ECT150L
ELECTRONICS I LABORATORY

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CREDIT HOURS: 1.0

TEXT: Meade, FOUNDATION OF ELECTRONICS LABORATORY PROJECTS (Thompson)

Course Structure: ECT-150L is designed to reinforce the concepts of basic electronics. Students will perform experiments from the Meade text as practice for periodic practical laboratory exams. The course grade is based only on the laboratory exams. Each laboratory exam's content is provided in this syllabus, and students are encouraged to use them for practice (do a "dry run") before taking the real exams, which are as shown below.

EXAM#	DESCRIPTION and PREPARTORY WORK	WEEK #_GIVEN _
1	Color Codes, Instrumentation, Ohm's Law, Series Circuits, Troubleshooting (Preparatory: Projects 1-14)	3
2	Series-Parallel Circuits, Thevenin/Norton (Preparatory: Projects 15-29)	6
3	Oscilloscope, Time, Frequency and Phase Measurement (Preparatory: Projects 33-39)	9
4	RL and RC AC/DC Circuits, (Preparatory: Projects 40-53)	12
5	Transformers and Resonant Circuits (Preparatory: Projects 45,46,54-60)	14

Grading

Each practical exam is worth 20 points, and there are five exams. Therefore, there are 100 points available in ECT150L. There is no "extra credit." **No makeup exams will be given**. If you miss one exam, the average of the other exams will be substituted for its grade. **Please show up on time to examinations. If you are more than 10 minutes late to a lab exam, you will not be allowed to take it**. All students will take exams individually; no group "help" is allowed. (You may work in groups during the practice exercises and preparatory work, but make sure you're practicing to take the exams by yourself.)

Letter grades are assigned as follows. For your reference, the supplied example is typical of work that will score in the 95-100 percentile range. Your efforts should be modeled accordingly.

Letter Grade	Percentage %	Quality Of Work
A	90 - 100%	Excellent. Quality far exceeding basic requirements.
B	80 - 89 %	Good. Quality exceeds most expectations.
C	70 - 79 %	Average; meets basic expectations.
D	60 - 69 %	Below expectations; needs improvement.
F	< 60 %	Inadequate, failing. Far below minimum standards.

COURSE POLICIES

I. Lab Partners: There are *no* lab partners allowed in ECT150L.

II. Handing Work in: Work should be given directly to the instructor or his authorized assistant. Under no circumstances should work be turned in to any other persons (including the office) without advance permission from the instructor.

III. Makeup Exams: No makeup exams are given in ECT150L. If you miss one exam, the average of the other exams will be substituted for its grade. Missing two or more exams will result in a grade of F for the course.

V. Plagiarism: *Copying the work of another, and claiming it to be your own is* **plagiarism**. This includes (but is not limited to) copying others homework, copying from a lab manual or textbook, or collusion. The minimum penalty for cheating in any form is a grade of zero for the element involved; in some cases, failure of the course and/or expulsion from the Institute will also result. **All cases of misconduct will be documented and forwarded to Student Services for disciplinary consideration**. The DeVry Student Handbook contains complete information on this topic.

Please do not turn in any work that is not your own! If in doubt, ask the instructor. Here are some ways to avoid any problems:

- Don't share your computer files (text files, schematics, etc) with anyone else.
- Don't share a diskette (or other media) with another student; it's too easy to get files mixed up.
- Don't copy answers from a neighbor. If you don't understand how to do it, ask!
- Decline any request from fellow students for a copy of your work. Anybody needing this level of help should ask the instructor.

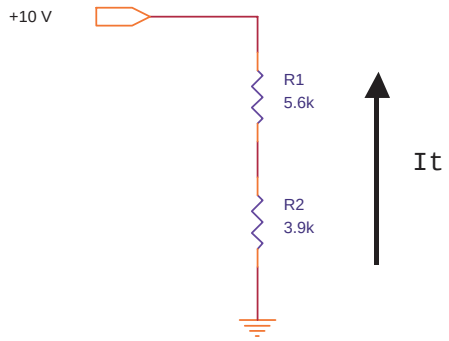
MISCELLANEOUS INFORMATION

Emergency Procedures: There are plaques located in the lab discussing emergency procedures. The instructor will remain in charge of your class group in an emergency.

