

## NATIONAL VOCATIONAL

# **TRAINING INSTITUTE**

## **TESTING DIVISION**

# **REGULATIONS AND SYLLABUS**

## FOR

## **RADIO, T.V. ELECTRONIC SERVICING**

### **CERTIFICATE ONE**

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### A. INTRODUCTION:

i. The review of this syllabus has been generally influenced by the demands of industries due to its continuous change as a result of technological advancement and the changing needs of society. It was also influenced by the TVET reforms under the directions of the new educational reforms with the view to opening up further education and training opportunities to TVET graduates. The certificate ONE syllabus is designed to respond to the following level descriptors:

| QUALIFICATION | KNOWLEDGE LEVEL  | SKILLS AND ATTITUDE:   |
|---------------|--|--|
| Certificate 1 | 1. To demonstrate a broad knowledge<br>base incorporating some technical<br>concepts.      | 1. Require a wide range of technical skills  |
|               | <ol> <li>To demonstrate knowledge of the theoretical basis of practical skills.</li> </ol> | 2. Are applied in a variety of familiar and complex contexts with minimum supervision. |
|               | 3. To demonstrate knowledge in<br>numeracy, literally, IT and<br>Entrepreneurial skills    | 3. Require collaboration with others in a team   |

ii The rational for the course is to provide students with broad understanding of the technology of the manufacture, installation maintenance and repairs of domestic and industrial equipment for the enhancement of national development.

### **B.** THE GENERAL OBJECTIVES

The Radio Television and Electronics course is to establish the level of knowledge and skills required by persons undergoing training or employed in the servicing of Radio, Television and any other electronic equipment whether domestic professional or industrial.

The course deals progressively with:

Observation of safe working procedures and safety precautions. Application practical skills, safe use of tools and equipment and judicious use of materials. The purposes and functions of components in basic circuits and their effect on signals. The circuit analysis required for the proper use of measuring instruments during fault tracing to component level.

### C. THE COURSE COMPONENT

The course comprises of:

- a. Trade Theory
- b. Trade Science and Calculation
- c. Trade Drawing
- d. General Paper
- e. Trade Practical

f.

EXAMINATION: The candidates would be examined in the FIVE components listed in 'C' above.

Practical work must be carefully planned to illustrate the application of trade Technology, Science and Calculations, and Drawing; so as to provide maximum opportunity for craft practice. It is recommended that not less than 60% of the course time should be allowed for craft practice.

#### D. KNOWLEDGE AND SKILLS REQUIREMENT

The prime objective of the programme is to provide knowledge and skills of the trade in a manner that will best meet the needs of the trade as well as industries using professional equipments

#### E. ENTRY TO THE COURSE

Minimum education: Must have passed JHS or SHS examination/Foundation Certificate. However, the selection of the students for the course is within the discretion of the head of the institution.

#### F. ELIGIBILITY FOR ENTRY TO EXAMINATION

Candidates may enter for examination only as internal candidate; that is those who at the time of entry to the examination are undertaking (or) have already completed the course at an approved establishment.

#### G. EXTERNAL EXAMINERS

The practical work of candidates will be assessed by an external examiner appointed by the Trade Testing Commissioner.

#### H. EXAMINATION RESULTS AND CERTIFICATES

Each candidate will receive record of performance given the grade of performance for the components

Taken. These are:

- i) Distinction
- ii) Credit
- iii) Pass
- iv) Referred/Failure

Certificates would be issued to candidates who pass in all the components.

#### I. NOTE:

All Technical and Vocational trainees who aspire to take advantage of the opportunities opened to them in the educational reforms should NOTE that, for a trainee to progress to certificate Two (2) a pass in Certificate One (1) is compulsory.

#### J. ACKNOWLEDGEMENT

NVTI wishes to acknowledge the team of experts, for preparing the materials which have been incorporated into this syllabus.

Mr. Sampson Keelson (Head of Electronics Dept., PTI-Kokomlemle) Ingneer Motey Addo (Gh. Inst. of Eng. Raphael Ocloo (Raphco Electro) Emmanuel Ashie (Head of Electronics Dept, NCCTI-Dansoman)

### SYLLABUS FOR ELECTRONICS CERTIFICATE ONE

| ТАЅК   | CRITICAL SKILLS  | SUB SKILLS   | INSTRUCTIONAL TECHNIQUES   | ASSESSMENT<br>METHOD  |
|--|--|--|--|---|
| 1.0 Recognize health<br>and safety hazard in<br>workshop.                                | <b>1.1</b> Observed General Safety.                          | <b>1.1.1</b> State safe working procedures and safety regulations.   | Discuss safe working procedures.   | Apply relevant<br>regulations to work<br>situations correctly.  |
|  | 1.2 Observed Electrical<br>Safety                            | <ul> <li>1.2.1 State various types of protective devices.</li> <li>1.2.2 Select suitable size of protective device.</li> <li>1.2.3 Describe the symptoms of electric shock and the correct action to be taken.</li> <li>1.2.4 List the type of fire extinguishers and their appropriate use.</li> <li>1.2.5 Demonstrate the use of fire extinguishers</li> </ul> | Assist student to discuss various<br>types of protective devices and<br>their usage.<br>Discuss and list the various<br>types of fire extinguishers, their<br>properties and appropriate use | Identify and describe<br>types of protective<br>devices and their<br>application.<br>Identify and list types<br>of fire extinguishers as<br>applicably to fire<br>safety. |
| 2.0 Demonstrate an<br>understanding of<br>the concept of Basic<br>Electrical Principles. | 2.1. Investigate the Nature of Electricity.                  | <b>2.1.1</b> Explain the structure atom through discussion   | Explain the meaning of electric field and its characteristics.   | Describe electric<br>field and its<br>properties.   |
|  | 2.2 Understand the<br>concept of Electric<br>field.          | <ul> <li>2.2.1 State Ohms Law</li> <li>2.2.2 Demonstrate a basic DC Circuit to illustrate the relationship between voltage (v) current (I) and Resistance (R)</li> <li>2.2.2 Define conducting material and</li> </ul>   | Through discussion describe<br>the types of magnet and<br>their application.   | Solve simple<br>problems involving<br>electric field.<br>Describe the types of<br>magnet and chair  |
|  | 2.3 Know and understand<br>the concept of Basic<br>Magnetism | <ul> <li>insolating material.</li> <li>2.2.3 State the types of conductors<br/>and insulators.</li> <li>2.2.4 State their applications.</li> <li>2.3.1 State the type of magnets and<br/>their applications.</li> </ul>  | -Assist students to state the laws of magnetism.   | application<br>correctly.<br>-Student to state<br>the laws of<br>magnetism .  |

