



Republic of Rwanda
Ministry of Education



RTB | RWANDA
TVET BOARD

TECHNICAL DRAWING

ETETD401

APPLY TECHNICAL DRAWING

Competence

RQF Level: 4

Learning Hours



Credits: 4

Sector: Technical Services

Trade: Electronics and Telecommunication

Module Type: General

Curriculum: TSVETE4001 - TVET Certificate IV in Electronics and Telecommunication

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Issue Date: May 2023

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|--|--|-----|-------------|----------------------|-----|-------------------|
| Purpose statement | This module describes the knowledge, skills and attitude required to apply technical drawing. At the end of this module, learners will be able to apply drawing scales, dimensions, make lettering, draw figures, solids and make projections of points, lines and figures in two and three dimensions using various drawing instruments, materials and equipment. In addition, the learners will use drawing software to draw lines, 2D and 3D figures. | | | | | |
| Learning assumed to be in place | Apply computer skills, Apply mechanics and properties of matters, apply mathematical analysis | | | | | |
| Delivery modality | Training delivery | | 100% | Assessment | | Total 100% |
| | Theoretical content | | 30% | Formative assessment | 30% | 50% |
| | Practical work: | | 70% | | 70% | |
| | • Group work and presentation | 30% | | | | |
| | • Individual work | 40% | | | | |
| | Summative assessment | | | | | 50% |

Element of Competency and Performance Criteria

| Elements of competency | Performance criteria |
|---|---|
| 1. Identify drawing instruments, materials and equipment | 1.1. Drawing materials are properly identified according to their uses |
| | 1.2. Drawing instruments are properly identified according to their types |
| | 1.3. Drawing equipment are properly identified according to the task to be done |
| | 1.4. Drawing board is properly prepared according to the drawing activities |
| 2. Draw symbols, lines and geometric figures used in technical drawing | 2.1. Drawing sheet layout is properly presented according to the standard |
| | 2.2. Types of line are correctly drawn according to their thickness |
| | 2.3. The symbols, geometric figures are accurately drawn according to their style |
| | 2.4. Lettering is effectively applied according to their applications |
| | 2.5. Geometrical angles are drawn according to their types |

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| | 2.6. Scales are accurately applied in technical drawing according to the measurements |
| | 2.7. Dimensions are properly described to technical drawings according to the standards |
| 3. Perform drawing projections | 3.1. Isometric projection types are properly described according to the types |
| | 3.2. Isometric projection are correctly applied based on drawing standards |
| | 3.3 Projected objects are correctly draw in 2D and 3D according to their dimensions and type of projection |
| 4. Apply Computer Aided Design (CAD) software | 4.1. The software used in drawing are properly identified according to their features |
| | 4.2. The elements of drawing software are well described according to their roles |
| | 4.3. Different types of lines and shapes are drawn in drawing software according to their types |

Knowledge, Skills, Attitudes

| Knowledge | Skills | Attitudes |
|--|---|---|
| <ul style="list-style-type: none"> ✓ Technical Symbols and diagrams ✓ Interpret block diagrams ✓ Industrial codes and standards ✓ Tools of drawing | <ul style="list-style-type: none"> ✓ Computer skills ✓ Proper use of measurement tools ✓ Computer-aided design ✓ Creating circuit diagram ✓ Analytical skills ✓ Diagnostic skills ✓ Communication skills ✓ Collaborative skills ✓ Task management skills | <ul style="list-style-type: none"> ✓ Honest ✓ Accountability ✓ Self-motivated ✓ Gender sensitive ✓ Customer care oriented ✓ Decisive ✓ Time management ✓ Humble ✓ Creative / Innovative ✓ Patient ✓ Responsible ✓ Flexible ✓ Integrity ✓ Goal oriented ✓ Self-confident ✓ Good common sense ✓ Task-oriented ✓ Customer focused ✓ Energetic ✓ Able to work independently ✓ Strong moral character ✓ Personal hygiene |

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| | | <ul style="list-style-type: none"> ✓ Open-minded ✓ Organized ✓ Maintain health ✓ Positive work ethics ✓ Problem solver ✓ Goals oriented ✓ Teamwork / Collaboration ✓ Professionalism ✓ Strong Work Ethic ✓ Adaptability ✓ Safety Consciousness |
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Course content

