Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

INDUSTRIAL TECHNICAL DRAWING

ELTTD401

PERFORM INDUSTRIAL TECHNICAL DRAWING

Competence

RQF Level: 4

Learning Hours 50

Credits: 5

Sector: Energy

Trade: Electrical Technology

Module Type: General

Curriculum: ENGELT4001- TVET Level 4 in Electrical Technology

Issued date: May,2023

<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes the skills, knowledge and attitude required to perform industrial technical drawing. At the end of this module, learners will be able to use Technical drawing instruments, materials and equipment, draw lines and symbols used in industrial electrical drawing, perform hydraulic and pneumatic drawings. He/she will also be able to draw electrical control and power circuit, pneumatic and hydraulic control and power circuit.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">N/A</td></tr>
<tr><td rowspan="6">Delivery modality</td><td colspan="2">Training delivery</td><td>100%</td><td colspan="2">Assessment</td><td>Total 100%</td></tr>
<tr><td colspan="2">Theoretical content</td><td>30%</td><td rowspan="4">Formative assessment</td><td>30%</td><td rowspan="4">50%</td></tr>
<tr><td colspan="2">Practical work:</td><td rowspan="3">70%</td><td rowspan="3">70%</td></tr>
<tr><td>• Group work and presentation</td><td>30%</td></tr>
<tr><td>• Individual work</td><td>40%</td></tr>
<tr><td colspan="2"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Carry out preliminary activities	1.1. Drawing Equipment, materials are appropriately identified based on the types and use
	1.2. Symbols are clearly identified according to the standards
	1.3. Drawing tools are appropriately identified based on the types and use
2. Perform electrical industrial drawings	2.1. Electrical Control and power circuits are correctly described according to control and power circuits elements
	2.2 Control and Power circuits are correctly drawn in line with related scenario
	2.3.Professional drawing software is clearly applied according to the software types
3. Perform hydraulic and pneumatic drawings	3.1. Hydro-pneumatic control and power circuits are correctly described according Hydro-pneumatic control and

	power circuits elements
	3.2. Control and Power circuits of hydraulic and pneumatic system are correctly drawn in line with related scenario
	3.3. Professional drawing software is clearly applied according to the software types

Intended Knowledge, Skills and Attitude

Knowledge	Skills	Attitudes
✓ Types of drawing tools ✓ Safety precautions, and security ✓ Technical Symbols and diagrams ✓ Interpret drawing ✓ Schematic diagrams ✓ Wiring diagrams ✓ Circuit diagrams ✓ Industrial codes and standards	✓ Computer skills ✓ Proper use of measurement tools ✓ Hand-drawing skills ✓ Computer-aided design ✓ Industrial drawing standards ✓ Creating technical drawings ✓ Analytical skills ✓ Diagnostic skills ✓ Communication skills ✓ Collaborative skills ✓ Task management skills	✓ Honest ✓ Accountability ✓ Self-motivated ✓ Gender sensitive ✓ Customer care oriented ✓ Decisive ✓ Time management ✓ Humble ✓ Creative ✓ Patient ✓ Responsible ✓ Innovative ✓ Flexible ✓ integrity ✓ Goal oriented ✓ Self-confident ✓ Motivated ✓ Good common sense ✓ Self-confident ✓ Task oriented ✓ Honest ✓ Customer focused ✓ Energetic ✓ Able to work independently ✓ Integrity ✓ Strong moral character ✓ Personal hygiene/grooming ✓ Time management ✓ Open minded ✓ Organized ✓ Maintain health ✓ Positive work ethics ✓ Gender sensitivity ✓ Flexible ✓ Problem solver

		✓ Goals oriented ✓ Teamwork and Collaboration ✓ Professionalism ✓ Strong Work Ethic ✓ Adaptability ✓ Safety Consciousness ✓ Customer Service Orientation

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Carry out preliminary activities 2. Perform electrical industrial drawings 3. Perform hydraulic and pneumatic drawings
Learning outcome 1: Carry out preliminary activities	**Learning hours: 15**

Indicative content

- **Definition of key terms used in industrial technical drawing**
  - ✓ Industrial drawing
  - ✓ Technical drawing
  - ✓ Drawing Symbols
  - ✓ Drawing standard
- **Identification of electrical technical drawing equipment and materials**
  - ✓ Types of industrial technical drawing equipment
  - ✓ Types of industrial technical drawing materials
- **Identification of Symbol Standards**
  - ✓ Introduction to different types of symbols
  - ✓ Description of the specific standards
  - ✓ Importance of using symbols
- **Identification of industrial technical drawing tools**

- ✓ Hand drawing tools
- ✓ Industrial electrical drawing and simulation software

Resources required for the learning outcome	
Equipment	▪ Computer
Materials	▪ Paper, Templates, Drawing board
Tools	▪ Pencils, Rulers, Erasers, compass, protractor , mini drafter, T-squares, Divider, drawing software
Facilitation techniques	▪ Demonstration, Individualized, Trainer guided, Group discussion, Practical exercises
Formative assessment methods /(CAT)	▪ Written assessment ▪ Oral presentation

Learning outcome 2:Perform electrical industrial drawings	Learning hours: 25

Indicative content

- **Description of Electrical Control and power circuits**
  - ✓ Control/command and power circuits elements
    - Isolating devices (Disconnector, Disconnector switch and Disconnect fuse)
    - Protection devices (Fuse, Circuit breaker and Disconnector)
    - Command devices (Cam switch, Push button, Push turn switch)
  - ✓ Manual, semi-automatic and automatic command drawing
    - Automatic command devices (Relays, Contactors)
  - ✓ Asynchronous, and dc motor starting control and power circuit drawing
  - ✓ braking control and power circuit drawing
  - ✓ Speed control of asynchronous, dc motor control and power circuit drawing
- **Control and power circuits drawing**
  - ✓ scenarios
- **Application of Professional drawing software**
  - ✓ software types
    - Solid work software

