NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York

DEPARTMENT: Electrical and Telecommunication Engineering Technology

SUBJECT CODE AND TITLE: EET1222/ET242
Circuit Analysis II

COURSE DESCRIPTION: Analysis of ac circuits with sine-wave sources and R L C circuit components covering phase shift, frequency response, power, and resonance in series and parallel circuits. Three phase wye and delta circuits are also covered. Hands-on laboratory experiments are included.

PREREQUISITE: EET1122/ET162

PRE or COREQUISITES: MAT1375/MA375, ENG1101/EG101, PHYS1434/SC434

TEXTBOOK:
1. Introductory Circuit Analysis,
   R. Boylestad, Prentice Hall 11th Ed. 2007
2. Department Laboratory Manual

COURSE OBJECTIVES/ COURSE OUTCOMES: Upon completion of this course, students will be able to:
1. Calculate voltage, current, impedance and power in series-parallel R,L,C, circuits with ac sources using phasors and complex numbers.(ABET Criteria 2a, 2b, 2f)
2. Use theorems: mesh analysis, nodal analysis. Thevenins's theorem, super-position theorem and maximum power transfer theorem. .(ABET Criteria 2a, 2b, 2f)
3. Calculate power-average, reactive and apparent and power factor. .(ABET Criteria 2a, 2b, 2f)
4. Calculate series and parallel resonance circuit parameters. .(ABET Criteria 2a, 2b, 2f)
5. Calculate voltage, current and power in 3-phase Balanced Y and Delta connections. .(ABET Criteria 2a, 2b, 2f)
6. Calculate turns ratio, reflected impedance and power for an ideal transformer. .(ABET Criteria 2a, 2b, 2f)
7. Wire ac circuits from a schematic and measure voltage and current using multitesters and oscilloscope. .(ABET Criteria 2a, 2b, 2d)
8. Analyze experiment results and write reports on a timely and professional manner. .(ABET Criteria 2a, 2c, 2e, 2f)

TOPICS: Topics include characteristics of sine waves, responses of R, L, and C to sine waves, phasors, series and parallel ac circuits power, selected network theorems series and parallel resonance, balanced delta and Y 3 Phase systems, ideal transformer.

CLASS HOURS: 4

LAB HOURS: 2

CREDITS: 5

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Descriptive details of laboratory coursework:
In the laboratory, experiments include measurements and calculations of voltage, current, impedances, and phase shifts in RL, RC and RLC circuits, series and parallel resonance characteristics using sine wave sources, multitesters and oscilloscope.

GRADING POLICY:

4-5 Exams 55%
1 Final Exam: 30%
Lab Reports 15%

Letter Grade	Numerical Grade Ranges	Quality
A	93-100	4.0
A-	90-92.9	3.7
B+	87-89.9	3.3
B	83-86.9	3.0
B-	80.82.9	2.7
C+	77-79.9	2.3
C	70-76.9	2.0
D	60-69.9	1.0
F	59.9 and below	0.0

Week/Topic	Reading Assignment	Homework & Lab Experiment
1. Orientation Sinusoidal Alternating Waveforms Generation, Frequency, Period, Phase Instantaneous, Peak, Peak-to-Peak, Average, Effective values, AC Meters	Pages 539-574	Chapter 13: 10-18, 30-32, 37, 42, 43 LAB: Orientation
2. Responses of R, L, and C Elements to AC input, Capacitive and Inductive Reactance	Pages 587-602	Chapter 14: 4-6, 10-11, 13, 15-18 LAB: Characteristics of a sine wave
3. Average Power and Power Factor Complex numbers	Pages 603-623	Chapter 14: 28, 31, 34-36 LAB: Dual Channel Oscilloscope and Audio Oscillator
4. Phasors-Polar and Rectangular Formats, P to RX. Conversion, R to P Conversion	Pages 623-628	Chapter 14: 39, 40, 43-45, 48, 50, 51 LAB: R-L-C components
5. Series AC circuits analysis using phasors (R-L, R-C, R-L-C) Ohm's Law, Kirchhoff's Voltage Law, Voltage Divider Rule, Frequency response	Pages 637-662	Chapter 15: 2-7, 9-12, 15, 16 LAB: Frequency Response of R, L, and C components
6. Parallel AC Circuits Analysis using phasors (R-L, R-C, R-L-C) Kirchhoff's Current Law, current Divider Rule, Admittance and Susceptance Frequency Response, Equivalent Circuits, Dual Trace Oscilloscope Phase Measurements.	Pages 668-690	Chapter 15: 25, 27-32, 33, 39, 40, 47, 48 LAB: Frequency Response of Series R-L Networks
7. Series-Parallel Circuits, Reduction of Series Parallel circuits to series circuits, analysis of ladder circuits.	Pages 713-728	Chapter 16: 1-8, 10, 12-14 LAB: Frequency Response of Series R-C Networks
8. Selected Network Theorems for AC Circuits-Source conversion, Mesh Analysis, Nodal Analysis.	Chapter 17 Pages 743-764	Chapter 17: 2-4, 5, 6, 14, 15 LAB: Midterm
9. Thevenin's Theorem, Superposition Theorem, Maximum Power, Transfer Theorem.	Pages 787-806 812-816	Chapter 18: 1, 2, 6, 12, 13, 19, 39 LAB: Phase Measurements
10. Power-True, Reactive and Apparent Power, Power Factor Correction, Wattmeter, Effective Resistance.	Pages 835-859	Chapter 19: 2-6, 10-13, 16-18 LAB: Series Sinusoidal Circuits, RL and RC
11. Series Resonance including Q Factor Selectivity, Bandwidth.	Pages 871-884	Chapter 20: 1-12 LAB: Series Sinusoidal Circuits, RLC
12. Parallel Resonance including selectivity, bandwidth, effect of Q.	Pages 885-902	Chapter 20: 13-21 LAB: Series Resonance
13. 3 Phase Systems, Y and Delta Connections, Power-3 Wattmeter and 2 Wattmeter Methods (Balanced systems)	Pages 1029-1052	Chapter 23: 1-5, 10-12,18, 30-34, 44-47 LAB: Parallel Resonance
14. Transformers including Turn Ratio; Voltage Transformer, Current Transformer, Reflected Impedance and Power.	Pages 989-998	Chapter 21 1-3,4,8,12 LAB: Low Pass Filters
15. Review and Final Exam		LAB: Final Exam