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| Learning outcomes | <p>At the end of the module the learner will be able to:</p> <ol style="list-style-type: none"> 1. Identify drawing instruments, materials and equipment 2. Draw lines and symbols used in electrical drawing 3. Perform drawing projections 4. Apply Computer Aided Design (CAD) software |
| Learning outcome 1: Identify drawing instruments/ equipment, materials and tools | Learning hours: 5 |
| Indicative content | |
| <ul style="list-style-type: none"> • Introduction to technical drawing <ul style="list-style-type: none"> ✓ Definition of key concepts ✓ Application technical drawing ✓ Types of technical drawing • Identification of drawing materials and their uses <ul style="list-style-type: none"> ✓ Drawing material • Identification of drawing tools/instrument and their uses <ul style="list-style-type: none"> ✓ Types Drawing instruments / Types Drawing instruments ✓ Types Drawing Tools | |
| Resources required for the learning outcome | |
| Equipment | Mini-Drafter |



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| Materials | Paper, Rubber, Pen ink, propelling pencil, Drawing pencil, Pencil sharpener, Templates, Pins |
| Tools | Ink-pen, Paper cutter, 1m straight drawing ruler, Right angle ruler, Protractor, Drawing Compass, French curves, Engineering Pencils, Drawing Template, set squares, T square, Paper holder, Mathematical set, Drawing board |
| Facilitation techniques | <ul style="list-style-type: none"> ▪ Brainstorming ▪ Group discussion ▪ Lectures |
| Formative assessment methods /(CAT) | <ul style="list-style-type: none"> ▪ Written assessment ▪ Oral presentation |

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| Learning outcome 2: Draw symbols, lines and shapes | Learning hours: 10 |
| Indicative content | |
| <ul style="list-style-type: none"> • Description of drawing sheet <ul style="list-style-type: none"> ✓ Drawing sheet types ✓ Drawing sheet dimensions ✓ drawing sheet parts • Description of geometric figures <ul style="list-style-type: none"> ✓ Point ✓ Types of lines and their uses ✓ Angles and their types ✓ Triangles and their types ✓ Quadrilaterals and their proprieties • Applying Drawing of Symbols <ul style="list-style-type: none"> ✓ Drawing symbols • Applying Drawing Lettering <ul style="list-style-type: none"> ✓ Features of lettering ✓ Classification of lettering ✓ Spacing of letters • Dimensioning techniques <ul style="list-style-type: none"> ✓ Types of dimensioning ✓ Method of dimensioning | |

- ✓ Elements of dimensioning
- ✓ Function of dimensions
- ✓ Rules of dimensioning
- **Applying drawing scale**
 - ✓ Description of drawing Scales
 - ✓ Sizes of Scales
 - ✓ Scale Representation
- **Drawing of lines**
 - ✓ Conventional lines
- **Drawing of geometric figures**
 - ✓ Types of Triangles
 - ✓ Types Polygons
 - ✓ Techniques of geometric construction
- **Apply drawing of solid object**
 - ✓ Polyhedrons (cube, Prism, pyramid)
 - ✓ Solids of revolution (sphere, cylinder, cone)

Resources required for the learning outcome

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| Equipment | Drawing board, Drawing table |
| Materials | Paper, Ink-pen, Rubber |
| Tools / instruments | Template, Ink-pen, One-meter straight drawing ruler, Right angle ruler, Protractor, Drawing Compass, Drafting Pencil, Drawing Template, French curves, Letter tracing, Set squares, Calculator, T square, Paper holder, Mathematical set |
| Facilitation techniques | <ul style="list-style-type: none"> ▪ Demonstration ▪ Individualized ▪ Brainstorming ▪ Group discussion |
| Formative assessment methods /(CAT) | <ul style="list-style-type: none"> ▪ Oral presentation ▪ Written assessment ▪ Performance based assessment |

