



Republic of Rwanda  
Ministry of Education



RTB | RWANDA  
TVET BOARD

## WOODEN ROOF CONSTRUCTION

WOTRM301

### CONSTRUCT WOODEN ROOF

#### Competence

RQF Level: 3

Learning Hours



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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<b>Purpose statement</b>	This module describes employable and practicable skills, knowledge and right attitudes required by the student to perform roof setting out, prepare materials for roof construction, assemble roof trusses, join and secure the roof frame and finally perform finishing activities for the roof. 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.					
<b>Delivery modality</b>	<b>Training delivery</b>		<b>100%</b>	<b>Assessment</b>		<b>Total 100%</b>
	Theoretical content		30%	Formative assessment	30%	50%
	Practical work:		70%		70%	
	• Group project and presentation	20%				
	• Individual project /Work	50%	Summative Assessment		50%	

## Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Perform setting out of the roof	1.1. Drawing of the roof is well interpreted in accordance with drawing standards.
	1.2. Top the wall is correctly checked for accommodating the wall plate
	1.3. Measurements of the trusses are accurately recorded respecting the drawing provided.
	1.4. Pegs for trusses are precisely fixed in their respective position.
	1.5. Setting out ropes are well levelled and fixed in their proper positions.
2. Prepare materials to the required sizes	2.1. Tools and equipment are properly selected referring to their uses.
	2.2. Roof types and components are properly identified in accordance with the standard
	2.3. Roof materials are well selected depending on their utilization
	2.4. Truss elements are accurately marked out before being taken to the machine
	2.5. Truss elements are properly cut respecting the measurements provided
3. Assemble trusses in accordance with the standard	3.1. Truss elements are properly laid out by respecting the setting out done.
	3.2. Truss elements are correctly assembled respecting the joint that are prepared
	3.3. Truss elements are tightly fixed as there are no gaps at the joints
	3.4. Roof structure elements are tightly connected as per standards
4. Join and secure all trusses together	4.1. Trusses are properly lifted to their positions.
	4.2. Trusses are correctly kept in the plumb position according to the roof standards
	4.3. Trusses are correctly connected to the wall plate/pillars by respecting the wind force that can be applied to the roof
	4.4. Trusses are strongly connected together by braces by respecting the roof skeleton standards
	4.5. Purlins are properly attached to rafters by respecting the length of covering materials
5. Perform roof finishing	5.1. Gutters are correctly fixed by respecting the required slope for draining water.
	5.2. Fascia boards and soffit are tightly fixed to the roof edges
	1.1. Wood preservation is well done for protecting the roof members from parasites
	1.2. Roof sheathing materials are accurately applied according to the roof frame

# Course content

<b>Learning outcomes</b>	<b>At the end of the module the learner will be able to:</b> <ol style="list-style-type: none"> <li>1. Perform setting out of the roof</li> <li>2. Prepare materials to the required sizes</li> <li>3. Assemble trusses in accordance with the standard</li> <li>4. Join and secure all trusses together</li> <li>5. Perform roof finishing</li> </ol>
<b>Learning outcome 1: Perform setting out of the roof</b>	<b>Learning hours: 10</b>
<b>Indicative content</b>	
<ul style="list-style-type: none"> <li>• <b>Roof drawing interpretation</b> <ul style="list-style-type: none"> <li>✓ The types of drawing materials</li> <li>✓ Drawing techniques</li> <li>✓ Drawing presentation</li> <li>✓ Drawing scales</li> </ul> </li> <li>• <b>Checking the top of the wall for accommodating the wall plate</b> <ul style="list-style-type: none"> <li>✓ Methods used to check the levels</li> <li>✓ Equipment used in levelling</li> <li>✓ Tools used for levelling</li> </ul> </li> <li>• <b>Recording measurements of the trusses</b> <ul style="list-style-type: none"> <li>✓ Attributes being measured</li> <li>✓ Process of measurement</li> <li>✓ Use of measuring instruments</li> <li>✓ Four stages of measurement:                             <ul style="list-style-type: none"> <li> Direct comparison;</li> <li> Indirect comparison;</li> <li> Measuring with arbitrary (non-standard) units;</li> <li> Measuring with standards units.</li> </ul> </li> </ul> </li> <li>• <b>Fixing pegs for trusses</b> <ul style="list-style-type: none"> <li>✓ Methods of fixing pegs</li> <li>✓ Roof layout</li> <li>✓ 3,4,5 method</li> </ul> </li> </ul>	




