Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

RENBW301

BENCH WORK APPLIED TO DOMESTIC ELECTRICITY

APPLY BENCH WORK TO DOMESTIC ELECTRICITY

Competence

RQF Level: 3

Learning Hours 70

Credits: 7

Sector: Energy

Trade: Renewable energy

Module Type: General

Curriculum: ENGREN3002- TVET Level 3 in Renewable energy

Issue Date: April 2022

<table>
<tr><td>Purpose statement</td><td colspan="5">This module describes the skills, knowledge and attitude required to apply bench work to domestic electricity. It is intended for learners who have successfully completed the 9 years basic education or its equivalent and pursuing TVET Certificate III in Domestic electricity or other related qualifications. At the end of this module, learners will be able to operate measuring and marking tools, operate striking and holding tools, operate cutting tools and operate power tools and. Qualified learners deemed competent to this competency may work under minimum supervision on routine tasks in various places such as Home buildings, shops, warehouses, supermarket, hospitals, pharmacies, banks, schools, garage, market, home, churches, hotels.</td></tr>
<tr><td rowspan="7">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 project and presentation</td><td>20%</td></tr>
<tr><td>• Individual project /Work</td><td>50%</td></tr>
<tr><td colspan="2"></td><td colspan="2">Summative Assessment</td><td>50%</td></tr>
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Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Operate measuring and marking tools	1.1. Materials are appropriately selected based their properties
	1.2. Hazard control and safety measures are appropriately implemented in measuring and marking tools.
	1.3. Steel rules are properly used in measuring different sizes
	1.4. Spirit level is properly used based on its standards of accuracy
	1.5. Plumb bob is properly used based on its standards of accuracy
	1.6. Vernier caliper is properly used based on its precision
	1.7. Micrometer is properly used based on needed precision
	1.8. Scriber in properly used based on the required marking

2. Operate striking and holding tools	2.1. Hammers are correctly used in accordance with the work to be done
	2.2. Punches are correctly used depending on the work piece
	2.3. Bench vices are correctly used to hold materials
3. Operate cutting tools	3.1. Hacksaw are correctly used in cutting different materials
	3.2. Files are correctly used based on the works to be done
	3.3. Chisels are correctly used based on the work to be done
	3.4. Snips and shears are correctly used based on the work to be done
	3.5. Taps and dies are correctly used on the work to be done
	3.6. Pipe and cubing cutters are correctly used based on the work to be done
4. Operate power tools	4.1. Portable electric drilling machine is correctly used based on the work to be done
	4.2. Portable grinding machine is correctly used based on the work to be done
	4.3. Electric wrench is correctly used based on the work to be done
	4.4. Electric screwdriver is correctly used based on the work to be done
	4.5. Rivet gun is correctly used based on the work to be done

Course content

Learning outcomes	**At the end of the module the learner will be able to:** 1. Operate measuring and marking tools 2. Operate striking and holding tools 3. Operate cutting tools 4. Operate power tools
Learning outcome 1: Operate measuring and marking tools	**Learning hours: 10**

Indicative content

- **Selection of materials**
  - ✓ Definition of ferrous metal and nonferrous metal
  - ✓ Mechanical properties
  - ✓ Technological properties
  - ✓ Physical properties
- **Implementation hazard control and safety**
  - ✓ Inspection of tools
  - ✓ Preventive maintenance of tools
  - ✓ Removal of defective tools from the service
  - ✓ Use of PPE
- **Use of steel rulers**
  - ✓ Function and application of ruler
  - ✓ Types of rulers:
  - ✓ Considerations for using rulers
  - ✓ Ruler maintenance
- **Use of spirit level**
  - ✓ Function and application of spirit level
  - ✓ Spirit level maintenance
- **Use of plumb bob**
  - ✓ Function and application of plumb bob
  - ✓ Steps in using a plumb bob for accurate vertical alignment
  - ✓ Plumb bob maintenance and care

- **Use of vernier caliper**
  - ✓ Function and application of vernier caliper
  - ✓ Types of vernier calipers
  - ✓ Vernier caliper maintenance and care
- Use of micrometer
  - ✓ Function and application of micrometer
  - ✓ Types of micrometers
  - ✓ Techniques of using a micrometer
  - ✓ Micrometer maintenance
- Use of scriber
  - ✓ Function and application of scriber
  - ✓ Common types of scribers

