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PRIFYSGOL GLYNDŴR WRECSAM
GLYNDŴR UNIVERSITY WREXHAM

MODULE SPECIFICATION FORM

Module Title:	**Electrical Network Theory**	Level:	**5**	Credit Value:	**10**

Module code: (if known)	**ENG597**	Cost Centre:	**GAEE**	JACS2 code:	**H620**

Semester(s) in which to be offered:	**1**	With effect from:	**July 2015**

Office use only: To be completed by AQSU:	Date approved: **July 2015** Date revised: Version No: 1

Existing/New: **Existing**	Title of module being replaced (if any): N/A

Originating Academic area: **Engineering and Applied Physics**	Module Leader: **Y Vagapov**

Module duration (total hours)	100	**Status:**	**Free-standing 10-credit component comprising second half of ENG588 (Electromagnetism and Networks).**
Scheduled learning and teaching hours	36	core/option/elective (identify programme where appropriate):	
Independent study hours	64		
Placement hours	0		

Percentage taught by Subjects other than originating Subject (please name other Subjects):	**0%**

Programme(s) in which to be offered: **Enginering European Programme** (Non Award Bearing)	Pre-requisites per programme (between levels):	**None**

Module Aims:

To develop the ability to analyse, design and use various types of electrical/electronic networks, by means of calculation and by computer simulation, and thus to deduce the implication of their effects in practical situations.

Expected Learning Outcomes

Knowledge and Understanding:
At the completion of this module, the student should be able to:

1. Analyse circuit-related problems by means of equivalent circuit models; and hence model the operation of a range of electrical devices and systems; *(KS 3)*
2. Use modelling software to simulate the behaviour of electromagnetic devices/systems and network circuits. *(KS 4)*

Key skills for employability

1. Written, oral and media communication skills,
2. Leadership, team working and networking skills
3. Opportunity, creativity and problem solving skills
4. Information technology skills and digital literacy
5. Information management skills
6. Research skills
7. Intercultural and sustainability skills
8. Career management skills
9. Learning to learn (managing personal and professional development, self management)
10. Numeracy

Assessment: *Please indicate the type(s) of assessment (eg examination, oral, coursework, project) and the weighting of each (%).*

Assessment is by means of a formal unseen examination.

(This corresponds to Assessment 2 of ENG588 - Electromagnetism and Networks.)

Assessment number (use as appropriate)	Learning Outcomes met	Type of assessment	Weighting	Duration (if exam)	Word count (if coursework)
Assessment One:	1, 2	Examination	100%	2 hr	

Learning and Teaching Strategies:

The module will be delivered through lectures, tutorials, and practical laboratory exercises. The tutorials will be used for the solution of problems in an interactive situation.

Practical and theory work will be supplemented by simulation using appropriate modelling software.

Syllabus outline:

Networks

DC Transients: Transient response R-L, R-C and RLC circuits; natural response and forced step response; natural frequency of oscillation and damping; analysis of non-linear circuits; graphical and analytical methods. Use of computer tools for analysis and problem solving.

AC Bridges: Balance conditions for DC Bridge. AC bridge: balance conditions and phasor diagram for a selection of bridges and deduce the areas of application for any particular bridge.

Networks - Coupled Circuits: Mutual inductance; mutually coupled circuits; dot notation; T and Pi equivalents of inductively-coupled circuits; coupling co-efficient (K). Cross-refer to 'transformers'.

Networks - Two-port (four-terminal) networks: "Four Terminal" parameters; T and Pi sections, ladder networks and attenuators; iterative impedance; image impedance; characteristic impedance; propagation coefficient; attenuation and phase change coefficients; the Neper; insertion loss. Symmetrical attenuators of T and Pi section; construction to particular specification; Passive symmetrical prototype filters: purely reactive elements, calculation of cut-off frequency, characteristic impedance and attenuation. Filter design. Transmission Lines and Aerials equivalent circuits. Software simulation

Bibliography:

Essential Reading

Bird, J. (2010) *Electrical Circuit Theory and Technology,* 4th Edn., Newnes.

Recommended Reading:

Hughes, E. et al. (2012) *Electrical and Electronic Technology*, 11th Edn., Pearson.

Floyd, T. (2009) *Electric Circuit Fundamentals*, 8th Edn, Prentice Hall.

Hughes, E. (2012) *Electrical and Electronic Technology*, 11th Edn, Prentice Hall.

Berube, R. (2004) *Computer Simulated Experiments for Electric Circuits Using Electronics Workbench Multisim* (3rd Edn), London, Prentice-Hall

'Mathworks' (2012), *Matlab and Simulink Student version 2012a*; Prentice Hall.

IEEE *Transactions on Electromagnetic Compatibility,* IEEE, Quarterly Journal.

IET *Microwave, Antennas & Propagation,* IET, Bi-monthly Journal.