

1. Module details**Module name****Frequency Selective Amplifiers****Module duration**

It is expected that students with the appropriate entry knowledge and skills will successfully complete this module in 18 - 20 hours.

Module code

NUE156

Discipline code

0703230 Electronic Installation and Maintenance.

2. Module purpose

This module provides the learner with a basic knowledge of the characteristics of frequency selective amplifiers.

3. Prerequisites

NUE158 Introduction to Resonance, Filters and Oscillators.

4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from NUEITAB.

5. Content**Band pass and band stop circuits**

Series and parallel resonant circuits as band stop filters
Series and parallel resonant circuits as band pass filters

Tuned amplifiers

Using a single LC load
Calculation of gain
Multistage tuned amplifiers

Amplifiers using frequency selective feedback

Gain stability
Active filters

Other filter networks

Ceramic resonator
Surface Acoustic Wave (SAW)
Crystal
Mechanical
Digital
Other types

6. Assessment strategy**Assessment methods**

Assessment should be progressive reflecting a holistic approach to ensure the module purpose is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of a number of item types, such as multiple choice, short answer and problem solving.

Conditions of assessment

Learning and assessment will take place in an environment that is conducive to a learner's development.

7. Learning outcome details**Learning outcome 1**

Identify and measure the characteristics of band pass and band stop circuitry.

Assessment criteria

- 1.1 Identify a band pass or band stop circuit configuration and describe the operation of the circuit.
- 1.2 Sketch the circuit symbols for a band pass and band stop filter.
- 1.3 Measure and plot the frequency response of a range of band pass and band stop circuitry.

Learning outcome 2

Evaluate the operation of a tuned amplifier.

Assessment criteria

- 2.1 Describe the effect on circuit operation of a resonant circuit at the input and output of an amplifier.
- 2.2 Calculate the Q factor and bandwidth of a tuned amplifier.
- 2.3 Demonstrate the effect of variations in the circuit 'Q' on bandwidth and gain.
- 2.4 Calculate the gain of a tuned amplifier stage with a single LC load.

Learning outcome 3	Identify the basic characteristics of an active filter.
Assessment criteria	<p>3.1 State the effect of gain stability on active filters.</p> <p>3.2 List the typical rates of roll off for higher order filters.</p> <p>3.3 List the names of typical active filters that are available in an integrated circuit form. These include state variable filter, switched capacitor filter, digital (sampled data) filter.</p>
Learning outcome 4	List types of filters and state their applications.
Assessment criteria	<p>4.1 Describe the principles of operation for a range of filter: - circuits including, SAW ceramic resonator, crystal - mechanical, digital etc.</p> <p>4.2 List typical examples of equipment that use SAW, ceramic resonator, crystal, mechanical and digital filters.</p>
8. Delivery of the module	
Delivery strategy	Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require learning outcome sequence other than that indicated in the module.
Resource requirements	<p><i>In addition learners will require access to:</i></p> <ul style="list-style-type: none"> • Standard electronics laboratory equipment out for making measurements • Standard electronics hand tools for assemble of systems • Conveyor belt or equivalent with appropriate presence sensors.
Occupational health and safety requirements	A safe and healthy environment will be provided for students and teachers as well as the particular safety procedures followed as part of the learning / teaching activity and content.