<ul style="list-style-type: none"> <li>✓ Rafter calculation</li> <li>✓ Square setting</li> <li>• <b>Levelling and fixing setting out ropes</b> <ul style="list-style-type: none"> <li>✓ Levelling instruments</li> <li>✓ Methods of levelling</li> <li>✓ Methods of setting out</li> <li>✓ Use of ropes/strings</li> </ul> </li> </ul>
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**Resources required for the learning outcome**


Equipment	Levelling equipment: <ul style="list-style-type: none"> <li>• Dumpy level,</li> <li>• Theodolite,</li> <li>• Total station</li> </ul>
Materials	<ul style="list-style-type: none"> <li>• Pegs</li> <li>• Nails</li> <li>• Strings/ropes</li> <li>• Drawing papers</li> <li>• Timber</li> </ul>
Tools	<ul style="list-style-type: none"> <li>• Hammer</li> <li>• Pencil</li> <li>• Spirit level</li> <li>• Tape measure</li> <li>• Marking tools</li> <li>• Calculator</li> <li>• Drawing board</li> </ul>
Facilitation techniques	<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Practical exercises (individual and group work)</li> <li>• Trainer guided</li> <li>• Demonstration and simulation</li> </ul>
Formative assessment methods	<ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Performance assessment</li> </ul>

<b>Learning outcome 2: Prepare materials to the required sizes</b>	<b>Learning hours: 5</b>
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**Indicative content**


<ul style="list-style-type: none"> <li>• <b>Selection of tools and equipment</b> <ul style="list-style-type: none"> <li>✓ Classification of tools used for roof construction:               <ul style="list-style-type: none"> <li> Holding tools</li> <li> Setting out tools</li> <li> Cutting and shaving tools</li> </ul> </li> </ul> </li> </ul>
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 Boring tools

 Fixing tools

✓ Classification of equipment:

 Portable machines

 Heavy duty machine

✓ Tools and equipment serviceability and safety requirements


- **Identification of roof types**

- ✓ Pitched roofs

- ✓ **Flat roofs**

- ✓ **Curved roofs**

- Examples:

-  Gable

-  Hip

-  Dutch

-  Mansard

-  Shed

-  Gambrel

-  Dormer

- **Roof components**

- ✓ Eaves

- ✓ Gable

- ✓ Flashing

- ✓ Hip

- ✓ Ridge

- ✓ Purlins

- ✓ Fascia boards

- ✓ Pitch

- ✓ Battens

- ✓ Wall plate

- ✓ Verge

- ✓ Roof gutter

- ✓ Common rafter

- ✓ Hip rafter

- **Selection of roof materials**

- ✓ Roof materials


- ✓ Metal


- ✓ Wood

- ✓ Nails

- ✓ Screws

- ✓ Covering material

-  Roofing tiles

 Roofing sheets

 Glasses

✓ Adhesive materials

✓ Preservative materials

• **Truss elements marking out**

✓ Marking techniques and methods

• **Truss elements cutting**

✓ Cutting techniques and methods

**Resources required for the indicative content**

Equipment	<ul style="list-style-type: none"><li>• Portable machines</li><li>• Heavy duty machine</li></ul>
Materials	<ul style="list-style-type: none"><li>• Metal</li><li>• Wood</li><li>• Nails</li><li>• Screws</li><li>• Roof sheeting</li><li>• Roofing tiles</li><li>• Roofing sheets</li><li>• Glasses</li><li>• Adhesive materials</li><li>• Preservative materials</li></ul>
Tools	<ul style="list-style-type: none"><li>• Holding tools</li><li>• Setting out tools</li><li>• Cutting and shaving tools</li><li>• Boring tools</li><li>• Fixing tools</li></ul>
Facilitation techniques	<ul style="list-style-type: none"><li>• Group discussion</li><li>• Practical exercises (individual and group work)</li><li>• Trainer guided</li><li>• Demonstration and simulation</li></ul>
Formative assessment methods	<ul style="list-style-type: none"><li>• Written assessment</li><li>• Performance assessment</li></ul>

**Learning outcome 3: Assemble trusses in accordance with the standard**

**Learning hours:15**










**Indicative content**

• **Truss elements laying out**

✓ Layout techniques/methods

✓ Rafter calculation

✓ Roof trusses types

- **Truss elements assembling**
  - ✓ Assembling techniques and methods
- **Truss elements fixing**
  - ✓ Fixing materials of roof structure elements:
    -  Nails
    -  Bolt and nut
    -  Screw
- **Connecting roof structure elements**
  - ✓ Roof structure elements
    -  Braces
    -  Purlins
    -  Ridge boards
  - ✓ Types of roof connectors:
    -  Iron galvanised
    -  Metal gussets
    -  Brackets

