Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

WOODEN STAIRCASES CONSTRUCTION

WOTST301

CONSTRUCT WOODEN STAIRCASES

Competence

RQF Level: 3

Learning Hours: 50

Credits: 5

Sector: Agriculture and Food Processing

Trade: Wood Technology

Module Type: Specific

Curriculum: AFPWOT3002- TVET Certificate 3 in Wood Technology

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<table>
<tr><td>Purpose statement</td><td colspan="5">This module describes employable and practicable skills, knowledge and right attitudes required by the student to prepare tools, materials and equipment for staircase construction, prepare the workplace; fix wooden staircase components; and perform staircase finishing. The contents provided in this course are packages reserved for a student pursuing TVET certificate III in wood technology. Graduates at this level will have knowledge and skills for initial work, community involvement and/or further learning.</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 project and presentation</td><td>20%</td></tr>
<tr><td>• Individual project /Work</td><td>50%</td></tr>
<tr><td colspan="3"></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. Prepare tools, materials and equipment	1.1. Staircase types are properly identified as specified in drawing.
	1.2. Tools and equipment are correctly selected to carry out tasks that are consistent with job requirements, serviceable, and rectification of faults if any or reported prior to commencement.
	1.3. Materials are properly selected and calculated according to the quantity requirements and in accordance with plans, specifications provided
	1.4. Materials are correctly prepared for the work application while respecting safety regulations and ready for use
	1.5. String is properly set out for treads and risers as per requirements of stair design
2. Prepare workplace	2.1. Exit is effectively determined on the ground or finish levels from job drawings and site location.
	2.2. Newel posts are properly set out of their footings and placed to layout of designed stairs, job drawings and specifications
	2.3. Stringers are properly located in their position according to the provided drawing.
	2.4. Landings dimensions are accurately done in accordance with landing standards and drawing provided
3. Fix wooden stair components	3.1. Stair components are properly identified according to the standard.
	3.2. Stringers are accurately cut and housed into newel posts according to the drawing provided
	3.3. Treads and risers are properly fixed and housed into the stringers

	3.4.	Landing is appropriately constructed according to the specifications provided in the drawing
	3.5.	Handrails and balusters are exactly fitted and fixed in accordance with the standard height of the handrail
	3.6.	Lateral ties are properly fixed and braced to the newels in accordance with specifications to maintain rigidity of stair structure
4. Perform staircase finishing	4.1.	Staircase is smoothly sanded as specified on the drawing.
	4.2.	Staircase is properly polished for protection and aesthetics purpose
	4.3.	Tools and equipment are properly cleaned, checked, maintained and stored in accordance with manufacturer recommendations and standard work practices
	4.4.	Work area and disposal of materials are obviously cleared according to legislation, regulations and job specifications

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Prepare tools, materials and equipment 2. Prepare workplace 3. Fix wooden stair components 4. Perform staircase finishing
Learning outcome 1: Prepare tools, materials and equipment	**Learning hours: 10**

Indicative content

- **Identification of staircase types**
  - ✓ Straight flight stairs
  - ✓ Turning flight stairs

    Examples of staircases
    - Spiral stairs
    - Circular stairs or curved stairs
    - Quarter turn stairs
    - Half turn stairs
    - Bifurcated stairs
    - Ladder
    - Geometrical stairs
- **Tools and equipment**
  - ✓ Classification and characteristics of tools and equipment
    - Types of hand tools
    - Portable machines.
    - Heavy duty machines
  - ✓ Tools and equipment safety requirements
- **Materials identification**
  - ✓ Stair building materials
    - Hard wood
    - Panels
    - Screws
    - Nails
    - Varnishes
  - ✓ Quality requirements of timber stairs
  - ✓ Factors considered while estimating quantity of materials of a stair case:
    - Stair members
    - Space
    - Stair types
- **Materials preparation**
  - ✓ Preparation techniques of wooden materials:
    - Measuring
    - Planing

- Cutting to the dimensions
- Boring
- Preservation
- Moulding

✓ Mixing techniques of adhesive and painting materials in relation to the properties of wood.

