



Technical Education, Vocational and Entrepreneurship
Training Authority (TEVETA)

DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY

YEAR III

Physics Techniques III

Record of Practical Assessment

Learner`s Name:_____

Learner`s NRC no.:_____

Learner`s TEVETA No.:_____

Assessment Period:_____

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PREFACE

The Technical Education, Vocational and Entrepreneurship Training Authority (TEVETA) is an institution created under the Technical Education, Vocational and Entrepreneurship Training Act Number 13 of 1998, as amended by the Technical Education, Vocational and Entrepreneurship Training (Amendment) Act Number 11 of 2005.

The Act among other things provides that TEVETA shall:

- (a) regulate and conduct national examinations and assessments relating to technical education, vocational and entrepreneurship training;
- (b) charge and collect fees in respect of examinations, assessments and other services provided by the Authority;
- (c) award certificates to persons who succeed in examinations and assessments undertaken under this Act
- (d) do all such things connected with or incidental to the functions of the Authority under this Act.

Through this mandate, the Assessment and Qualifications Division of TEVETA has developed Practical Assessment Tool Kits to enable learners achieve the competences that are congruent with the demand of the workplace tasks. These tool kits in part are also intended to ensure that similar conditions under which all students in TEVET are assessed and examined apply wherever the course is undertaken in Zambia.

The Trainers shall work with the Learners to collect evidence of competence, using the benchmarks provided by the unit standards. During the year, the Learners shall be required to undertake a series of practical assessment tasks. It is the sum of all these assessments tasks that deems a Learner to be competent (or not).

This approach to assessment is not a one-off event but one that gives learners many opportunities to demonstrate skill and allow for the capturing and recording of these demonstrations.

For the Learner to be deemed competent, they must demonstrate competency in every aspect of the practical tasks being undertaken. It must however be understood by the Trainer that Competency does not mean expert. It means that the candidate has attained sufficient skill and knowledge to perform the activity or service to a degree and quality that is acceptable to the industry and the customer in a time within which a competent person at the level could reasonably be expected to perform the task.

While this will be undertaken at institutional level, it is therefore envisaged that the Assessment principles of VALIDITY, RELIABILITY, FAIRENESS and FLEXIBILITY shall at all times be adhered to.



Pre-Assessment

Assessment process explained to the employee (✓ if Yes).	<input type="checkbox"/>
Any appeal relating to the outcome of the assessment or the way in which the assessment was conducted shall be made through the company's <u>fair treatment policy</u> as explained to the employee (✓ if Yes).	<input type="checkbox"/>

Employee/Trainee Employee/Trainee name: _____ (Print) Employee/Trainee comments:	Assessor Assessor name: _____ (Print) Assessor comments:	
I fully understand the assessment and appeals process.	Theory assessment sighted and checked as satisfactory.	<input type="checkbox"/>
Signature: _____ Date: _____	Signature: _____ Date: _____	

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(unit code) 671 Physics Techniques

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Prepare for the practical assessment

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Work Health and Safety

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Assessor qualifications

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Expiry status of assessment

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Resources required

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Observation Checklist

1. DESIGNING OF LOGIC GATES [OR-GATE, OR-GATE & AND-GATE] USING TRANSISTORS	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Designing a fully operational OR-gate and obtain truth tables from its operations. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting T-R OR-gate circuit correctly. <input type="checkbox"/> Connecting two voltmeters to both inputs and one to the output correctly. <input type="checkbox"/> Switching ON the circuit to power it and Testing for input conditions. [Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V] <input type="checkbox"/> Recording the output states for all input Testings correctly. <input type="checkbox"/> Drawing a truth table for the circuit correctly. 						
b) Designing a fully operational AND-gate and obtain truth tables from its operations. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting T-R AND-gate circuit correctly. <input type="checkbox"/> Connecting two voltmeters to both inputs and one to the output correctly. <input type="checkbox"/> Switching ON the circuit to power it and Testing for input conditions. [Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V] <input type="checkbox"/> Recording the output states for all input Testings correctly. <input type="checkbox"/> Drawing a truth table for the circuit correctly. 	□	□	□	□	□	□



Assessor comments:

Signed: Assessor:

Trainee:

2. LOGIC CONTROLLED LIGHTING CIRCUIT	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Build and Testing a circuit that controls lighting. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting circuit correctly. <input type="checkbox"/> Expose the LDR to daylight and note and Recording the state of lamp correctly. <input type="checkbox"/> (If lamp did not come ON, adjust the variable resistor correctly until it comes ON). <input type="checkbox"/> Cover the LDR completely, note and Recording the state of the lamp correctly. <input type="checkbox"/> Drawing a truth table for the observations. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor:

