)	Va	Ia
30	230.9	17.39	1480.62	9053.78	0.5906	337.4	-11.24
50	230.9	15.68	1484.07	7476.86	0.4879	342.5	-6.849
80	230.9	14.77	1486.04	6571.5	0.4287	345.5	-4.318

GRID TEST



Induction Motor					DC Motor			
Vph	Iph	Nr(rpm)	Pout(watt)	Te(Nm)	Va	Ia	Vf	If
230.9	11.44	1502.58	-1134	-8.12	349.8	18.66	327.94	2.52
230.9	11.49	1503	-1422	-9.04	349.8	19.2	327.94	2.52
230.9	11.70	1504.2	-2073	-13.60	349.8	21.3	327.94	2.49
230.9	11.97	1505.5	-2708	-17.18	349.8	23.3	327.94	2.48
230.9	12.67	1508	-3935	-24.92	349.8	27.4	327.94	2.46

Calculations:
NO LOAD TEST

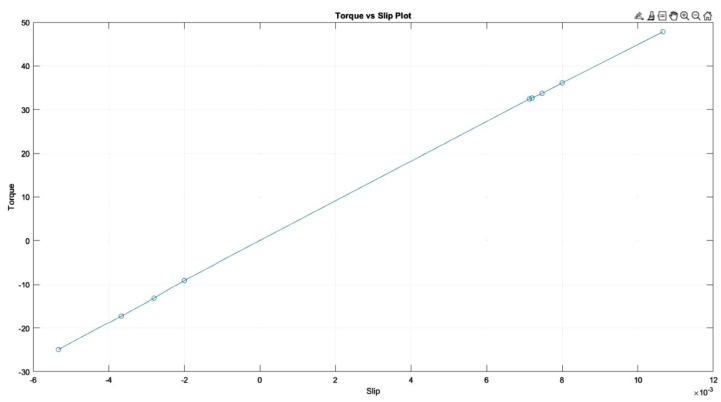
Vs, line = 400 V
Is, line = 11.28 A
Pin = 377.1 W
Qin = 7809 VAR
Nr = 1499.3706 rpm
Te = 0.01967 Nm

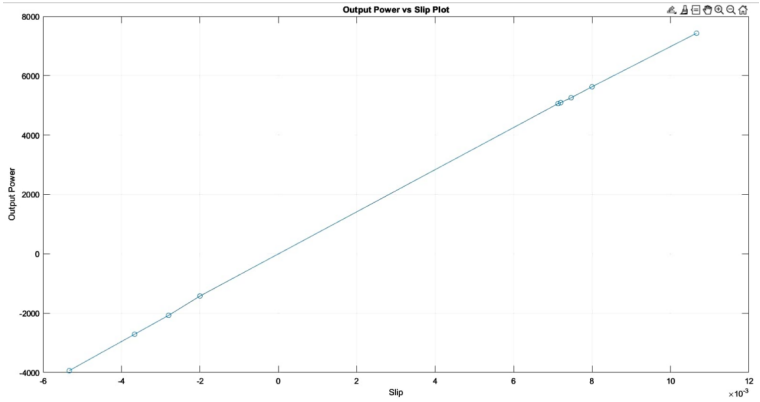
Xnl = Qin/3*(Is, line^2) = 20.45766 ohm
Xm = Xnl = 20.46 ohm
Lm = Xm/2*pi*50 = 0.06512 H
Pcu,nl = Pin - Prot = Pin - Te*w = 374.61 W
Pcu,nl = 3*Inl^2*Rs
Rs = 0.9813 ohm

BLOCKED ROTOR TEST
Vs = 18.63 V
Is = 21.62 A
Pin = 600.8 W
Qin = 354.8 VAR

Xb = Qin/3*(Is^2) = 0.253 ohm
Rb = Pin/3*(Is^2) = 0.42845 ohm
Zb = Rs+jXs+(R'r+jX'r)||jXm = Rb+jXb
Xb = Xs +X'r*(Xm/(X'r+Xm))
R'r = Rb -Rs*((X'r+Xm)/Xm)^2
Xs=X'r=k; k^2+k*40.667-5.176=0
Xs = X'r = k = 0.127 ohm
Ls = L'r = k/(2*pi*20) = 0.00101 H
R'r = 0.961 ohm

GRAPHS:





Discussion Questions:

1. While conducting the No-Load test, even though there is no-load, why watt-meter reading is not zero?

2. Which loss in the machine is significant in the no-load test and why?

3. Which loss in the machine is significant in the blocked rotor test and why?

4. When r’2/s is split into a series connection of r’2 and r’2{1/s − 1} in the rotor equivalent circuit of an induction machine, what do the power absorbed by the individual resistors physically represent?

5. What are the different losses that are present in an induction machine?

6. Back calculate the power delivered to the rotor at rated slip condition and Comment the calculated power is matching with the nameplate details or not.