- **Setting out string for treads and risers**

✓ Identification of parts of stair and their functions

✓ Setting out process

- Margin line
- Steel square
- Thickness of rise and tread
- Complete string and fit in newel posts

Resources required for the learning outcome	
Equipment	• Portable machines and heavy duty woodworking machines
Materials	• Hard wood timber • Panels • Screws • Nails • Varnishes • Stains • Sanding sealers • Sand papers
Tools	• Tape measure, claw hammer, screw driver, hand saws, chisels, rasps • Brushes, painting rolls, clamping devices.
Facilitation techniques	• Group discussion • Brainstorming • Trainer guided • Practical group works
Formative assessment methods	• Written assessment • Performance assessment

Learning outcome 2: Prepare workplace	Learning hours: 15

Indicative content

- **Exit determination**

✓ Characteristics of staircases

- Sufficient landing area
- Flight should have specified number of stairs
- All steps must be of uniform size
- Must be near to all rooms of the building

- **Setting out newel posts**

✓ Setting out process

- Laying out techniques of stair according to drawings, plan and specifications

- Setting out techniques of newel posts and footings

- **Locating stringers**
  - ✓ Characteristics of area where the strings will be fixed.
  - ✓ Techniques and steps of fixing strings

- **Landings dimensions**
  - ✓ Standard requirements of stair landings

Resources required for the indicative content	
Equipment	• Levelling equipment: Theodolite; dumpy level and razor beam
Materials	• Hard wood timber • Stringer boards
Tools	• Tape measure • Saws • Ruler • Chalk line
Facilitation techniques	• Group discussion • Brainstorming • Trainer guided • Practical group works
Formative assessment methods	• Written assessment • Performance assessment

Learning outcome 3: Fix wooden stair components	**Learning hours: 15**
Indicative content	

- **Identification of staircase components**
  - ✓ Step
  - ✓ Riser
  - ✓ Tread/going
  - ✓ Landing
  - ✓ Nosing
  - ✓ Flight
  - ✓ Hand rail
  - ✓ Balustrade
  - ✓ Pitch or slope
  - ✓ Run
  - ✓ Soffit
  - ✓ Scotia
  - ✓ Newel post
  - ✓ Strings or stringers
  - ✓ Spandrel

- Staircase calculation
  - Rise
  - Tread/going

- **Cutting stringers and housing them into newel posts**
  - ✓ Cutting methods and techniques of stringers
  - ✓ Fixing techniques of stringers into the newel posts and/or landing
  - ✓ Housing joints

- **Fixing treads and risers and housing them into stringers**
  - ✓ Fixing techniques of treads and risers to strings
  - ✓ Safety and security requirements of stair
  - ✓ Techniques of fixing tie bolts to strings

- **Landing construction**
  - ✓ Construction steps and
  - ✓ Techniques of stair landings

- **Fitting and fixing handrails and balusters**
  - ✓ Techniques of fitting and fixing handrails and balusters

- **Fixing and bracing lateral ties to newels**
  - ✓ Fixing techniques of lateral ties to newels post
  - ✓ Fixing techniques of bracing

Resources required for the indicative content	
Equipment	Table saw machine, mortiser machine, planer machine
Materials	• Riser boards • Stringer boards • Screws • Nails • Bolts & nuts • Newel posts boards • Wood glue
Tools	• Screw drivers, clamping devices, hand plane, chisels, hand saws
Facilitation techniques	• Brainstorming • Demonstration and simulation • Individual and group work • Practical exercise • Group discussion
Formative assessment methods	• Written assessment • Performance assessment

Learning outcome 4: Perform staircase finishing	Learning hours: 10

Indicative content

- **Sanding staircase**
  - ✓ Sanding methods of wooden stair case: Hand sanding and machine sanding
- **Polishing staircase**
  - ✓ Types of paints:
    - Paints
    - Varnishes
    - Stains
  - ✓ Steps involved in polishing a wooden staircase
  - ✓ Use of spray gun
  - ✓ Material drying time before the next coat.
- **Cleaning, checking, maintaining and storing tools and equipment**
  - ✓ Methods cleaning and maintenance of tools and equipment
  - ✓ Guidelines in storing tools and equipment securely
- **Clearing work area and disposal of materials**
  - ✓ Techniques of cleaning the workplace

Resources required for the indicative content

Equipment	• Sanding machine, • Spray gun • Vacuum cleaner
Materials	• Paints • Stains • Varnishes • Sanding sealers • Sand papers
Tools	• Scraper, • Broom, • Brush • Paint roller • Trash bin
Facilitation techniques	• Demonstration and simulation • Individual and group work • Practical exercises • Trainer guided • Group discussion & presentation
Formative assessment methods	• Written assessment • Performance assessment

Integrated/Summative assessment (For specific module)

Integrated situation

Roko construction located in Kicukiro District offered a tender of constructing a wooden stair in one of their new residential building located at Kacyiru. The stair specifications are detailed as follows:

- Height between ground level and upper floor is 3.5m
- The width of a stair should be 90cm.
- Length of the flight is 5m
- The handrail should be at 1m and the base is mat foundation.