Food and Drink: For your safety (and to protect our investment in laboratory equipment), these are not allowed in the laboratory at any time, even in closed containers. Violators will be expelled from the laboratory.

Materials allowed: Laboratory instrumentation as required. No notes or textbooks.

Wire the circuit below on your white breadboard. Demonstrate for the instructor or FA the following:



_____ (2 points) The circuit is correctly wired

_____ (2 points) The correct resistor values are in the circuit

_____ (2 points) The power supply is correctly set and used

_____ (2 points) Measure the current I_T correctly (report value): _____

_____ (2 points) Measure V_{R1} correctly

_____ (2 points) Measure V_{R2} correctly

_____ (2 points) Calculate the total resistance based on V_T and I_T

_____ (2 points) Measure R_1 using correct procedure (report value): _____

Have the instructor or FA place a "bug" into your circuit. You have 10 minutes to find it, document it, and correct it. Note to FA: You must move all components on the breadboard into new positions, but there must be only one fault inserted.

_____ (2 points) Explain what was wrong below:

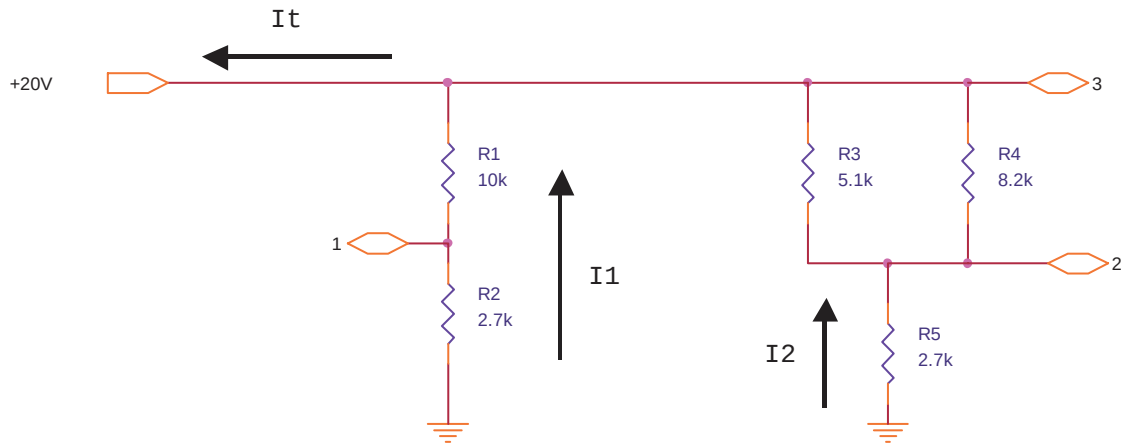
Have the instructor or FA modify your circuit (change at least one resistor value, and add at least one new resistor to the circuit). Inspect the circuit and draw the new circuit schematic diagram below, showing the correct values of all the resistors.

_____ (2 points) Schematic diagram of circuit is correct

Practicum 2: Series-Parallel Circuits, Thevenin/Norton

Materials allowed: Laboratory instrumentation as required. No notes or textbooks.