Trainee:



3. VERIFICATION OF DE-MORGAN'S EXPRESSION	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
<p>a) Verifying De-Morgan's 1st Law $\overline{AB} = \bar{A} + \bar{B}$ by comparing output of two variable circuits. This includes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Connecting correctly two circuits with same inputs A and B using 1st expression of De Morgan. <input type="checkbox"/> Feed in the Testing condition as follows correctly. [Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V] <input type="checkbox"/> Recording correctly the output voltage for each circuit and each Testing. <input type="checkbox"/> Drawing truth tables for both circuit correctly. <input type="checkbox"/> Concluding correctly if two circuits work in the same way. <p>b) Verifying De-Morgan's 2nd Law $\overline{A + B} = \bar{A} \cdot \bar{B}$ by comparing output of two variable circuits. This includes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Connecting correctly two circuits with same inputs A and B using 1st expression of De Morgan. <input type="checkbox"/> Feed in the Testing condition as follows correctly. [Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V] <input type="checkbox"/> Recording correctly the output voltage for each circuit and each Testing. <input type="checkbox"/> Drawing truth tables for both circuit correctly. <input type="checkbox"/> Concluding correctly if two circuits work in the same way. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor: Trainee:



4. DESIGNING, BUILDING AND DRAWING TRUTH TABLE FOR OPERATION OF HALF ADDER/FULL ADDER USING X-OR AND BASIC GATES	Satisfactory			Not Satisfactory		
	Attempt No			Attempt No		
	1	2	2	1	2	3
During observation of work activities, the candidate demonstrated that they can:						

<p>a) Designing, Build and Determine states of output for Half-Adder. This includes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Verifying the gates to be Usingd correctly. <input type="checkbox"/> Making the Connectingions as per half adder circuit diagram correctly. <input type="checkbox"/> Switching on V_{CC} and apply various combinations of input according to truth table correctly. <p>[Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V]</p> <ul style="list-style-type: none"> <input type="checkbox"/> Note down the output readings for half-adder. <input type="checkbox"/> Drawing a truth table of half-adder. <p>b) Designing, Build and Determine states of output for Full-Adder. This includes</p> <ul style="list-style-type: none"> <input type="checkbox"/> Verifying the gates to be Usingd correctly. <input type="checkbox"/> Making the Connectingions as per full adder circuit diagram correctly. <input type="checkbox"/> Switching on V_{CC} and apply various combinations of input according to truth table correctly. <p>Carry In (C_{in}) grounded [Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V] Carry In (C_{in}) set at 5V [Testing 1: Ground both inputs Testing 2: Ground one terminal and set another at 5V Testing 3: Reverse terminals in Testing 2 Testing 4: Set both terminals to 5V]</p> <ul style="list-style-type: none"> <input type="checkbox"/> Note down the output readings for full-adder. <input type="checkbox"/> Drawing a truth table of full-adder. 						
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Assessor comments:

Signed: Assessor:

Trainee:

5. IMPLEMENTATION OF 4-BIT PARALLEL ADDER USING 7483 IC	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Designing, build and Implement a 4-bit Parallel adder. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting the circuit as per diagram correctly. <input type="checkbox"/> Using the toggle Switchings to set up input code combination correctly. [Using a minimum of four (4) different sets of input codes] <input type="checkbox"/> Observing the output combination using LED's correctly. <input type="checkbox"/> Comparing your output to truth tables and comment. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor:

Trainee:



6. IMPLEMENTATION OF 4-BIT PARALLEL HALF SUBTRACTOR USING 7483 IC				Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:				Attempt No			Attempt No		
				1	2	2	1	2	3
a) Designing, build and Implement a 4-bit Parallel subtractor. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting the circuit as per diagram correctly. <input type="checkbox"/> Using the toggle Switchings to set up input code combination correctly. [Using a minimum of four (4) different sets of input codes] <input type="checkbox"/> Observing the output combination using LED's correctly. <input type="checkbox"/> Comparing your output to truth tables and comment. 				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor:

Trainee:

