Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

CEMENT FLOORING

BDCCF301

PERFORM CEMENT FLOORING CONSTRUCTION

Competence

RQF Level: 3

Learning Hours 40

Credits: 4

Sector: Construction and Building Services

Trade: Building construction

Module Type: Specific

Curriculum: CBSBDC3001- TVET Certificate 3 in Building Construction

Issue Date: October ,2021

<table>
<tr><td>`Purpose statement</td><td colspan="5">This core module describes the skills, knowledge and attitude to be acquired by the learner to construct pavement of any surface made with concrete, by mainly preparing hardcore base, concrete and performing screeding.</td></tr>
<tr><td>Leaning assumed to be in place</td><td colspan="5">Safety, Health and environment at workplace, Construction basic technical drawing, Building Set out, Fundamentals of building materials, Construct stones structures, Elect bricks & blocks masonry wall, Plastering of structure elements, Opening fixation 50Hrs</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>
</table>

Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. **Prepare materials, tools and equipment.**	1.1. Appropriate selection of PPE according to the work to be done
	1.2. Appropriate selection of tools and equipment according to the work to be done
	1.3. Appropriate selection of materials according to the applicable quality standards
2. **Prepare the hard-core base**	2.1. The ground base is well compacted and leveled in accordance to the design.
	2.2. Hardcore base are systematically laid on the ground base and leveled.
	2.3. Hard core base level is completely checked for straightness following marked lines.
3. **Prepare concrete.**	3.1. Ingredients for concrete mix are selected according to the applicable quality standards.
	3.2. Mix ratio are accurately applied according to the standard requirements and expected

	concrete strength.
	3.3. Concrete mixing is carried out at a convenient place.
4. **Perform screeding**	4.1. Sufficient layers of screed are strategically applied on the hardcore base at regular intervals
	4.2. Fresh concrete is efficiently poured on top of and slightly deep into hardcore base.
	4.3. Cement screeding is continuously done for leveling the floor with reference to set screeds.
	4.4. A layer of smooth surface is promptly applied on the top of screeded surface and further smoothed.
5. **Clean the work place**	5.1. Careful cleaning of tools and equipment 5.2. Systematically cleaning of working area 5.3. Adequate storage of tools and equipment.

Course content	
Learning outcomes	**At the end of the module the learner will be able to:** 1. **Prepare materials, tools and equipment** 2. **Prepare the hardcore base** 3. **Prepare concrete** 4. **Perform screeding** 5. **Clean the workplace**
Learning outcome 1: **Prepare materials, tools and equipment**	**Learning hours: 3**
Indicative content	
• **Identification of tools used for cement pavement** ➢ The use of cement pavement tools ➢ The maintenance of cement pavement tools • **Identification of equipment for cement pavement** ➢ Sprayer machine with accessories ➢ Grading machine ➢ PPE ➢ Use of cement pavement equipment • **Identification of materials used in cement pavement** ➢ Types of materials used for cement pavement ➢ Properties of Materials ➢ cement pavement selection criteria:	
Resources required for the learning outcome	
Equipment	RS 175: wheelbarrow specifications, ISO 18650-1: Building construction machinery and equipment-contrete mixers-part1: commercial specifications, ISO 19711-1: Truck mixers-part 1: terminologies and commercial specifications, RS EAS 1021: Steelhead hammer-specifications, RS EAS 1020: Shovels and spades specifications, RS ISO 3310-1: Test Sieves-Technical requirements and testing
Materials	Cement, Fine aggregate, Coarse aggregate, Water, Stone, Bricks, Internet, handouts, RS 107 : Building sand from natural sources — Specification, RS ARS 1304 : Guidelines for use of various types of cement, RS EAS 18-1 : Cements — Part 1 : Composition, specification and conformity criteria for common cements.
Tools	Trowel, Spirit level, Squares, Building line, Tape measure, Wheelbarrow, Roller brush, Hand brush, Scrapper, Tray , Steel float, Sand paper, Pan/bucket, Extension pole, Mixing stick, Strings (Road marking line), Brushes, Paint Scrapper, Roller,

	Roller tray and Bucket/pan
Facilitation techniques	• Group discussion • Trainer guided • Matching questions • Multiple choice • Sentence completion • Short questions • Essay • Open ended questions
Formative assessment methods	• Written assessment • Performance assessment

Learning outcome 2: **Prepare hardcore base**	**Learning hours: 10**
Indicative content	
• **Compaction and levelling the ground base.** ➢ Methods of preparing ground base ➢ Methods of compacting ground base ➢ Purpose of compacting ground base ➢ Check ground base level • **Laying and levelling of hardcore material on the ground base.** ➢ Steps of laying hardcore material ➢ Types of hardcore • **Checking of hard core base level.** ➢ Checking the marked level of hardcore methods ➢ Adjusting hardcore base level	
Resources required for the indicative content	
Equipment	RS 175: wheelbarrow specifications, ISO 18650-1: Building construction machinery and equipment-contrete mixers-part1: commercial specifications, ISO 19711-1: Truck mixers-part 1: terminologies and commercial specifications, RS EAS 1021: Steelhead hammer-specifications, RS EAS 1020: Shovels and spades specifications, RS ISO 3310-1: Test Sieves-Technical requirements and testing
Materials	Cement, Fine aggregate, Coarse aggregate, Water, Stone, Bricks, Internet, handouts, RS 107: Building sand from natural sources — Specification, RS ARS 1304 : Guidelines for use of various types of cement, RS EAS 18-1 : Cements — Part 1 : Composition, specification and conformity criteria for common cements.

