Module Proforma

Approved, 2022.02

Summary Information

Module Code	4403ELE
Formal Module Title	Engineering Circuit Analysis
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Martin Jones	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
Obrad Dordevic	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	22
Tutorial	22

Module Offering(s)

Offering Code	Location	Start Month	Duration
SEP-CTY	CTY	September	12 Weeks

Aims and Outcomes

Aims	To enhance knowledge and understanding of the essential mathematics underpinning electrical and electronic engineering. To develop intellectual abilities in selecting and applying appropriate circuit analysis techniques for analysing various electrical and electronic circuits. To introduce passive electronic components and understand their operating characteristics. To introduce the operating principles of single-phase transformers and electronic filters.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Understand the fundamental relationships governing electric circuits
MLO2	Employ circuit analysis techniques to solve series, parallel and series parallel dc and ac circuits
MLO3	Understand the different powers in ac circuits and perform calculations
MLO4	Analyse simple three-phase circuits
MLO5	Explain the operating principles of single-phase transformers and perform calculation to determine the operating efficiency of transformers

Module Content

Outline Syllabus
Passive components, AC circuits and phasors: Introduction to electric fields, permittivity, Capacitance, impedance of a capacitor. Introduction to magnetic fields, self and mutual inductance, impedance of an inductor. Operating principles of transformers. Alternating current fundamentals, period, frequency and angular frequency. Peak, and rms values. Complex representation of sinusoidal quantities.Phasors. Application of complex numbers in simple ac circuits. Powers in ac circuits. Complex-waveforms. Resonance in simple series ac circuits. Series RLC circuit as a band-pass filter. RC circuits as low-pass and high pass filters. Circuit analysis techniques, steady-state dc and ac circuit analysis: Kirchhoff's laws. Voltage and current divider rules.The superposition principle. Mesh current analysis. Nodal potential analysis. Non-ideal current and voltage sources. Source transformations.Thevenin’s and Norton’s equivalent circuits. Maximum power transfer theory.

Module Overview

Additional Information
The material delivered in this module will be complimented by the practical skills module where students will undertake practical experiments to reinforce the material delivered in this module. UNESCO Sustainable Development GoalsQuality EducationGender EqualityDecent Work and Economic GrowthReduced InequalitiesUK SPEC AHEP 4CEng. M1 Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering.M2 Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed.M3 Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.M4 Select and critically evaluate technical literature and other sources of information to solve complex problems.M11 Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.M13 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.M16 Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance.M18 Plan and record self-learning and development as the foundation for lifelong learning/CPD.IEng.B1 Apply knowledge of mathematics, statistics, natural science and engineeringprinciples to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.B2 Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.B3 Select and apply appropriate computational and analytical techniques to model broadly-defined problems, recognising the limitations of the techniques employed.B4 Select and evaluate technical literature and other sources of information to address broadly-defined problems.B13 Select and apply appropriate materials, equipment, engineering technologies and processes.B16 Function effectively as an individual, and as a member or leader of a team.B18 Plan and record self-learning and development as the foundation for lifelong learning/CPD.Where this module is part of a Degree Apprenticeship programme, the knowledge learning outcomes is K1.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Test	On-line tests	100	0	MLO2, MLO3, MLO5, MLO4, MLO1