

LAB RECORD: (Weight: 30 %)

PART (A): TRANSFORMER TEST DATA : Frequency $f \approx 60$ Hz.[Steps 1 & 2] :

No Load Primary voltage $V_p = \dots\dots\dots$ Volts

No Load Secondary voltage $V_s = \dots\dots\dots$ Volts

(a) Load $Z_L = R = 100\Omega$ [Steps 3 , 4 & 5]

Primary voltage $V_p = \dots\dots\dots$ Volts ; Secondary voltage $V_s = \dots\dots\dots$ Volts

Primary current $I_p = \dots\dots\dots$ Amp ; Secondary current $I_s = \dots\dots\dots$ Amp

Wattmeter readings : $P_{in} = \dots\dots\dots$ Watts ; $P_{out} = \dots\dots\dots$ Watts

Δt (from cursor data on CT/VT waveforms) = $\dots\dots\dots$ sec.

(b) Load $Z_L = R + j\omega L \approx 43.5 + j75.4 \Omega$ [ie R set at 43.5Ω & $L \approx 0.2H$, $f \approx 60$ Hz]
[Step 6]

Primary voltage $V_p = \dots\dots\dots$ Volts ; Secondary voltage $V_s = \dots\dots\dots$ Volts

Primary current $I_p = \dots\dots\dots$ Amp ; Secondary current $I_s = \dots\dots\dots$ Amp

Wattmeter readings : $P_{in} = \dots\dots\dots$ Watts ; $P_{out} = \dots\dots\dots$ Watts

Δt (from cursor data on CT/VT waveforms) = $\dots\dots\dots$ sec.

PART (B) : THREE-PHASE POWER TEST DATA : Frequency = ~ 60 .Hz.

Readings for $V_{ph} \approx 60$ VoltsRMS (ie VT output on CH1 ≈ 3 VoltsRMS)
[Steps 7 to 10]

LOAD	VT Output Volts RMS	CT Output Volts RMS	Cursor Δt for Phase shift sec or msec	W ₁ Watts	W ₂ Watts
R					
L					
C					
Series RL					
Series RL//C					

TA Signature $\dot{\quad}$

LAB REPORT: Weight: 50 %)

PART (A): (a) Turns Ratio

Specified transformer ratio $n = 208/120 = 1.733$

Experimental value(from voltage measurements) $n = \dots\dots\dots$

Error : $\dots\dots\dots\%$

(b) For the load $Z_L (= Z_s) = R + j\omega L \approx 43.5 + j75.4 \Omega$,
Secondary impedance magnitude Z_s (from voltage & current measurements)

$Z_s = \dots\dots\dots$

Impedance angle (from cursor Δt) $\theta = \dots\dots\dots$ degrees

Primary impedance magnitude Z_p (from voltage & current measurements)

$Z_p = \dots\dots\dots$

Verify that $Z_p = n^2 Z_s$:

$\dots\dots\dots$

(c) Voltage Regulation: % Reg (R load) = $\dots\dots\dots$

% Reg (RL load) = $\dots\dots\dots$

(d) Power Efficiency (from Wattmeter data): η (R load) = $\dots\dots\dots$

η (RL load) = $\dots\dots\dots$

PART (B): Average Power P & Power Factor PF (RL and RL//C Loads)

LOAD	P_{theory} Watts	P_{expt} Watts	% Error in P	PF_{theory}	PF_{expt}	% Error in PF
Series RL						
Series RL//C						

1 : $P_{theory} = 3 I^2 ReZ$ and $PF = \cos[\tan^{-1}(ImZ/ReZ)]$

2 : $P_{expt} = W1 \pm W2$ and $PF_{expt} = \cos(360f\Delta t)^\circ$

DISCUSSION & CONCLUSION: [Discuss possible reasons for any differences observed between theory and the experimental results. Express, in your own words, what you learned from this experiment.]