Republic of Rwanda
Ministry of Education

RTB | RWANDA TVET BOARD

CONCRETE TESTS

PWOCO401

Perform concrete tests

Competence

RQF Level: 4

Learning Hours 30

Credits: 3

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 concrete tests. It is intended for learners who are pursuing level IV in Public Works. At the end of this module, learners will be able to perform slump test, perform compression test, and rebound hammer test.</td></tr>
<tr><td>Learning assumed to be in place</td><td colspan="6">Cement tests</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 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>
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Elements of Competency and Performance Criteria

Elements of competency	Performance criteria
1. Perform slump test	1.1. Test standard is correctly selected
	1.2. Tools, Materials and equipment are correctly selected as per work to be done
	1.3. Slump test materials are correctly sampled in reference with the standards
	1.4. Slump test sample is prepared as per standards
	1.5. Slump test results are analyzed as per standards
	1.6. Slump test report is elaborated as per standards
2. Perform compression test	2.1. Test standard methods are clearly identified
	2.2. Tools and equipment are clearly identified
	2.3. Compression test samples are prepared as per standards

	2.4. Compression test results are analyzed as per standards
	2.5. Compression test report is elaborated as standards
3. Perform rebound hammer	3.1. Test standard methods are clearly Identified
	3.2. Tools and equipment are clearly identified
	3.3. Testing location is properly prepared as per standards
	3.4. Rebound hammer test results are analyzed as standards
	3.5. Rebound hammer test report is elaborated as per standards

Intended Knowledge, Skills, and Attitude

Knowledge	Skills	Attitude
✓ Describe concrete materials ✓ Classify laboratory tools and equipment ✓ Describe characteristics of concrete ✓ Identify concrete types and properties ✓ Explain thermochemistry ✓ Interpret Mechanical Physics ✓ Determine quantities concrete samples required ✓ Identify units of measurement	✓ Apply ICT in reporting ✓ Take sample ✓ Perform concrete testing ✓ Analyze concrete test results ✓ Report work done	✓ Communicate actively at workplace ✓ Demonstrate professionalism in taking samples ✓ Pay attention in performing tests ✓ Respect time in reporting the work done

Course content

Learning outcomes	At the end of the module the learner will be able to: 1. Perform slump test 2. Perform compression test 3. Rebound hammer
Learning outcome 1: Perform slump test	**Learning hours:10**
Indicative content	

- **Selection of standards test method**
  - ✓ Definitions of terms used for slump test
  - ✓ Applicable standards
  - ✓ Purpose of slump test
  - ✓ Applications of slump test
- **Selection of Tools, materials and equipment**
  - ✓ Classes of tools
  - ✓ Classes of equipment
  - ✓ Types of materials
- **Sampling of materials for slump test**
  - ✓ Techniques of sampling
  - ✓ Characteristics of sample
- **Sample preparation for slump test**
  - ✓ Sample size
  - ✓ Mixing procedures of materials for slump test
- **Analysis of slump test data**
  - ✓ Slump test procedures
  - ✓ Measuring slump test value
- **Reporting slump test results**
  - ✓ Identification of report elements

✓ Elaboration of test report

Resources required for the learning outcome	
Equipment	Printer, Computer, concrete mixer, Truck mixer, white board, chalkboard, project, wheel barrow.
Materials	Coarse aggregates, Fine aggregate, water, cement, admixture, pen / pencils, notebook, internet, books, log sheet, internet
Tools	Brushes, Slump cone, scoop, tamping Rod, shovel, trowel, plate, tape measure, pan, ruler, barrel brush.
Facilitation techniques	Brainstorming, demonstration and simulation, individual and group work Practical exercise, trainer guided, group discussion, four steps
Formative assessment methods /(CAT)	Written assessment, Oral presentation, Performance assessment, Project based assessment

Learning outcome 2: Perform compression test	**Learning hours: 15**
Indicative content	

- **Selection of standards test method**
  - ✓ Definitions of terms used for compression test
  - ✓ Applicable standards
  - ✓ Purpose of compression test
  - ✓ Applications of compression test
- **Selection of Tools and equipment**
  - ✓ Classes of tools
  - ✓ Classes of equipment
- **Sample preparation for compression test**

- ✓ Sample status/ condition for compression test
- ✓ Sample size for compression test

- **Analysis of compression test data**
  - ✓ Compression test procedures
  - ✓ Calculation of compressive strength value
- **Reporting compression test results**
  - ✓ Identification of report elements
  - ✓ Elaboration of test report

Resources required for the learning outcome	
Equipment	Concrete mixer, Concrete Truck mixer, Compression machine, concrete vibrator, Computers, printer, Balance, white board, chalkboard, project.
Materials	Coarse aggregates, Fine aggregate, water, cement, admixture, pen / pencils, notebook, internet, books, log sheet, Internet.
Tools	Brushes, scoop, tamping Rod, shovel, trowel, plate, tape measure
Facilitation techniques	Brainstorming, Demonstration and simulation, Individual and group work, Practical exercise, Trainer guided ,Group discussion, four steps
Formative assessment methods /(CAT)	Written assessment, Oral presentation, Performance assessment, Project based assessment.