| Learning outcome 3: Perform drawing projections | | Learning hours: 10 | |
|--|--|--|--|
| Indicative content | | | |
| <ul style="list-style-type: none">• Description of isometric projection<ul style="list-style-type: none">✓ Introduction to isometric projection✓ Types of isometric projection<ul style="list-style-type: none"> Diametric projection (2D) Axonometric projection (3D)✓ Applications of isometric projection• Applying Types of projections<ul style="list-style-type: none">✓ Pictorial Projection✓ Orthographic projection✓ Drawing of views• Applying sectioning<ul style="list-style-type: none">✓ Sectional views✓ How section are shown✓ Multisection views. | | | |
| Resources required for the learning outcome | | | |
| Equipment | | Drawing board, Drawing table | |
| Materials | | Paper, Rubber, Pencil, paper | |
| Tools | | White boards, Marker pens, Calculator, Scale rulers, Pencils, Rubber, Drawing Compass, T square, Protractor, Pencil sharpener, Mathematical set | |
| Facilitation techniques | | <ul style="list-style-type: none">▪ Demonstration▪ Brainstorming▪ Individual▪ Trainer guided▪ Group discussion | |
| Formative assessment methods /(CAT) | | <ul style="list-style-type: none">▪ Oral presentation▪ Written assessment▪ Performance based assessment | |

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| Learning outcome 4: Apply Computer Aided Design (CAD) software | | Learning hours: 15 | |
| Indicative content | | | |
| <ul style="list-style-type: none">• Description of drawing software<ul style="list-style-type: none">✓ Types of drawing software<ul style="list-style-type: none">✚ Solid work✚ CAD (Computer aided design)• Description of drawing software elements<ul style="list-style-type: none">✓ Drawing software installation✓ Drawing software elements• Drawing different lines and shapes in software<ul style="list-style-type: none">✓ Drawing of Lines✓ Drawing of shapes in 2D✓ Drawing of regular shapes in 3D✓ Drawing of Irregular/regular solids | | | |
| Resources required for the learning outcome | | | |
| Equipment | Computer, projector | | |
| Materials | Paper, templates | | |
| Tools | Software: Solid Works or other CAD software Pencils, Rulers, Erasers, Compass, Protractor, Drawing board | | |
| Facilitation techniques | <ul style="list-style-type: none">▪ Demonstration and simulation▪ Practical exercise▪ Trainer guided▪ Group discussion | | |
| Formative assessment methods /(CAT) | <ul style="list-style-type: none">▪ Written assessment▪ Oral presentation▪ Performance evidence▪ Product based evidence | | |

List of abbreviations

1. **2D**: 2 Dimensional
2. **3D**: 3 Dimensional
3. **CAD**: Computer Aided Design
4. **TVET**: Technical and Vocational Education and Training
5. **CAT**: Continuous Assessment Testing

References

1. E. F. (1958). *Technical Drawing*. 4th ed The Macmillan Company.
2. Giesecke F, M. A. (1960). *Technical Drawing*. Macmillan Co.
3. Giesecke, F. E. (2016). *Technical Drawing Eight Edition*. odd Mix BOOKS.
4. Jenson, C. H. (1925). *Engineering Drawing and Design*. 4th ed Macmillian/McGram-Hill.
5. Jeyapoovan T. (2010). *Lesson Plan for Engineering Graphics*. New Delhi: Vikas Publishing House Pvt Ltd.
6. Lamit, L. G. (1981). *Descriptive Geometry*. 1st ed Prentice-Hall.
7. ShortD, J. C. (2008). *Engineering Drawing &*. Boston: McGraw-Hill.

Glossary

Technical drawing: is a precise and detailed drawing of an object as employed in architecture or engineering (technical drawing also called engineering drawing)

T square– is a tool used in technical drawing, primarily as a guide for drawing straight horizontal lines on a drafting table.

Architecture – The internal structure of a computer system or a chip that determines its operational functionality and performance.

Pencil – Is a writing or drawing implement with a solid pigment core in a protective casing that reduces the risk of core breakage, and keeps its form marking the user's hand.

Scale rulers – A scale ruler is a tool for measuring lengths and transferring measurements at a fixed ratio of length

Template – A design or model used as a guidance to create the same design or shape with precision

Drafting Pencil – is a type of pencil that is designed specifically for use in precision drawing and sketching

French curves – Is a flat drafting instrument, usually consisting of a sheet of clear plastic, the edges of which are cut into several scroll-like curves enabling a draftsman to draw lines of varying curvature

CAD software: A graphics program used for creating illustrations, technical drawings. A graphics program that maintains images in vector graphics format, allowing the user to design and illustrate objects on the display screen