Tools	Trowel, Spirit level, Squares, Building line, Tape measure, Wheelbarrow, Roller brush, Hand brush, Scrapper, Tray , Steel float, Sand paper, Pan/bucket, Extension pole, Mixing stick, Strings (Road marking line), Brushes, Paint Scrapper, Roller, Roller tray and Bucket/pan
Facilitation techniques	• Group discussion • Trainer guided • Matching questions • Multiple choice • Practical exercises • Short questions • Essay • Open ended questions
Formative assessment methods	• Written assessment • Performance assessment • Product based assessment

Learning outcome 3: Prepare concrete	**Learning hours: 5**
Indicative content	
• **Select ingredient for concrete** ➢ Ingredient for concrete in compliance with Rwandastandard (RS 108 mortar masonry - specification) ➢ Properties of concrete ingredients ➢ Use of concrete ingredient ➢ Quality of good ingredients for concrete • **Apply mix ratio** ➢ Identification of batching method • **Carry out concrete mixing** ➢ Methods of concrete mixing ➢ Procedures of concrete mixing	
Resources required for the indicative content	
Equipment	RS 175: wheelbarrow specifications, ISO 18650-1: Building construction machinery and equipment-contrete mixers-part1: commercial specifications, ISO 19711-1: Truck mixers-part 1: terminologies and commercial specifications, RS EAS 1021: Steelhead hammer-specifications, RS EAS 1020: Shovels and spades specifications, RS ISO 3310-1: Test Sieves-Technical requirements and testing
Materials	Cement, Fine aggregate, Coarse aggregate, Water, Stone, Bricks, Internet, handouts, RS 107: Building sand from natural sources — Specification, RS ARS 1304:

	Guidelines for use of various types of cement, RS EAS 18-1 : Cements — Part 1 : Composition, specification and conformity criteria for common cements.
Tools	Trowel, Spirit level, Squares, Building line, Tape measure, Wheelbarrow, Roller brush, Hand brush, Scrapper, Tray , Steel float, Sand paper, Pan/bucket, Extension pole, Mixing stick, Strings (Road marking line), Brushes, Paint Scrapper, Roller, Roller tray and Bucket/pan
Facilitation techniques	• Lectures • Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided • Group discussion
Formative assessment methods	• Written assessment • Performance assessment • Product based assessment • Project based assessment

Learning outcome 4: Perform screeding	**Learning hours: 20**
Indicative content	
• **Layers application of screeds on the hardcore at a regular interval** ➢ Types of screeds ➢ Thickness of screeds ➢ Determination of screeds interval • **Pour fresh concrete on top and slightly deep into hardcore** ➢ Properties of concrete ➢ Defects of concrete ➢ Pouring of fresh Concrete • **Screed concrete for levelling the floor with reference to set screeds** ➢ Steps of concrete screeding • **Application of layer of smoothing surface** ➢ Steps of smoothing surface with cement	
Resources required for the indicative content	
Equipment	RS 175: wheelbarrow specifications, ISO 18650-1: Building construction machinery and equipment-contrete mixers-part1: commercial specifications, ISO 19711-1: Truck mixers-part 1: terminologies and commercial specifications, RS EAS 1021: Steelhead hammer-specifications, RS EAS 1020: Shovels and spades specifications, RS ISO 3310-1: Test Sieves-Technical requirements and testing

Materials	Cement, Fine aggregate, Coarse aggregate, Water, Stone, Bricks, Internet, handouts, RS 107: Building sand from natural sources — Specification, RS ARS 1304: Guidelines for use of various types of cement, RS EAS 18-1 : Cements — Part 1 : Composition, specification and conformity criteria for common cements.
Tools	Trowel, Spirit level, Squares, Building line, Tape measure, Wheelbarrow, Roller brush, Hand brush, Scrapper, Tray , Steel float, Sand paper, Pan/bucket, Extension pole, Mixing stick, Strings (Road marking line), Brushes, Paint Scrapper, Roller, Roller tray and Bucket/pan
Facilitation techniques	• Lectures • Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided • Group discussion
Formative assessment methods	• Written assessment • Performance assessment • Product based assessment • Project based assessment