### Resources required for the indicative content

Equipment	Levelling equipment: <ul style="list-style-type: none"> <li>• Theodolite,</li> <li>• Dumpy level</li> </ul>
Materials	<ul style="list-style-type: none"> <li>• Nails</li> <li>• Bolt and nut</li> <li>• Screw</li> <li>• Braces</li> <li>• Purlins</li> <li>• Ridge boards</li> <li>• Iron galvanised</li> <li>• Metal gussets</li> <li>• Brackets</li> </ul>
Tools	<ul style="list-style-type: none"> <li>• Levelling tools</li> <li>• Claw hammer</li> <li>• Spanners</li> <li>• Screw drivers</li> <li>• Spirit level</li> <li>• Tape measure</li> </ul>
Facilitation techniques	<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Practical exercises (individual and group work)</li> <li>• Trainer guided</li> <li>• Demonstration and simulation</li> </ul>
Formative assessment methods	<ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Performance assessment</li> </ul>




**Indicative content**

- **Lifting trusses to their positions**
  - ✓ Methods of lifting
  - ✓ Method of equilibrium
- **Keeping trusses in the plumb position**
  - ✓ Use of a plumb bob
  - ✓ Vertical/horizontal positions
- **Connecting trusses to the wall plate/pillars**
  - ✓ Bird’s mouth creation
  - ✓ Rod anchors
  - ✓ Methods of connecting wall plates with rafters
- **Connecting trusses together by braces**
  - ✓ Diagonal checking
  - ✓ Lateral braces
  - ✓ Bracing methods
- **Attaching purlins to rafters**
  - ✓ Spacing of purlins
  - ✓ Methods for connecting purlins to rafters.

**Resources required for the indicative content**

Equipment	<ul style="list-style-type: none"> <li>• Lifting equipment</li> </ul>
Materials	<ul style="list-style-type: none"> <li>• Braces</li> <li>• Anchors</li> </ul>
Tools	<ul style="list-style-type: none"> <li>• Plumb bob</li> <li>• Spirit level</li> </ul>
Facilitation techniques	<ul style="list-style-type: none"> <li>• Group discussion</li> <li>• Practical exercises (individual and group work)</li> <li>• Trainer guided</li> <li>• Demonstration and simulation</li> </ul>
Formative assessment methods	<ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Performance assessment</li> </ul>

**Indicative content**

- **Fixing gutters**
  - ✓ Silicone sealant
  - ✓ Mastic
  - ✓ Methods of gutter fixing
- **Fixing fascia boards and soffit to the roof edges**
  - ✓ Fixing techniques
- **Wood preservation**
  - ✓ Application of wood preservatives
  - ✓ Methods of application: brushing, spray gun, rolling
- **Application of roof sheathing materials**
  - ✓ Characteristics of roof materials.
  - ✓ Laying techniques and principles
  - ✓ Techniques of fixing:
    -  Using nails
    -  Screws
    -  Bolt and nuts

**Resources required for the indicative content**

Equipment	<ul style="list-style-type: none"> <li>• Welding machine,</li> </ul>
Materials	<ul style="list-style-type: none"> <li>• Paraffin,</li> <li>• thinner,</li> <li>• Bolt and nuts;</li> <li>• Nails;</li> <li>• Glasses;</li> <li>• Roof Tiles;</li> <li>• roof sheets</li> </ul>
Tools	<ul style="list-style-type: none"> <li>• Scraper,</li> <li>• broom,</li> <li>• silicone gun</li> </ul>
Facilitation techniques	<ul style="list-style-type: none"> <li>• Demonstration and simulation</li> <li>• Individual and group work</li> <li>• Practical exercise</li> <li>• Trainer guided</li> <li>• Group discussion</li> </ul>
Formative assessment methods	<ul style="list-style-type: none"> <li>• Written assessment</li> <li>• Oral presentation</li> </ul>

**Integrated situation**

S.G.G. contractors located at Kicukiro District wants to construct gable roof on the carpentry workshop but does not have staff to construct that roof and requests you as qualified carpenters to construct it. The roof will have 15 m x10m, the riser of 3.5m and overhang 1.20m; the covering materials are iron sheets, the timber to be used for trusses is in eucalyptus. The following tasks will be done in group of six (6) trainees.