Resources required for the learning outcome	
Equipment	Computers, Projector, Projection screen, Printers
Materials	Chalks, Pens, Books, Papers, Flip-chart, PPT slides, Sample of aluminum ,mild steel, copper and other metals, PPE
Tools	Internet access, Voltage tester, Pictures and videos, steel rulers, spirit level, plump bob, Vernier caliper, micrometer, scriber
Facilitation techniques & learning activities	• Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided • Group discussion
Formative assessment methods	• Written assessment • Oral presentation • Performance assessment • Product based assessment • Project based assessment

Learning outcome 2: Operate striking and holding tools	Learning hours: 20
Indicative content	
• **Use of hammers** ✓ Function and application of hammers ✓ Types of hummers ✓ Effective way to use a hammer • **Use of punches to mark the work piece** ✓ Function and application of punches ✓ Types of punches ✓ Effective use of punches • **Use bench vices to hold materials** ✓ Function and application of bench vice ✓ Types of vices ✓ Effective use of bench vices ✓ maintenance of vices	
Resources required for the indicative content	
Equipment	Computers, Projector, Projection screen, Printers
Materials	Chalks, Pens, Books, Papers, Flip-chart, Picture and videos, PPT slides
Tools	Internet access, cables Crimping Tool, rivet gun, hammers, punches, bench vices
Facilitation techniques and learning activities	• Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided • Group discussion
Formative assessment methods	• Written assessment • Oral presentation • Performance assessment • Product based assessment • Project based assessment

Learning outcome 3: Operate cutting tools	Learning hours: 20

Indicative content

- Use of hacksaw
  - ✓ Function and application of hacksaw
  - ✓ Types of hacksaw blades
  - ✓ Fixation of hacksaw blade
- Use of files
  - ✓ Function and application of files
  - ✓ Types of files
- Use of chisels
  - ✓ Function and application of chisel
  - ✓ Types of chisels
- Use of snips and shears
  - ✓ Function and application of snips and shears
  - ✓ Types of snips and shears
- Use of taps and dies
  - ✓ Function and application of taps and dies
  - ✓ taps and dies maintenance
- Use of pipe and cubing cutters
  - ✓ Function and application of pipe and cubing cutters
  - ✓ Types of pipes and cubing cutters
  - ✓ Pipes and cubing cutters maintenance
- Maintenance of cutting tools

Resources required for the indicative content

Equipment	Computers, Projector, Projection screen, Printers
Materials	Chalks, Pens, Books, Papers, Flip-chart, PPT slides
Tools	Internet access, hacksaw, , files, chisels, snips and shears, taps and dies, pipes and cubing cutters
Facilitation techniques & learning activities	• Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided • Group discussion

Formative assessment methods	• Written assessment • Oral presentation • Performance assessment • Product based assessment • Project based assessment

Learning outcome 4: Operate power tools	**Learning hours: 20**
Indicative content	
• **Use of portable electric drilling machine** ✓ Function and application of electric drilling machine ✓ Fixation of drill bit in a portable drilling machine ✓ Portable drilling machine maintenance • **Use of portable grinding** ✓ Function and application of portable grinding machine ✓ Fixing the grinding disk in the machine ✓ Use a grinding machine ✓ Portable grinding machine care and maintenance • **Use of electric wrench** ✓ Function and application of electric wrench ✓ Care of an electric wrench • **Use of electric screwdriver** ✓ Function and application of an electric screwdriver ✓ Electric screwdriver maintenance • **Use of rivet gun** ✓ Function and application of a rivet gun ✓ Types of rivet gun ✓	
Resources required for the indicative content	
Equipment	Computers, Projector, Projection screen, Printers

Materials	Chalks, Pens, Books, Papers, Flip-chart, PPT slides
Tools	Screwdriver, Voltage Tester, Portable drilling machine, Portable grinding machine, Electric wrench, Electric screwdriver, Rivet gun
Facilitation techniques & learning activities	• Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided ▪ Group discussion
Formative assessment methods	• Written assessment • Oral presentation • Performance assessment • Product based assessment • Project based assessment

References:

1. Hallman, R. (1997). *Handtools for trail work*. USDA Forest Service, Technology & Development Program.
2. Bowman, M. (2014). *Sheet Metal Work*. Crowood.
3. Hu, J., Marciniak, Z., & Duncan, J. (Eds.). (2002). *Mechanics of sheet metal forming*. Elsevier.
4. Dickason, A. (1987). *The Geometry of Sheet Metal Work*. Pearson Education Limited.
5. Kamberg, M. L. (2019). *Careers in Welding*. The Rosen Publishing Group, Inc.
6. Makgato, M., & Afeti, G. (Eds.). (2020). *New Models for Technical and Vocational Education and Training*. IGI Global.