Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

CEMENT CONCRETE WORKS

PWOCW401

Perform cement concrete works

Competence

RQF Level: 4

Learning Hours 40

Credits: 4

Sector: Construction and Building Services

Trade: Public Works

Module Type: Specific

Curriculum: CBSPWO4001 TVET CERTIFICATE IV in Public Works

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<table>
<tr><td>Purpose statement</td><td colspan="6">This module describes the knowledge, skills, and attitudes required to perform cement concrete works. It is intended for learners pursuing RQF level IV in public works. At the end of this module, learners will be able to perform preliminary works, concrete mixing, concrete casting and post concreting works.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">Steel bar works</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 work and presentation</td><td>30%</td></tr>
<tr><td>• Individual work</td><td>40%</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. Perform preliminary works	1.1. PPE are properly used according to the work to be done.
	1.2. Concrete mix ratio is properly interpreted according to the design and specification
	1.3. Tools and Equipment is appropriately selected in accordance to the work to be done.
	1.4. Mixing area is properly prepared in accordance with the work to be done.
	1.5. Casting area is properly prepared in accordance with the work to be done.
	1.6. Casting area is properly checked in accordance with the work to be done.

2. Perform concrete mixing	2.1. Materials are appropriately selected according to the work to be done.
	2.2. Mixing tools and Equipment is appropriately selected in accordance with the work to be done
	2.3. Materials batching are properly performed in accordance with specifications
	2.4. Concrete materials are properly mixed as per specifications
	2.5. Concrete workability test is properly performed in accordance with standards
3. Perform concrete casting	3.1. Concrete mixture is properly transported in accordance with segregation measures
	3.2. Samples for compression tests are properly taken as per standards
	3.3. Concrete is properly poured as per requirements
	3.4. Tools and Equipment is properly cleaned as per requirement
	3.5. Tools and Equipment is properly stored as per requirement
4. Perform post concreting works	4.1. Concrete curing is properly done according to specifications
	4.2. Formwork removal is appropriately performed in accordance with standards
	4.3. Work place is properly cleaned as per requirements

Intended Knowledge, Skills, and Attitude

Knowledge	Skills	Attitude

✓ Describe cement concrete materials ✓ Classify tools and equipment ✓ Explain Concrete mixing procedures ✓ Describe characteristics of concrete ✓ Discuss concrete types and properties ✓ Explain thermochemistry ✓ Determine the quantities of materials required ✓ Identify units of measurement	✓ Report work done ✓ Set out ✓ Perform concrete mixing ✓ Perform concrete batching ✓ Perform concrete casting ✓ Cure concrete work ✓ Apply ICT in reporting	✓ Communicate actively at workplace ✓ Demonstrate professionalism in casting concrete ✓ Pay attention in performing tests ✓ Demonstrate good leadership in managing the site ✓ Respect time in reporting ✓ Communicate at workplace

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Perform preliminary works 2. Perform concrete mixing 3. Perform concrete casting 4. Perform post concreting works
Learning outcome 1: Perform Preliminary works	**Learning hours: 5**
Indicative content	
• **Use of PPE** ✓ Functions of PPE ✓ Types of PPE for concrete works ✓ Maintenance of PPE • **Interpretation of concrete mix ratio**	

- ✓ Concept of concrete mix ratio
- ✓ Calculation of concrete ingredients from mix ratio design

- **Selection of tools and equipment**
  - ✓ Selection of tools
  - ✓ Selection of equipment
  - ✓ Maintenance of tools and equipment
- **Preparation of concrete mixing area**
  - ✓ Setting out of concrete mixing area
  - ✓ Pavement of concrete mixing area
- **Preparation of area to cast concrete**
  - ✓ Cleaning of area to cast concrete
  - ✓ Formwork preparation
- **Checking of area to cast concrete**
  - ✓ Cleaning of area to cast concrete
  - ✓ Checking of condition of formwork
  - ✓ Checking of condition of steel frames

Resources required for the learning outcome	
Equipment	PPEs (Overall, reflector jacket, helmet, Safety shoes, gloves, face mask and goggles), Concrete mixer, Concrete vibrator, Crane machine, Dumper
Materials	N/A
Tools	Spade, Hoe, Trowel, Wooden float, Mortar pan, Spirit level, Square, Hammer, Plumb bob, Tape measure, Wheel barrow
Facilitation techniques	Group discussion and presentation, Trainer guided, Brainstorming, Demonstration and simulation, Individual and group work, Practical exercise
Formative assessment methods /(CAT)	Written assessment, Oral assessment, Practical assessment

Learning outcome 2: Perform concrete mixing	**Learning hours: 10**
Indicative content	

- **Selection of materials for concrete**
  - ✓ Identification of concrete ingredients
  - ✓ Identification of admixtures

- ✓ Quantification of concrete ingredients

- **Selection of mixing tools and equipment**
  - ✓ Selection of mixing tools
  - ✓ Selection of mixing equipment
- **Batching of concrete ingredients**
  - ✓ Batching by weight
  - ✓ Batching by volume
- **Mixing of concrete ingredients**
  - ✓ Manual mixing (hand mixing)
  - ✓ Mechanical mixing (machine mixing)
- **Test of concrete workability**
  - ✓ Sampling for slump test
  - ✓ Performing of slump test

Resources required for the learning outcome	
Equipment	Concrete mixer, Concrete vibrator, Concrete Plant mixer, Slump test cone and its accessories
Materials	Cement, Sand, Gravel, Water, Additives
Tools	Spade, wheel barrow
Facilitation techniques	Group discussion and presentation, Trainer guided, Brainstorming, Demonstration and simulation, Individual, group work and Practical exercise
Formative assessment methods /(CAT)	Performance assessment, Product based assessment