7. DESIGNING AND TESTING OF MONOSTABLE MULTIVIBRATORS USING 555 TIMER	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Designing, build and Testing Monostable Multivibrator using 555 Timer. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting the circuit as per diagram correctly. <input type="checkbox"/> Switching ON circuit correctly. <input type="checkbox"/> Testing the Monostable Multivibrator under the Multivibrator conditioning correctly for both negative and positive triggering. 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor:

Trainee:



8. DESIGNING AND TESTING OF ASTABLE MULTIVIBRATORS USING 555 TIMER	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Designing, build and TestingAstableMultivibrator using 555 Timer. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting the circuit as per diagram correctly. <input type="checkbox"/> Switching ON circuit correctly. <input type="checkbox"/> Testing the AstableMultivibrator under the Multivibrator conditioning correctly. <input type="checkbox"/> Monitoring output on Oscilloscope correctly. <input type="checkbox"/> Drawing the output waveform correctly. <input type="checkbox"/> Hence determine the periodic time correctly 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor:

Trainee:

9. TRUTH TABLE VERIFICATION OF RS AND D TYPE FLIP-FLOPS	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Verifying correctly the operation of RS type Flip-Flop. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting circuit diagram correctly. <input type="checkbox"/> Testing under the flip-flop states correctly <input type="checkbox"/> Monitoring results correctly using LED's and Recording them. <input type="checkbox"/> Drawing truth tables for RS flip-flop and Comparing with standard table correctly. b) Verifying correctly the operation of RS and D type Flip-Flops. This includes <ul style="list-style-type: none"> <input type="checkbox"/> Connecting circuit diagram correctly. <input type="checkbox"/> Testing under the flip-flop states correctly <input type="checkbox"/> Monitoring results correctly using LED's and Recording them. <input type="checkbox"/> Drawing truth tables for RS flip-flop and Comparing with standard table correctly. 	□	□	□	□	□	□

Assessor comments:

Signed: Assessor:

Trainee:



10. TRUTH TABLE VERIFICATION OF T AND JK TYPE FLIP-FLOPS	Satisfactory			Not Satisfactory		
During observation of work activities, the candidate demonstrated that they can:	Attempt No			Attempt No		
	1	2	2	1	2	3
a) Verifying correctly the operation of T type Flip-Flop. This includes <div><div><input type="checkbox"/> Connecting circuit diagram correctly.</div><div><input type="checkbox"/> Testing under the flip-flop states correctly</div><div><input type="checkbox"/> Monitoring results correctly using LED's and Recording them.</div><div><input type="checkbox"/> Drawing truth tables for T flip-flop and Comparing with standard table correctly.</div></div>						
b) Verifying correctly the operation of JK type Flip-Flops. This includes <div><div><input type="checkbox"/> Connecting circuit diagram correctly.</div><div><input type="checkbox"/> Testing under the flip-flop states correctly</div><div><input type="checkbox"/> Monitoring results correctly using LED's and Recording them.</div><div><input type="checkbox"/> Drawing truth tables for JK flip-flop and Comparing with standard table correctly.</div></div>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Assessor comments:

Signed: Assessor:

Trainee:

Final Assessment Summary

Practical assessment summary

Note: refer to mapping document if required

		Satisfactory	Not Satisfactory
1.	Designing Of Logic Gates [OR-Gate, NOR-Gate & AND-Gate] Using Transistors		
2.	Logic Controlled Lighting Circuit		
3.	Verification Of De-Morgan's Expression		
4.	Designing, Build And Drawing Truth Table For Operation Of Half Adder/Full Adder Using X-OR And Basic Gates		
5.	Implementation Of 4-Bit Parallel Adder Using 7483 IC		
6.	Implementation Of 4-Bit Parallel Half Subtractor Using 7483 IC		
7.	Designing And Testing Of Monostable Multivibrators Using 555 Timer		
8.	Designing And Testing Of Astable Multivibrators Using 555 Timer		
9.	Truth Table Verification Of RS And D Type Flip-Flops		
10.	Truth Table Verification Of T And JK Type Flip-Flops		



Assessor comments:

Assessment Outcome

Satisfactory ☐

Not Satisfactory ☐

Employee/Trainee	Assessor
Employee/Trainee name: _____ (Print)	Assessor name: _____ (Print)
Employee/Trainee comments:	Assessor comments:
Signature: _____ Date: _____	Signature: _____ Date: _____



VALIDATION OF THE ASSESSMENT

NAME:..... DATE:.....

POSITION: **PRINCIPAL/HEAD OF INSTITUTION** SIGNATURE:.....

NAME INSTITUTION:.....

STAMP:

