Changing lives through learning

Access to Higher Education Unit

This unit forms part of an Access to HE Diploma. If delivering the graded version of this unit, please refer to the Provider Handbook for details on grading descriptors and the application of these across units within your programme.

Unit Title: AC Circuit Analysis

Graded Unit Reference Number: GA33EEE03

Ungraded Unit Reference Number: UA33EEE03

Module: Electrical and Electronic Engineering

Level: Three (3)

Credit Value: Three (3)

Minimum Guided Learning Hours: 30

Learning Outcome (The Learner will):	Assessment Criterion (The Learner can):
1. Use A.C. circuit theory to solve simple series A.C. circuit problems	1.1 Draw the phasor diagrams and related voltage and current waveforms for simple A.C. circuits
	1.2 Describe inductive reactance and capacitive reactance and use basic relationships to solve simple problems
	1.3 Derive the impendence triangle from the voltage triangle and show that $Z^2 = R^2 + X^2$ Z and that $tan\varphi = X/R$, $sin\varphi = X/Z$ and that $cos\varphi = R/Z$
	1.4 Apply equations to the solution of single branch L-R and C-R series circuits at power and radio frequencies
	1.5 Derive the power triangle from the voltage triangle and identify true power, *P,* apparent power, *S,* and reactive power *Q*
	1.6 Define $power\ factor$ and show that, where *V* and *I* are sinusoidal, $power\ factor = cos\varphi$
2. Use A.C. circuit theory to solve complex series A.C. circuit problems	2.1 Use phasor diagrams and calculations to solve A.C. series R-L-C circuit problems

		2.2	Define series resonance and sketch a phasor diagram showing that when $V = V_R$ at resonance, V_L and V_C may be much greater than the supply voltage
		2.3	Derive and apply the formula for the frequency of series resonance
		2.4	Define Q factor
3.	Apply A.C. circuit theory to the solution of parallel network problems including resonant conditions	3.1	Draw the phasor diagram for a 2-branch parallel circuit with C in one branch and: L only; L and R; or R only in the other branch
		3.2	State the conditions for resonance in a parallel circuit with L and R in one branch and C only in the other
		3.3	Apply the exact and approximate formulae for the parallel resonance frequency
		3.4	Solve problems to correct the power factor for a given circuit and explain why this might be desirable in practice
		3.5	Explain the use of resonant circuits to select and amplify signals