BMK carpentry Ltd has won the tender to build that stair and as one of carpenters in this company, you are requested to construct that stair within 24 hrs. Tasks are described as follow:

- ✓ Prepare tools, materials and equipment
- ✓ Prepare workplace
- ✓ Fix wooden stair components
- ✓ Perform staircase finishing

All materials are found in BMK carpentry Ltd stores.

Resources

Tools	• Scraper, Broom, brush; Paint roller; Trash bin; Screw drivers, clamping devices, hand plane, chisels, hand saws; tape measure; ruler & chalk line.
Equipment	• Sanding machine, Spray gun, Vacuum cleaner, Table saw machine, mortiser machine, planer machine; Levelling equipment: Theodolite; dumpy level and razor beam;
Materials/ Consumables	• Hard wood timber; Panels; Screws; Nails; Varnishes; Stains; Sanding sealers; Sand papers; Riser boards; Stringer boards; Bolts & nuts; Newel posts boards; Wood glue

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: **Prepare tools, materials and equipment** **(30%)**	1.1. Staircase types are properly identified as specified in drawing.	Staircase types are properly identified as specified in drawing.			6
	1.2. Tools and equipment are correctly selected to carry out tasks that are consistent with job requirements, serviceable, and rectification of faults if any or reported prior to commencement.	Tools and equipment are correctly selected			6
	1.3. Materials are properly selected and calculated according to the quantity requirements and in accordance with plans, specifications provided	Materials are properly selected			6

	1.4. Materials are correctly prepared for the work application while respecting safety regulations and ready for use	Materials are correctly prepared			6
	1.5. String is properly set out for treads and risers as per requirements of stair design	String is properly set out for treads and risers			6
Learning outcome 2: **Prepare workplace** **(30%)**	2.1. Exit is effectively determined on the ground or finish levels from job drawings and site location.	Exit is effectively determined on the ground			7
	2.2. Newel posts are properly set out of their footings and placed to layout of designed stairs, job drawings and specifications	Newel posts are properly set out of their footings			7
	2.3. Stringers are properly located in their position according to the provided drawing.	Stringers are properly located in their position			8
	2.4 Landings dimensions are accurately done in accordance with landing standards and drawing provided	Landings dimensions are accurately done			8
Learning outcome 3: **Fix wooden stair components** **(30%)**	3.1 Stair components are properly identified according to the standard.	Stair components are properly identified according to the standard.			5
	3.2. Stringers are accurately cut and housed into newel posts according to the drawing provided	Stringers are accurately cut and housed into newel posts			5
	3.3. Treads and risers are properly fixed and housed into the stringers	Treads and risers are properly fixed and housed into the stringers			5
	3.4. Landing is appropriately constructed according to the specifications provided in the drawing	Landing is appropriately constructed			5
	3.5. Handrails and balusters are exactly fitted and fixed in accordance with the standard height of the handrail	Handrails and balusters are exactly fitted and fixed			5
	3.6. Lateral ties are properly fixed and braced to the newels in accordance with specifications to maintain rigidity of stair structure	Lateral ties are properly fixed and braced to the newels			5
Learning outcome 4: **Perform staircase finishing** **(10%)**	4.1. Staircase is smoothly sanded as specified on the drawing.	Staircase is smoothly sanded			3
	4.2. Staircase is properly polished for protection and aesthetics purpose	Staircase is properly polished			3
	4.3. Tools and equipment are properly cleaned, checked, maintained and stored in accordance with manufacturer	Tools and equipment are properly cleaned,			2

	recommendations and standard work practices	checked, maintained and stored			
	4.4. Work area and disposal of materials are obviously cleared according to legislation, regulations and job specifications	Work area and disposal of materials are obviously cleared			2
Total marks					**100**
Percentage Weightage					**100%**
Minimum Passing line % (Aggregate): 70%					