- Automation studio software

Resources required for the learning outcome	
Equipment	▪ Computer
Materials	▪ Paper, Templates, Drawing board
Tools	▪ Pencils, Rulers, Erasers, compass, protractor , mini drafter, T-squares, Divider, drawing software
Facilitation techniques	▪ Demonstration, Individualized, Trainer guided, Group discussion, Practical exercises
Formative assessment methods /(CAT)	▪ Oral presentation ▪ Performance based assessment ▪ Product based assessment

Learning outcome 3: Perform hydraulic and pneumatic drawings	**Learning hours: 10**

Indicative content

- **Describe hydraulic and pneumatic drawings control and power circuits**
  - ✓ Hydro-pneumatic control and power circuits elements
- **hydro –pneumatic system Control and Power circuits drawing**
  - ✓ scenarios
- **Application of Professional drawing software according to the requirements**
  - ✓ Soldwork software
  - ✓ Automation studio software

Resources required for the learning outcome	
Equipment	▪ Computer
Materials	▪ Paper, Templates, Drawing board
Tools	▪ Pencils, Rulers, Erasers, compass, protractor, mini drafter, T-squares, Divider, drawing software

Facilitation techniques	▪ Demonstration, Individualized, Trainer guided, Group discussion, Practical exercises, Jig saw, Demonstration and simulation Practical exercise
Formative assessment methods /(CAT)	▪ Oral presentation ▪ Performance based assessment

List of abbreviations

1. **TVET**: technical vocation and education training
2. **RQF**: Rwanda Qualification Framework
3. **RTB**: Rwanda TVET Board
4. **PPE**: Person Protective Equipment
5. **CAT**: Continuous Assessment Test
6. **NA**: Not applicable

References

1. Le schéma électrique, Hubert Largeaud, troisieme edition revue et corrigée, 1991 2.
2. Geometric and engineering drawing by K. Morling, Third edition, 201
3. David Andelson(2006)Technical drawing
4. SHRI P.J MEHATA (1988)3rdEdition,Engineering drawing practice,Newdelhi,INDIA
5. S. Chand &Er. R.K. Dhawan, Machine drawing
6. Warren J. Luzadder / Jon M. Duff, Introduction to Engineering drawing, second edition.
7. M Bhattacharyya & S. Pal, Fundamental of Engineering drawing, fourth Edition.
8. Dhawan, R. K., A Text Book of Machine Drawing, 2nd ed., 1998.
9. K.R. GopalaKrishna,,Engineering drawing (vol I & II combined) edition 2001
10. Brian Hadley, Practical Engineering Drawing
11. Driscall, technical drawing for today, second edition
12. Dhawan, R. K., A Text Book of Machine Drawing in First Angle Projection, 2003.
13. Parker, M., Manual of British S
14. Oweeye, E.M. and Smith, S.E., Engineering Drawing, 1994 edition.
15. Gopalakrishna, K. R., Engineering Drawing, 4th ed., 1991.
16. Bhattacharyya, M. & Pal, S., Fundamentals of Engineering Drawing, 1996 edition.
17. Warren, J. F. and Fon, M.D., Introduction to Interactive Computer Graphics for Design and Production, 2002 edition.

Glossary

Delivery modality: describes various methods or formats in which training programs are delivered to participants.

Preliminary activities: initial tasks, preparations, or actions that are undertaken before the main or primary activities of a project, process, or event. These activities are typically performed to lay the groundwork, gather necessary information, set the stage, or establish the conditions for the subsequent steps or main activities.
Tools: instruments designed to facilitate the process of assembly or disassembly and ensure efficient and safe handling of the parts involved.

Materials: resources that are used to create or construct something. Materials can be physical substances, natural or synthetic, that have specific properties and characteristics. They are often used in manufacturing, construction, and various other industries.
Equipment: devices used specifically for the process of assembling or putting together various components or parts to create a finished product or structure
Workplace: location or environment where work is conducted. It is a place where employees, staff members, or workers engage in their job duties and responsibilities
Learning outcome: specific statements that describe what learners are expected to know, understand, or be able to do after completing a learning experience, such as a course, training program, or educational activity.

Module: refers to a self-contained instructional unit or segment within a broader training program or curriculum. It is designed to deliver specific learning content and objectives in a structured and organized manner. A training module typically focuses on a particular topic, skill, or competency and provides learners with the necessary knowledge and guidance to achieve the desired learning outcomes.

Formative assessment: a type of assessment that is conducted during the learning process to monitor student progress, provides feedback, and informs instructional decisions.

Summative assessment: a type of assessment used to evaluate learning outcomes at the end of a unit or course

Resources: refers to various materials, tools, or assets that are available to individuals or organizations to support or facilitate a particular task, project, or goal

Solid work software: widely used computer-aided design (CAD) software that is specifically designed for 3D modelling and product design. It is developed by Dassault Systems and is known for its powerful features, user-friendly interface, and extensive capabilities in creating, simulating, and documenting 3D models.

CAD: Computer **A**ided **D**esign

Hydro-pneumatic system:
A hydro-pneumatic system is a type of mechanical system that combines the use of hydraulic and pneumatic components to achieve specific functions or tasks. It utilizes both fluid power and compressed air to transmit and control forces or motion.

machine by a software layer.