Learning outcome 3: Perform concrete casting	**Learning hours: 15**
Indicative content	

- **Transportation of fresh concrete**
  - ✓ Mode of transport of concrete
  - ✓ Loading and unloading of concrete
  - ✓ Effects of poor concrete transportation
- **Concrete sampling for compression test**
  - ✓ Sampling for compression test
  - ✓ Handling of compression test sample
- **Concrete pouring**

- ✓ Concrete placement
- ✓ Concrete vibration
- ✓ Concrete levelling and finishing

- **Cleaning of tools and equipment**
  - ✓ Methods of cleaning of tools and equipment
  - ✓ Maintenance of tools and equipment
- **Storing of tools and equipment**
  - ✓ Preparation of the area for storing tools and equipment
  - ✓ Technics of storing tools and equipment
  - ✓ Discard unused tools and equipment

Resources required for the learning outcome	
Equipment	Concrete Plant, Mobile mixer truck, Concrete mixer
Materials	Concrete, water, admixtures
Tools	Spade, Wheel barrow, Mortar pan / Bucket , Straight edge
Facilitation techniques	Group discussion and presentation, Trainer guided, Brainstorming, Demonstration and simulation, Individual and group work and Practical exercise
Formative assessment methods /(CAT)	Performance assessment, Product based assessment

Learning outcome 4: Perform post concreting works	**Learning hours: 10**

Indicative content

- **Curing of concrete**
  - ✓ Purpose of concrete curing
  - ✓ Identification of different methods of concrete curing
- **Removal of formwork**
  - ✓ Removal of falsework (Forms supports)
  - ✓ Removal of boards
  - ✓ Checking of surface condition
- **Cleaning of work place**

Resources required for the learning outcome	
Equipment	Dumpy level, Theodolite, water tank truck
Materials	Water, Blanket, sand
Tools	Bucket, Watering can, Flexible pipe, Water container, Tape measure, Plumb bob, Spirit level, Square, Hammer
Facilitation techniques	Group discussion and presentation, Trainer guided, Brainstorming, Demonstration and simulation, Individual and group work and Practical exercise
Formative assessment methods /(CAT)	Practical assessment

Integrated/Summative assessment

Integrated situation

Gatsibo District office has got a problem of a slippery unpaved car parking during rainy seasons and with a lot of dust during summer periods. Therefore, the district has signed a contract with KEPP Ltd to upgrade the parking with a 15cm thick cement concrete pavement. The parking to be constructed is 30m long and 20m wide. As a technician from the foresaid company, you are requested to construct a 4m x 2m x 15cm portion of the work within 6 hours and remove the formwork 1 week later, given that:

i. Workplace is already prepared
ii. All materials, tools and Equipment is available on site

Resources

Tools	Spades, Mortar pan, Trowel, Floats, Spirit level, Tape measure, Bucket, Straight edge, Watering can, Water container and Wheel barrow
Equipment	PPE: Helmet, Gloves, Goggles, Dust mask, Overall, Safety shoes Concrete vibrator, Concrete mixer
Materials/ Consumables	Cement, Sand, Gravel and Water

Assessable	Assessment criteria		Observation	Marks

outcomes	(Based on performance criteria)	Indicator			allocation
			Yes	No	
1. **Perform preliminary works** **(20%)**	PPE are properly used according to the work to be done.	PPE are won			4
	Concrete mix ratio is properly interpreted according to the design and specifications	Concrete mix ratio is interpreted			4
	Tools and Equipment is appropriately selected in accordance to the work to be done	Tools are selected			4
		Equipment is selected			4
	Mixing area is properly prepared in accordance with the work to be done.	Setting out of concrete mixing area is done			3
		Pavement of concrete mixing area is done			5
	Casting area is properly prepared in accordance with the work to be done.	Area to cast concrete is cleaned			3
		Formwork is prepared			3
	Casting area is properly checked in accordance with the work to be done.	Area to cast concrete is cleaned			3
		Condition of formwork checked			3
		Condition of steel frames is checked			3
2. **Perform concrete mixing** **(30%)**	Materials are appropriately selected according to the work to be done.	Materials are selected			5
	Mixing tools and Equipment is appropriately selected in accordance with the work to be done	Mixing tools are selected			3
		Mixing Equipment is selected			3
	Materials batching is	Materials batching are			5

	properly performed in accordance with specifications	done			
	Concrete materials are properly mixed as per specifications	Concrete materials are properly mixed			5
	Concrete workability test is properly performed in accordance with standards	Concrete workability test is done			5
3. Perform concrete casting (30%)	Concrete mixture is properly transported in accordance with segregation measures	Concrete mixture is transported			5
	Samples for compression tests are properly taken as per standard	Samples for compression tests are taken			2
	Concrete is properly poured as per requirements	Concrete pouring is done			5
	Tools and Equipment is properly cleaned as per requirement	Tools are cleaned			2
		Equipment is cleaned			2
	Tools and Equipment is properly stored as per requirement	Tools are stored			2
		Equipment is stored			2
4. Perform post concreting works (20%)	Concrete curing is properly done according to specifications	Concrete curing is done			5
	Formwork removal is appropriately performed in accordance with standards	Formwork removal is done			5
	Work place is properly cleaned as per	Work place is cleaned			5

	requirement				
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

References

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