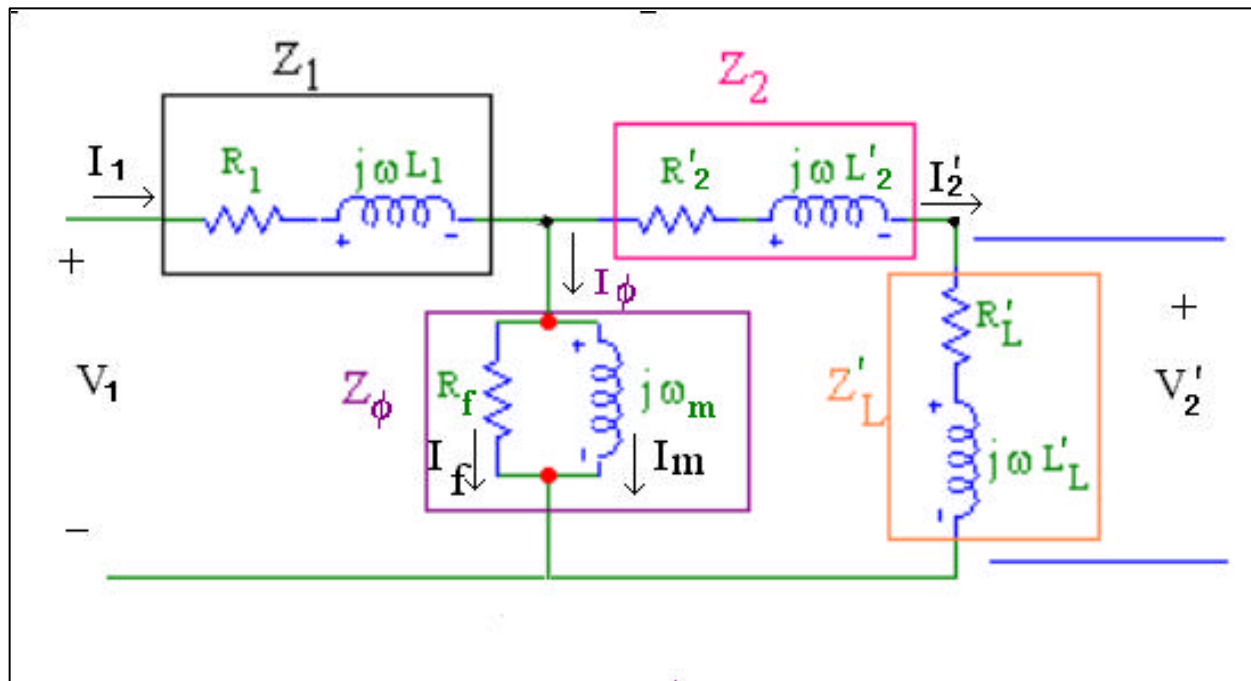# EE341 - Course Notes

Electric Circuit Analysis

Homework No. 1

Instructor: Ali Keyhani

Homework No.1

1. **The operation of AC machines (in particular, transformers and induction machines) can be studied with the aid of the T-Circuit shown below.**

Primary or Stator   **Secondary or Rotor**

Homework No.1

 Several parameter sets are given in the table below. Your solutions should be summarized in a table in format as shown below. Use polar form for all complex number. Show your calculations separately.

Set	V_1	V_2	I_1	I'_2	I_f
13	$2700\angle22°$	-	$10\angle{-}39°$	$10\angle{-}39°$	0
14	-	$23\angle{-}54.6°$	$259.4\angle{-}54.6°$	$259.4\angle{-}54.6°$	$23\angle{-}55°$

Homework No.1

Practice all cases.

Only cases with parametes sets 1, 2, 4, and 11 will be graded.

Write a Matlab program to solve case 11.

SET	Z₁ R_1	L_1	Z_f Parallel R_f	L_m	Z'_2 R'_2	L'_2	Z_L R_L	L_L	V1	V2	I_1	I'_2	I_f
1	1	0.01	10000	8	1	0.01	Open Circuit		480∠0°	?	?	?	?
2	1	0.01	10000	8	1	0.01	200	0	480∠0°	?	?	?	?
3	0.02	0.00265	Open Circuit		0	0	Open Circuit		1∠0°	?	?	?	?
4	0.02	0.00265	Open Circuit		0	0	1.0	0	1∠0°	?	?	?	?
5	0.02	0.00265	Open Circuit		0	0	.707	1.875x10⁻³	?	1∠0°	?	?	?
6	0	0	100	0.1	0.01	106x10⁻⁶	1.0	0	1∠0°		?	?	?

Homework No.1

S E T	Z₁		Z_f Parallel		Z'₂		Z_L						
	R_1	L_1	R_f	L_m	R'_2	L'_2	R_L	L_L	V1	V2	I_1	I'_2	I_f
7	0	0	100	0.01	.01	106×10^{-6}	1.414	3.75×10^{-3}	$1\angle 0°$	?	?	?	?
8	.3	1.33×10^{-3}	Open Circuit	3.45×10^{-2}	.15	$.56 \times 10^{-3}$	7.35	0	$127 \angle 0°$	?	?	?	?
9	10	5.2×10^{-2}	Open Circuit		0	0	200	.4	?	$5000 \angle 0°$	?	?	?
10	.15	2.54×10^{-3}	Open Circuit		1.57	6.24×10^{-3}	98.5	.178	$2400 \angle 0°$	?	?	?	?
11	.3	0.003	1	4.25×10^{-2}	.2	.003	10	0	$440 \angle 0°$	?	?	?	?
12	.3	0.003	0	4.25×10^{-2}	.2	.003	1.0	0	$380 \angle 0°$		?	?	?

Homework No.1

Assume

1. All elements are in series except R_f and L_m which are in parallel.
2. R = ohms; L=henrys; V = volts; $\mathbf{w}$L=ohms.
3. $\mathbf{w}=2\mathbf{p}$f=377 radsec; jX= j$\mathbf{w}$L for f=60Hz
4. Open circuit = R and/or L to infinity
5. Short circuit = R and/or L to ® 0

Homework No.1

2. For the cases with parameters sets 1, 2, 4 and 11 in the table, draw the Thevenin equivalent circuits seen by the load Impedance Z_L', connected to terminals A-B. Calculate the parameters of the Thevenin equivalents circuits.

3. For cases with parameter sets 1, 2, 4 and 11 in the table, and assuming $L_L'=0$. Find the values of R_L' wich will result in the maximum power delivered to R_L'. (use the maximum power transfer principle).

4. As the power specialist in your company, you are asked to derive a model of an AC machine. With the machine terminals open-circuited, you are measure Voc=100V. With the machine terminals shorted, you measure Isc=50A. Calculate the parameters of the Thevenin Equivalent circuit of the machine.