

e-Quals Unit Syllabus

Level 2 Electronic Systems
(7267-424)



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Rationale

This unit concerns the dynamic aspects of electronic systems including input/output devices and input/output waveforms, also test and fault finding on prepared circuit boards.

Learning outcomes

There are **three** outcomes to this unit. The candidate will be able to demonstrate an understanding of:

- waves and waveforms
- input and output transducers
- electronic modules.

Assessment and grading

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

Unit 424

Electronic systems

Outcome 1

Demonstrate an understanding of waves and waveforms and apply this knowledge in a practical situation

Practical activities

The candidate will be able to:

- 1 assemble waveshaping circuits on prototype boards
- 2 observe waveforms on an oscilloscope

Underpinning knowledge

The candidate will be able to:

- 1 identify sinusoidal and rectangular waveforms and can
 - a define waveform parameters for a rectangular wave
 - i periodic time
 - ii frequency
 - iii amplitude (peak value)
 - iv peak to peak value
 - v average value
 - vi mark/space ratio
 - b define fundamental and harmonic frequencies
 - c state the frequency components of common waveforms
 - i sinusoidal
 - ii square (odds only)
 - iii pulse (odds and evens)
 - d synthesise symmetrical squarewaves graphically
- 2 identify sound and electromagnetic waves and can
 - a state wave parameters
 - i frequency
 - ii velocity
 - iii wavelength
 - b define sound wave frequency range
 - i audio
 - ii ultrasonic

- c define e-m wave frequency range
 - i VLF to SHF bands
 - ii microwaves
 - iii infrared
 - iv visible light
 - v ultraviolet
- 3 identify waveshaping and can
 - a obtain waveforms on an oscilloscope for a CR circuit with symmetrical squarewave input
 - i capacitor voltage (for short time constant)
 - ii differentiated voltage across resistor (for short time constant)
 - iii integrated voltage across capacitor (for long time constant)
 - iv graphical interpretation of CR time constant
 - b obtain waveforms on an oscilloscope for an inverse parallel diode clipper with sinewave input
 - c describe procedures for practical measurements
 - i selection and care of instruments for circuit testing
 - ii use oscilloscope to waveform for prepared CR/diode circuits.

Unit 424

Electronic systems

Outcome 2

Demonstrate an understanding of input and output transducers and apply this knowledge safely in a practical situation

Practical activities

The candidate will be able to:

- 1 use a multimeter to test continuity of switch and relay contacts
- 2 test continuity of moving coil transducers
- 3 measure the resistance of recording heads, relay coils and PM motor armature.

Underpinning knowledge

The candidate will be able to:

- 1 identify input transducers and sensors and can
 - a recognise common switches
 - i slide
 - ii DIL
 - iii rocker
 - iv toggle
 - v rotary wafer
 - b show contact arrangements by means of a diagram
 - i SPST
 - ii SPDT (SPCO)
 - iii DPST
 - iv DPDT (DPCO)
 - c recognise common microphones and circuit symbols
 - i electret condenser microphone
 - ii dynamic microphone
 - d define microphone parameters
 - i frequency response
 - ii cardioid response
 - e recognise an audio playback tape head, circuit symbol and electrical connections

- 2 identify output transducers and can
- a recognise moving coil loudspeakers and headphones, circuit symbols and electrical connections
 - i full range unit
 - ii function of enclosure
 - iii miniature loudspeaker
 - iv hi fl headphones
 - b define loudspeaker and headphone parameters
 - i range of impedances
 - ii frequency range
 - c recognise a d.c. permanent magnet motor and circuit symbol
 - i electrical connections
 - ii electrical connections
 - iii applications
 - d identify a d.c. low voltage relay
 - i circuit symbol
 - ii relay contact arrangements SPNO SPCO DPNO DPCO (DPDT)
 - e recognise audio erase and record tape heads, electrical connections and circuit symbols
 - f recognise an electrostatic monochrome CRT for analogue oscilloscope
 - i circuit symbol
 - ii electrical connections
 - iii screen sizes
 - g recognise a monochrome monitor CRT with electromagnetic deflection
 - i circuit symbol
 - ii electrical connections
 - iii screen sizes
 - iv common CRT faults
 - h describe procedures for practical measurements
 - i continuity of switch and relay contacts
 - ii continuity of moving coil transducers
 - iii resistance of recording heads, relay coils and PM motor armature.

Unit 424

Electronic systems

Outcome 3

Demonstrate an understanding of electronic modules and apply this knowledge safely in a practical situation

Practical activities

The candidate will be able to:

- 1 use electronic instruments to test electronic modules
- 2 assemble circuits on prototype boards using ICs and passive components
- 3 carry out fault-finding on prepared circuit boards

Underpinning knowledge

The candidate will be able to:

- 1 identify a block diagram approach to amplifiers and can
 - a define voltage amplifier parameters
 - i define voltage amplifier parameters
 - ii phase shift (0 or 180 deg)
 - iii half power bandwidth
 - b explain the basic concept of dB in terms of power and voltage for +3 dB and -3 dB
 - c give examples of amplifier bandwidths
 - i audio
 - ii video
 - iii d.c. amplifier
 - d identify distortion in a sinusoidal test waveform
 - i clipping
 - ii crossover
 - e calculate overall voltage gain (as a ratio) and phase shift from input and output data
 - i single stage amplifier
 - ii cascaded stages
- 2 identify a block diagram approach to oscillators and waveform generators and can
 - a state that a sinusoidal oscillator is an amplifier block with positive feedback and method of frequency determination
 - b state that oscillators are classed as
 - i LC
 - ii Wien RC
 - iii crystal controlled

- c outline the concept of waveform generators
 - i square wave
 - ii triangular wave
 - iii sawtooth
- 3 identify passive filters and can
 - a define filter terms with reference to a frequency response diagram
 - i low pass
 - ii high pass
 - iii band pass
 - iv circuit symbols
 - b recognise practical filters
 - i CR
 - ii LR
 - iii LC
 - iv packaged filter
- 4 identify computer, audio and video system block diagrams and can
 - a recognise system block diagrams with relevant waveforms for
 - i public address system
 - ii analogue oscilloscope
 - iii video monitor
 - iv monochrome CCTV system
 - v PC system with peripherals
 - b describe procedures for prototyping, practical measurements and fault finding
 - i selection and care of instruments for circuit testing
 - ii circuit assembly on prototype boards using ICs and passive components
 - iii measurement exercises using prepared circuits of passive filters,
 - iv cascaded IC amplifiers, sinusoidal oscillator, rectangular waveform
 - v generator with CR waveshaping
 - vi fault-finding to module level on prepared circuits
- 5 identify employees' responsibilities for workshop safety and can
 - a explain how to take care of own health and that of others
 - b state the need to respect equipment provided for health and safety
 - c describe procedures to ensure safety of repair on completion
 - d state reporting requirements
 - i report all hazards and notify authorities
 - ii report accidents to employer HASAWA 1974
Reporting of Injuries (RIDDOR) 1995
Notification of Accidents etc 1980
Management of Health and Safety Regulations 1992
(Regulation 12 Employee's Responsibility)

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 waves and waveforms and apply this knowledge in a practical situation	<input type="checkbox"/>	
2 Demonstrate an understanding of input and output transducers and apply this knowledge safely in a practical situation	<input type="checkbox"/>	
3 Demonstrate an understanding of electronic modules and apply this knowledge safely in a practical situation	<input type="checkbox"/>	

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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