e-Quals Unit Syllabus

Level 3 Electronic principles (7267-523)

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Unit 523 Electronic principles

Rationale

This unit concerns the electronic principles and applications associated with reactance, resonance, transformers, transducers and semi-conductor devices.

Learning outcomes

There are **two** performance outcomes for this unit. The candidate will be able to:

- demonstrate an understanding of reactance, resonance and transformers and the practical applications of these components and circuits
- demonstrate an understanding of semi-conductor devices, displays and transducers and the practical applications of these components.

Assessment and grading

Assessment will be by means of a **set assignment** covering both practical activities and underpinning knowledge.

Unit 523 Electronic principles

Outcome 1 Demonstrate an understanding of reactance, resonance, transformers and power transfer and the practical applications of these components and circuits

Practical activities

The candidate will be able to:

1 use electronic instruments to carry out practical tests

2 test transformers in both static and dynamic states

Underpinning knowledge

The candidate will be able to:

1 a calculate inductive and capacitive reactance

b identify reactance graphs

c calculate the impedance, phase angle and voltages in an RLC series circuit, and draw appropriate phasor diagrams

d sketch the variation of reactance with frequency for LR and CR circuits and identify 3dB points for

i. high pass filter

ii. low pass filter

iii. band pass filter

iv. band stop filter

e state the effect of component values on the current in series and parallel a.c. circuits

f plot current against frequency for LR and CR circuits

2 a explain the condition of resonance for series and parallel circuits by reference to phasors

b calculate frequency of resonance for series and parallel a.c. circuits

c identify typical resonance curves and state the effect of damping, Q and bandwidth

3 a compare the construction of transformers for typical applications

i. a.f.

ii. r.f.

iii. power, including switch mode power

b state the transformation ratio and the need for tappings

c calculate current, voltage, VA, impedance and turns ratio, on an ideal transformer

d identify specifications for a range of transformers

e explain how magnetic and electrostatic shielding is provided

f identify transformer thermal protective devices

4 explain maximum power transfer for a resistive load.

Unit 523 Electronic principles

Outcome 2 Demonstrate an understanding of semi-conductor devices, displays and transducers and the practical applications of these components

Practical activities

The candidate will be able to:

1 use electronic instruments to carry out practical tests

Underpinning knowledge

The candidate will be able to:

1 a list the relative merits of silicon and germanium diodes and transistors

b list the relative merits of silicon and germanium diodes and transistors

c explain the operation, typical application and fault identification of

i. bi-polar junction transistors

ii. field effect transistors

iii. laser diodes

iv. silicon controlled rectifiers (SCR)

v. solid state relays

vi. diacs

vii. triacs

2 describe typical operating principles for

i. vacuum fluorescent displays

ii. gas plasma displays

3 describe the operating conditions and typical application of

i. photocells

ii. photodiodes

iii. phototransistors

iv. optocouplers

v. infra-red sources and sensors

vi. the fibre optic link

vii. solid state temperature measurement devices

viii. Hall effect devices

4 explain the safe discharge of devices

Unit record sheet

Use this form to track your progress through this unit.

Tick the boxes when you have covered each outcome. When they are all ticked, you are ready to be assessed.

Outcome	✓	Date
1 Demonstrate an understanding of reactance, resonance, transformers and power transfer and the practical applications of these components and circuits	☐	
2 Demonstrate an understanding of semi-conductor devices, displays and transducers and the practical applications of these components	☐	
	☐	
	☐	
	☐	

Candidate Signature ..... **Date** .....

City & Guilds Registration Number .....

Quality nominee (if sampled) ..... **Date** .....

Assessor Signature ..... **Date** .....

External Verifier Signature (if sampled) ..... **Date** .....

Centre Name ..... **Centre Number** .....

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