Wire the circuit below on your white breadboard. Demonstrate for the instructor or FA the following:



_____ (2 points) The circuit is correctly wired; all resistors correct values and in correct positions.

_____ (2 points) All resistors have the correct values and positions in the circuit

_____ (2 points) Measure I_2 using correct procedure. Value: _____

_____ (2 points) Measure V1, V2, V3 using correct procedure: Values: _____

_____ (2 points) Measure V12 using correct procedure. Value: _____

_____ (2 points) Calculate I_1, I_2, and I_T. Values: I_1 = _____, I_2 = _____, I_T = _____

_____ (2 points) Calculate V1, V2, V3. Values: V1 = _____, V2 = _____, V3 = _____

Take one of the "Black box" circuits supplied by the instructor and do the following:

Black Box number: _____

_____ (2 points) Measure the open-circuit voltage and short-circuit current.

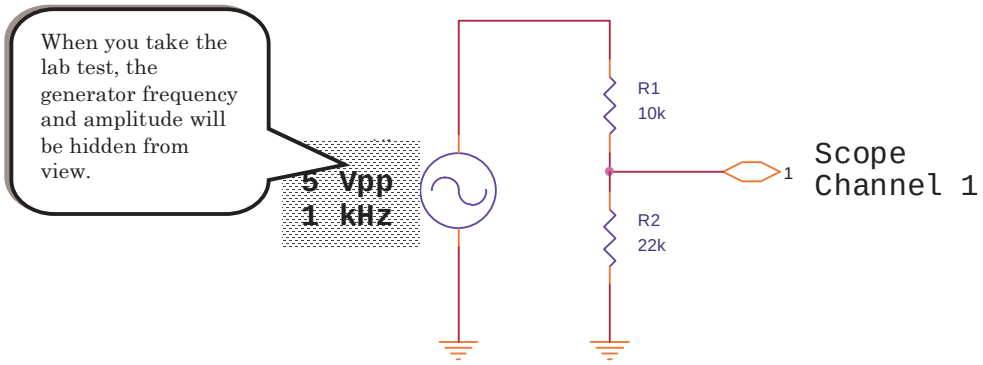
_____ (2 points) Draw the Thevenin equivalent circuit here.

_____ (2 points) Draw the Norton equivalent circuit here.

Practicum 3: Oscilloscope, Time, Frequency and Phase Measurement

Materials allowed: Laboratory instrumentation as required. No notes or textbooks.

Connect the following circuit. Demonstrate for the instructor or FA the following:



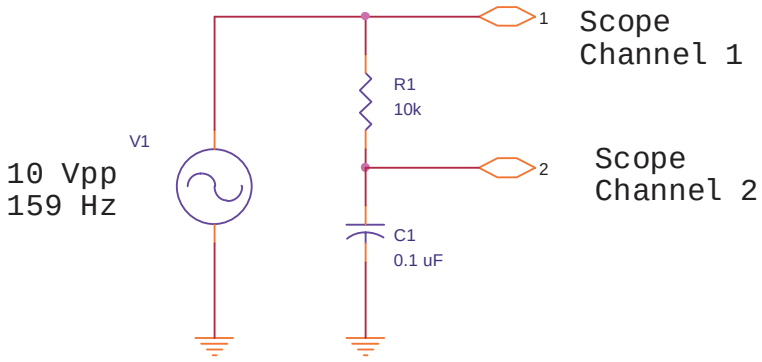
_____ (2 points) Correctly connect signal generator and oscilloscope channel 1 to circuit.

_____ (4 points) Without using autoscale or automatic readout features, measure:

V1 (pp): _____ Time Period: _____ Frequency: _____

_____ (4 points) Have FA or instructor "scramble" scope controls. Without using autoscale, adjust the scope for stable trigger, 2 or 3 horizontal cycles displayed, vertical amplitude 70-100% full scale. 2 minutes is allowed for this step.

Build the circuit below. Set the scope trigger on Channel 1, and display both channels on screen.

