ECE 331: Test #2. Name _____

Closed Book, Closed Notes, Calculators Permitted.

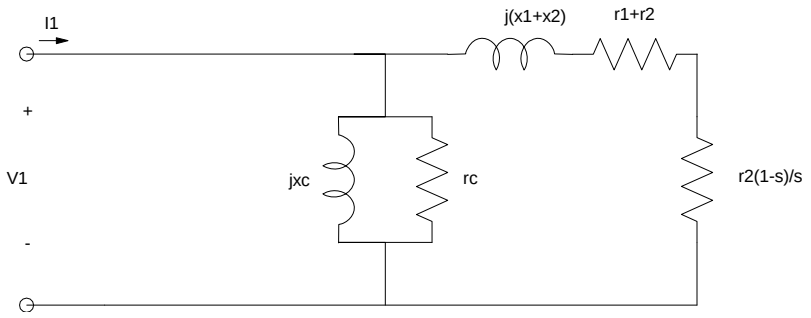
1. Assume you have a 2-pole (ns = 377 rad/sec) 3-phase incudtion motor with a line-to-neutral voltage of 120V rms. Assume no rotational losses. Determine the motor parameters if the per-phase measurements are:

DC test: V1 = 10V, I1 = 50 Amps

No-Load Test (s=0): V1 = 120V rms, I1 = 20A, pf = 0.2 lagging

Locked Rotor Test (s=1): V1 = 12V rms, I1 = 20A, pf = 0.9 lagging.

r1	r2	x1 + x2	xc	rc

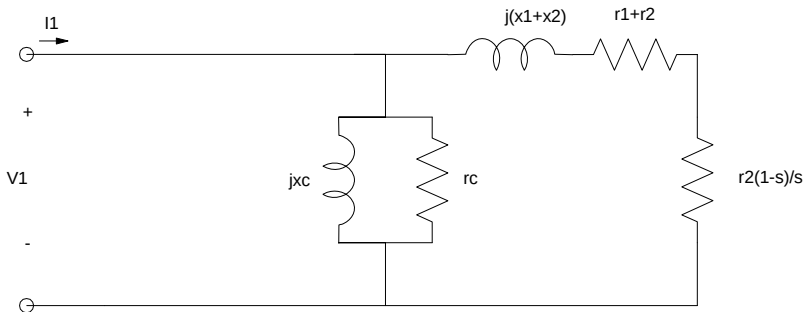


2) Assume you have a 2-pole (ns = 377 rad/sec) 3-phase AC induction motor with a line-to-neutral voltage of 120V rms and

r1 = r2 = 0.2 Ohms, x1 = x2 = 0.5 Ohms, rc = 1000 Ohms, xc = 500 Ohms,

Find the input current, I1, the output power, and the efficiency for a slip of 0.05 (s=0.05). Assume no rotational losses.

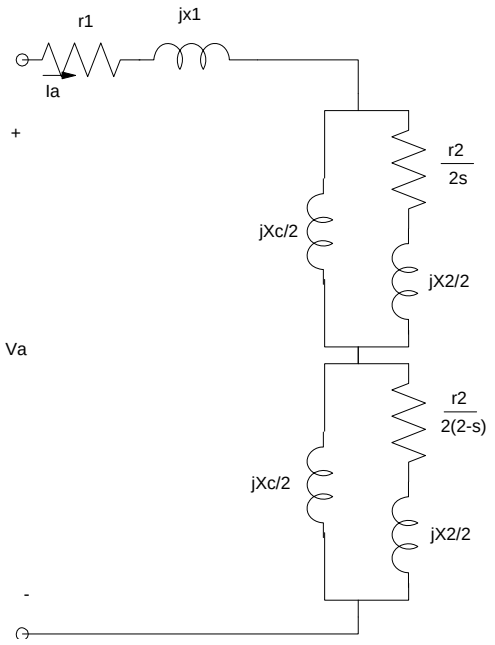
I1	pf	Po	efficiency



3) Assume a2-pole (ns = 377 rad/sec) single-phase AC induction motor operating at 120V rms. Assume the parameters are:

- r1 = r2 = 0.2 Ohms
- x1 = x2 = 0.8 Ohms
- Xc = 500 Ohms.
- No rotational losses.

Determine the test results you should get for the DC test, no load test, and locked rotor test.



DC Test:

Va	Ia
12V DC	

Locked Rotor Test (s=1)

Va	Ia	power factor
12V rms		

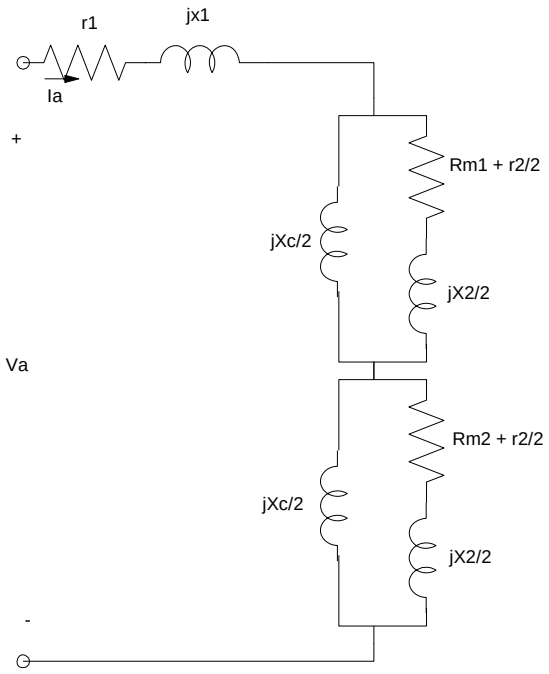
No Load Test (s=0)

Va	Ia	power factor
120V rms		

4) Assume a 2-pole (ns = 377 rad/sec) single-phase AC induction motor operating at 120V rms. Assume the parameters are:

- r1 = r2 = 0.2 Ohms
- x1 = x2 = 0.8 Ohms
- Xc = 500 Ohms.
- No rotational losses.

Determine the input current, Ia, the output power, output torque, and efficiency when running with a slip of 5% (s=0.05).



Speed (rad/sec)	
$R_{m1} = \frac{r_2}{2}\left(\frac{1-s}{s}\right)$	
$R_{m2} = \frac{r_2}{2}\left(\frac{1-s}{s-2}\right)$	
Total impedance Za	
Ia	
power factor	
Power to Rm1	
Power to Rm2	
Total Power (Po)	