Learning outcome 4: Clean the workplace	**Learning hours: 20**
Indicative content	
• **Cleaning of tools and equipment** ➢ Cleaning of tools ➢ Cleaning of equipment • **Cleaning of working area** ➢ Classification of unwanted materials • **Storing tools and equipment** ➢ Safe store of tools and equipment	
Resources required for the indicative content	
Equipment	RS 175: wheelbarrow specifications, ISO 18650-1: Building construction machinery and equipment-contrete mixers-part1: commercial specifications, ISO 19711-1: Truck mixers-part 1: terminologies and commercial specifications, RS EAS 1021: Steelhead hammer-specifications, RS EAS 1020: Shovels and spades specifications, RS ISO 3310-1: Test Sieves-Technical requirements and testing
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	Composition, specification and conformity criteria for common cements.
Tools	Trowel, Spirit level, Squares, Building line, Tape measure, Wheelbarrow, Roller brush, Hand brush, Scrapper, Tray , Steel float, Sand paper, Pan/bucket, Extension pole, Mixing stick, Strings (Road marking line), Brushes, Paint Scrapper, Roller, Roller tray and Bucket/pan
Facilitation techniques	• Lectures • Demonstration and simulation • Individual and group work • Practical exercise • Individualized • Trainer guided • Group discussion
Formative assessment methods	• Written assessment • Performance assessment • Product based assessment • Project based assessment

Integrated/Summative assessment (For specific module)

Integrated situation

Carrefour Guest house located in Musanze District has gained the competitive edge over its competitors and the market increased dramatically, therefore is facing the problem of accommodating its esteemed clients and has decided to extend the business. It has signed a contract with BENCCO LTD to construct a five roomed house. The project is at the phase of making cement pavement in the rooms, and each room with 4m2 should have a mason to prepare materials, tools and equipment, prepare the hardcore base and also perform screeding.

As a Mason in BENCCO LTD, you are requested to work in one of the rooms within 4 hours, given that: the mix ratio of mortar is 1:3. All materials, tools and equipment are provided, and furthermore the smoothness is very important.

Resources

Tools	Wood floater, Steel floater, Tape measure, Spirit level, Spades, Steel squares, Trowel, Notch trowel, Steel ruler, Hammer, Scraper, Straight edge, Mason's line, Mortar pan, Stones, Dampy level, Calibrated Gauge Box, Wheelbarrow
Equipment	PPE, concrete mixer
Materials/ Consumables	Sand, Cement, Water, Lime, Lime, Nails

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	

Learning outcome 1: 1. **Prepare materials, tools and equipment (20%)**	1.1. Appropriate tools are selected according to the work to be performed	Tools are properly selected			5
	1.2. Equipment is precisely selected and adequately prepared for work to be done.	Equipment are properly selected			7
	1.3. Materials are selected according to the required quality.	Materials are properly selected			8
Learning outcome 2: **Prepare the hardcore base** **(20%)**	2.1. The ground base is well compacted and leveled in accordance to the design.	The ground base is well compacted and leveled			5
	2.2. Hardcore base are systematically laid on the ground base and leveled.	Hardcore base are systematically laid on the ground base and leveled			8
	2.3. Hard core base level is completely checked for straightness following marked lines.	Hard core base level is completely checked			7
Learning outcome 3: **Prepare concrete** **(20%)**	3.1. Ingredients for concrete mix are selected according to the applicable quality standards.	Ingredients for concrete mix are selected			5
	3.2. Mix ratio are accurately applied according to the standard requirements and expected concrete strength.	Mix ratio are accurately applied			8
	3.3. Concrete mixing is carried out at a convenient place.	Concrete mixing is conveniently carried out.			7
Learning outcome 4: **Perform screeding (30%)**	4.1. Sufficient layers of screed are strategically applied on the hardcore base at regular intervals.	Sufficient layers of screed are strategically applied			8
	4.2. Fresh concrete is efficiently poured on top of and slightly deep into hardcore base.	Fresh concrete is efficiently poured			7
	4.3. Cement screeding is continuously done for leveling the floor with reference to set screeds.	Cement screeding is continuously done			8
	4.3. A layer of smooth surface is promptly applied on the top of screeded surface and further	layer of smooth surface is promptly applied			7

	smoothed.				
Learning outcome 5: Clean the work place (10%)	5.1 Careful cleaning of tools and equipment	Tools and equipment are cleaned careful			4
	5.2 Systematically cleaning of working area	working area are Systematically cleaned			4
	5.3 Adequate storage of tools and equipment.	Tools and equipment adequately stored.			2
Total marks					**100**
Percentage Weightage					**100%**
Minimum Passing line % (Aggregate): 70%					

References:

1. Bing Wen SHAN BIAN ZHU, Cement Concrete Pavement Construction,1990, Abebooks
2. De Vekey RC (2001). Bricks blocks and masonry made from aggregate concrete: Part 2 – APPEarance and environmental aspects, BRE Digest 460, Part 2.
3. M.Rashad Islam & Rafiqul A Tarelder, Pavement Design: Materials, Analysis,2016, McGraw-Hill Education
4. Norbert J. Delatte, Concrete Pavement Design, Construction, and Performance Second Edition,2016 Routledge
5. William & Radford, Cement Houses and How to Build Them ,1996, McGraw-Hill Education