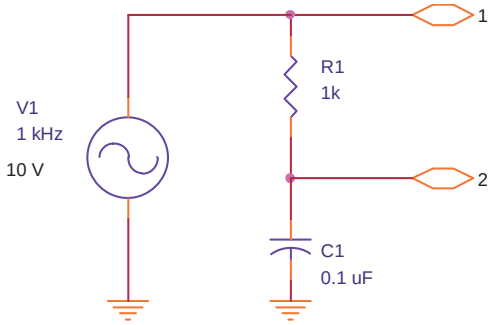


_____ (5 points) Measure V1(pp) and V2(pp). Values: V1(pp) _____ V2(pp) _____

_____ (5 points) Measure the phase angle of V2. Value: _____

Materials allowed: Laboratory instrumentation as required. No notes or textbooks.

Connect the following circuit. Demonstrate for the instructor or FA the following:



_____ (4 points) The signal generator is set for the correct frequency and amplitude.

_____ (2 points) Measure the voltage V_{R1} using the oscilloscope.

V_{R1} = _____ (Phase and Magnitude, V_{RMS})

_____ (2 points) Measure the voltage and phase of V_2 using the oscilloscope.

V_2 = _____ (Phase and Magnitude, V_{RMS})

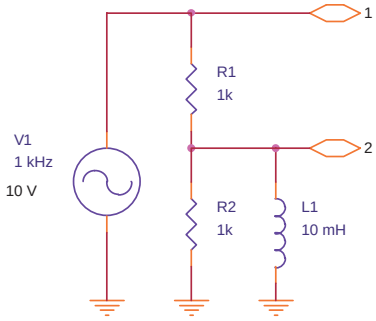
_____ (2 points) Calculate the voltage V_2 using phasor methods.

Calculated V_2 = _____ (Phase and Magnitude, V_{RMS})

_____ (2 points) Find the break frequency (f_c) of the circuit by sweeping the frequency.

Measured f_c = _____

Build the following circuit and measure the indicated quantities.



_____ (4 points) The circuit is correctly built and all components are correct values.

_____ (2 points) Measure the phase angle of V_2. Value: _____

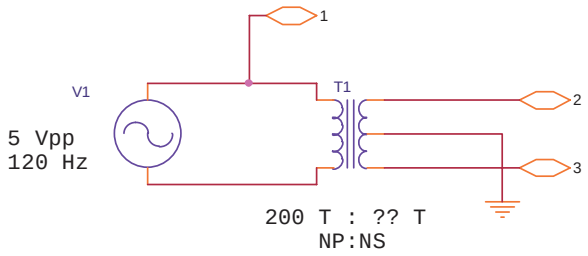
_____ (2 points) Find the break frequency (f_c) of the circuit by sweeping the frequency.

Measured f_c = _____

Practicum 5: Transformers and Resonant Circuits

Materials allowed: Laboratory instrumentation as required. No notes or textbooks.

Connect the following circuit. Demonstrate for the instructor or FA the following:

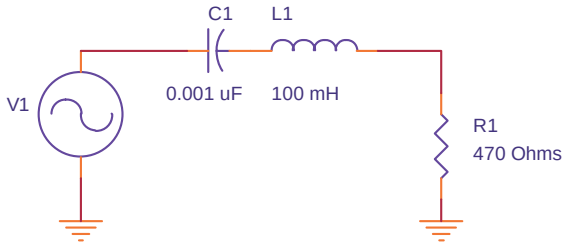


_____ (4 points) Correctly measure test points 2 and 3 using the oscilloscope. (Channel 1 should display test point 2, Channel 2 should display test point 3.)

_____ (4 points) Set up the measurements for calculating the number of turns in the secondary of the transformer. You may use either the DMM or scope.

_____ (2 points) Calculate N_S, the number of turns in the secondary.

Connect the following circuit:



_____ (2 points) Calculate the resonant frequency. F_0 = _____

_____ (4 points) Measure the resonant frequency with the test equipment. $F_{0(MEAS)}$ = _____

_____ (2 points) Measure the bandwidth of the circuit. BW_{MEAS} = _____

_____ (2 points) Calculate the Q of the circuit based on BW_{MEAS} and $F_{0(MEAS}$

Value: _____