Learning outcome 3: Perform Rebound hammer	**Learning hours: 5**
Indicative content	

- **Selection of standards test method**
  - ✓ Definitions of terms used for Rebound hammer test
  - ✓ Applicable standards
  - ✓ Purpose of Rebound hammer test
  - ✓ Applications of Rebound hammer test
- **Selection of Tools and equipment**

- ✓ Classes of tools
- ✓ Classes of equipment

- **Testing location preparation for Rebound hammer test**
- **Analysis of Rebound hammer test data**
  - ✓ Rebound hammer test procedures
  - ✓ Calculation of rebound hammer test value
- **Reporting Rebound hammer test results**
  - ✓ Identification of report elements
  - ✓ Elaboration of test report

Resources required for the learning outcome	
Equipment	Rebound hammer, computer, printer, projector
Materials	Nails, Pen / pencils, notebook, internet, books, log sheet, Internet.
Tools	Tape measure
Facilitation techniques	Brainstorming, Demonstration and simulation, Individual and group work, Practical exercise, Trainer guided ,Group discussion, four steps
Formative assessment methods /(CAT)	Written assessment, Oral presentation, Performance assessment, Project based assessment.

Integrated/Summative assessment

Rutsiro District wants to rehabilitate Mubuga bridge of 10 m length which was damaged by heavy rain in the beginning of May. This project has execution period of 2 years and it is intended to connect two cells of Nyabirasi sector.

The project design requires the laboratory tests specifically for concrete tests in order to know concrete workability by performing slump test, determination on how concrete responds to crushing by performing compression test and determination of concrete structural strength by performing Rebound hammer test.

Client also wants these tests to be done in the time extent between provisional handover and definitive handover.

As the project is urgent the client has already provided 5 Concrete grades as follow: C20, C25, C30, C35, and C40. The cement used is Portland cement (CIMERWA).

Therefore, you are hired as laboratory technician to perform the above-mentioned task for the required concrete grades on the project design stage.

Instructions:

- Duration of task: 7 hours
- Recommended standard: American Society for Testing and Materials
- A well-equipped laboratory is provided
- Cubes to be used for compression tests are provided with respect to the given concrete grades.
- Portland cement is available

Resources

Tools	▪ Trowel, Scoop, Tamping rod, Slump cone, Ruler, Tape measure, Hammer, barrel brush, Shovel
Equipment	▪ Rebound hammer, computer, printer, Concrete mixer, Compression machine, Concrete vibrator, Balance, Plate
Materials/ Consumables	▪ Pen, Paper, Concrete, Concrete Cubes, Water, Brushes, Nails, Log sheet

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Perform slump test (50%)	Test standard is correctly selected	Test standard is selected			2
		Materials are selected			5

	Tools, Materials and equipment are correctly selected as per work to be done	Tools are selected			5
		Equipment is selected			5
	Slump test materials are correctly sampled in accordance with the standard.	Sample size is indicated			2
	Slump test sample is correctly prepared in accordance with the standard	Batching of sample is performed			4
		Mixing of materials is done			3
	Slump test results are properly analysed in accordance with the standards	Slump test procedure is performed			5
		slump test value is measured			4
		slump test data are recorded			3
	Reporting slump test results	All report elements are identified			2
		Testing report is elaborated			5
Learning outcome 2 Perform compression test (30%)	Test standard is clearly selected	Test standard is selected			1
	Tools and equipment are clearly selected	Tools are selected			4
		Equipment is selected			4
	Compression test samples are prepared in accordance with the standards	Sample status / condition is checked			2
	Compression test results are analysed in accordance with the standards	The specimen block/cube is placed in testing machine			6

		Load indicator is set to zero			2
		Load is applied until the specimen is failed			3
		Compressive strength value is calculated			2
	Compression test report is elaborated in accordance with the standards	All report elements are identified			2
		Testing report is elaborated			4
Learning outcome 3: **Perform rebound hammer.** (20%)	Test standard is clearly Identified	Test standard is identified			1
	Tools and equipment are clearly selected	Tools are selected			2
		Equipment is selected			2
	Testing location is properly prepared in accordance with the standard	Testing location is checked			1
		Testing location is prepared			2
	Rebound hammer test results are analyzed in accordance with the standard	rebound hammer is firmly held perpendicular to the test surface			5
		rebound hammer is gradually pushed toward the test surface until the hammer impact			2

		rebound hammer test value is calculated			3
		Maximum crushing road over cross-sectional area of specimen is calculated			2
	3.5 Rebound hammer test report is elaborated as per standards	All report elements are identified			2
		Testing report is well elaborated			3
Total marks					100
Percentage Weightage					100%
Minimum Passing line % (Aggregate):					70%

References

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