- ✓ Perform setting out of the roof
- ✓ Prepare materials to the required sizes
- ✓ Assemble trusses in accordance with the standard
- ✓ Join and secure all trusses together
- ✓ Perform roof finishing

But before you effectively start the real work, you are asked to demonstrate your competences by making a small roof having 3m x2m, the riser of 3.5m and overhang 1.20m, same covering materials and same timber for trusses.

All materials, tools and equipment are found in S.G.G constructor's workshop.

Drawing is also available.

The proofing work should be done within 10 hours.

**Resources**

Tools	<ul style="list-style-type: none"> <li>• Holding tools;</li> <li>• Setting out tools;</li> <li>• Cutting and shaving tools ;</li> <li>• Boring tools</li> <li>• Fixing tools</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>• Portable machines &amp;</li> <li>• Heavy duty machines</li> </ul>
Materials/ Consumables	<ul style="list-style-type: none"> <li>• Nails;</li> <li>• Bolt and nut;</li> <li>• Screw;</li> <li>• Braces;</li> <li>• Purlins;</li> <li>• Ridge boards;</li> <li>• Iron galvanised;</li> <li>• Metal gussets,</li> <li>• Rafters,</li> <li>• Wall plates.</li> </ul>

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
<b>Learning outcome 1:</b>  <b>Perform setting out of the roof</b>  (20%)	1.1. Drawing of the roof is well interpreted in accordance with drawing standards.	Drawing of the roof is well interpreted			4
	1.2. Top the wall is correctly checked for accommodating the wall plate	Top the wall is correctly checked			4
	1.3. Measurements of the trusses are accurately recorded respecting the drawing provided.	Measurements of the trusses are accurately recorded			4
	1.4. Pegs for trusses are precisely fixed in their respective position	Pegs for trusses are precisely fixed			4
	1.5. Setting out ropes are well levelled and fixed in their proper positions.	Ropes/strings are well levelled and fixed in their positions			4
<b>Learning outcome 2:</b>  <b>Prepare materials to the required sizes</b>  (20%)	2.1. Tools and equipment are properly selected referring to their uses.	Tools and equipment are properly selected.			4
	2.2. Roof types and components are properly identified in accordance with the standard				4
	2.3. Roof materials are well selected depending on their utilization	Roof materials are well selected			4
	2.4. Truss elements are accurately marked out before being taken to the machine	Truss elements are accurately marked out			4
	2.5. Truss elements are properly cut respecting the measurements provided	Truss elements are properly cut			4
<b>Learning outcome 3:</b>  <b>Assemble trusses in accordance with the standard</b>  (20%)	3.1. Truss elements are properly laid out by respecting the setting out done.	Truss elements are properly laid out			5
	3.2. Truss elements are correctly assembled respecting the joint that are prepared	Truss elements are correctly assembled			5
	3.3. Truss elements are tightly fixed as there are no gaps at the joints	Truss elements are tightly fixed			5
	3.4. Roof structure elements are tightly connected as per standards	Roof structure elements are tightly connected as per standards			5
<b>Learning outcome 4:</b>	4.1. Trusses are properly lifted to their positions.	Trusses are properly lifted			4

<b>Join and secure all trusses together</b>  (20%)	4.2. Trusses are correctly kept in the plumb position according to the roof standards	Trusses are correctly kept in the plumb position			4
	4.3. Trusses are correctly connected to the wall plate/pillars by respecting the wind force that can be applied to the roof	Trusses are correctly connected to the wall plate/pillars			4
	4.4. Trusses are strongly connected together by braces by respecting the roof skeleton standards	Trusses are strongly connected together by braces			4
	4.5. Purlins are properly attached to rafters by respecting the length of covering materials	. Purlins are properly attached to rafters			4
<b>Learning outcome 5: Perform roof finishing</b>  (20%)	4.6. Gutters are correctly fixed by respecting the required slope for draining water	Gutters are correctly fixed			5
	4.7. Fascia boards are tightly applied to the roof edges	Fascia boards are tightly applied			5
	4.8. Wood preservation is well done for protecting the roof members from parasites	Wood preservation is well done			5
	4.9. Roof covering materials are accurately applied according to the roof frame	Roof covering materials are accurately applied			5
<b>Total marks</b>					<b>100</b>
<b>Percentage Weightage</b>					<b>100%</b>
<b>Minimum Passing line % (Aggregate): 70%</b>					