

METAL & ENGINEERING NATIONAL CURRICULUM

MODULE: BASIC TRANSDUCERS - NE19

PURPOSE: This module aims to introduce the student to a range of devices that convert various forms of energy into electrical energy and vice versa. These devices are generally termed transducers.

NOMINAL DURATION: Half module

*A full module is designed on the assumption that most of the students will achieve the competencies specified in 35 to 40 hours.
The length of time taken to complete a module will vary depending on factors such as teaching method used, knowledge and skills at entry and individual students ability.*

PREREQUISITES: Electrical Principles (NE160) or
Introduction to Electricity and Electronics (NBB14)
or AC Principles (NE 03)

LEARNING OUTCOMES On completion of this module the student will be able to:

1. Describe typical applications of transducers.
2. Describe the construction and explain the operation of transducers.
3. Construct operational circuits using specified transducers.
4. Measure and record input stimulation and output response of specified transducers.
5. Identify and replace faulty transducers rendering the circuit serviceable.

STUDENTS SHOULD BE MADE AWARE OF OCCUPATIONAL HEALTH AND SAFETY ISSUES IN ALL SITUATIONS AND BE EXPECTED TO DEMONSTRATE SAFE WORKING PRACTICES AT ALL TIMES.

OUTLINE OF CONTENT:

This module contains:

1. **Types of transducers**
 - thermistor (NTC and PTC)
 - light dependent resistor (LDR)
 - photo-transistor
 - opto-coupler
 - speaker (electro magnetic, dynamic, Piezzo)
 - magnetic pick up cartridge
 - light emitting diode
 - strain gauge
 - hall effect device
 - thermocouple
 - Peltier effect device
 - Piezzo electric device
 - microphone
2. **Applications of transducers in industry and commerce.**
3. **Circuit parameters and limitations.**

ON THE JOB TRAINING:

For consolidation the material in this module should be linked and complimented by the relevant on-the-job skill practice or other equivalent experience.

PERFORMANCE CRITERIA:

The criteria for each learning outcome should be:

Learning Outcome 1

Assessment:

**Objective written tests
Assignments**

Performance:

- a. **Describe typical industrial and commercial applications of transducers.**
- b. **List transducer input and output energy forms and ranges.**

Learning Outcome 2

Assessment:

**Objective written test
Assignments**

Performance:

- a. **Draw labelled diagram identifying the various parts of a transducer.**
- b. **Explain the construction and theory of operation of each of the following transducers: speaker, magnetic pick up cartridge, strain gauge, Hall effect device, thermocouple, Piezzo-electrical device.**

Learning Outcome 3

Assessment:

Practical assignments

Performance:

Correctly construct operational circuits for each of the following transducers: thermistor, light dependent resistor, photo-transistor, opto-coupler, light emitting diode, strain gauge, Hall effect device, thermocouple, Piezzo electric device.

Learning Outcome 4

Assessment:

Practical assignments

Performance:

- a. **Apply a range of input stimuli to circuits containing each of the transducers listed below and measure and record the output responses: thermistor, opto-coupler, strain gauge, Hall effect device, thermocouple, Piezzo electric device.**
- b. **For the transducers listed in part (a) compare transducer input and outputs with respect to linearity and range.**
- c. **For the transducers listed in part (a) graph transducer input against output.**
- d. **For the transducers listed in part (a) measured response with manufacturers data.**

Learning Outcome 5

Assessment:

Practical assignments

Performance:

For the transducer circuits used in learning outcome 4 identify and replace any faulty circuit components rendering the circuit serviceable.

1. SUGGESTED TEACHING/LEARNING STRATEGIES

2. SUGGESTED MINIMUM RESOURCES

Floyd, "Electronic Devices".

Uffenbeck, "Introduction to Electronics".

Boylestad & Nashelsky, "Electronic Devices and Circuit Theory".

Manufacturers' data sheets.

3. SUGGESTED ON-JOB TRAINING - FOR MAXIMUM SKILL ACQUISITION