| ТАЅК   | CRITICAL SKILLS   | SUB SKILLS   | INSTRUCTIONAL TECHNIQUES  | ASSESSMENT<br>METHOD  |
|--|---|--|---|---|
|  |   | <ul><li>2.3.2 Define the following magnetic flux, flux Density and Reluctance.</li><li>2.3.3 State the laws of magnetism.</li></ul>  | Demonstrate to explain the laws of magnetism.   | -Student to<br>demonstrate to<br>proof the law.   |
|  | 2.4 Understand the concept<br>of Semi conductor<br>theory     | <ul> <li>2.4.1 Define semiconductor.</li> <li>2.4.2 State the electrical properties<br/>(valence band ,conduction band, and<br/>forbidden band).</li> <li>2.4.3 State the types of semiconductor<br/>material (Germanium and Silicon.)</li> <li>2.4.4 Explain the process of doping<br/>(Extrinsic and Intrinsic Semiconductor)</li> </ul>   | Discuss the electrical properties<br>of semiconductor material.<br>Discuss the formation of P-type<br>and N-type material   | Explain the properties<br>of semiconductor<br>materials.<br>Explain the difference<br>between N-type and P-<br>type material. |
| <b>3.0</b> Differentiate<br>between types of<br>Passive Electronic<br>Components | <b>3.1</b> Know and understands the application of Resistors. | <ul> <li>3.1.1 Define Resistance</li> <li>3.1.2 State types of Resistors (Carbon<br/>,metal, film, wirewond integrated,<br/>resistor ,Variable. Resistor )</li> <li>3.1.3 Select value of resistor using colour<br/>coding.</li> <li>3.1.4 Test the value of resistor using<br/>measuring instruments.</li> <li>3.1.5 Estimate Power Rating of Resistor s</li> <li>3.1.6 Connect Resistor in series and<br/>parallel.</li> </ul> | <ul> <li>Guide students to discuss<br/>various types of fixed resistors<br/>characteristics and uses.</li> <li>Guide students to discuss<br/>various types of resistors<br/>characteristics and their<br/>application.</li> <li>Discuss how to use the colour<br/>code table to determine the<br/>nominal value of resistance.</li> <li>Through discussion show how<br/>to estimate power handling<br/>capacity of various size.</li> <li>Discus and show how<br/>resistors are connected in series<br/>and parallel</li> </ul> |   |

| ТАЅК | CRITICAL SKILLS             | SUB SKILLS   | INSTRUCTIONAL<br>TECHNIQUES                  | ASSESSMENT<br>METHOD   |
|------|-----------------------------|--|--|------------------------|
|      | 3.2 Know and understand the | <b>3.2.1</b> Define capacitance of capacitor.                  | - Discuss to bring out capacitance           | Explain capacitance of |
|      | application of Capacitor    | 3.2.2 State the make /types of capacitor                       | of a capacitor and                           | a capacitor and be     |
|      |                             | (Paper , trimmer ,mica, ceramic silvered                       | characteristics under D.C                    | able to describe its   |
|      |                             | mica, polyester, tantalum and                                  | conditions.                                  | behavior under D.C     |
|      |                             | electrolytic capacitor).                                       | - Discuss to show how to                     | conditions correctly.  |
|      |                             | 3.2.3 Estimate the Rating of Capacitors.                       | identify types of capacitors and             |                        |
|      |                             | 3.2.4 State the relationship between                           | its area of application.                     | Identify and describe  |
|      |                             | charge and applied voltage of capacitor.                       | <ul> <li>Discuss to bring out the</li> </ul> | characteristics of     |
|      |                             |  | relationship between charge                  | various types of       |
|      |                             | 3.2.5 Select values of capacitor using                         | and applied voltage of a                     | capacitors. Calculate  |
|      |                             | numerals code.   | capacitor and help students to               | for charge(s) across a |
|      |                             | 3.2.6 Solve problems involved in                               | perform simple calculations.                 | capacitor against      |
|      |                             | capacitors in series and parallel.                             |  | applied voltage and    |
|      |                             | 3.2.7 Calculate energy stored in a                             | - Discuss to show how to solve               | current.               |
|      |                             | capacitor.   | problems involving capacitors in             |                        |
|      |                             | 3.2.8 Explain the behavior of the                              | series and parallel.                         | Solve problems         |
|      |                             | capacitor under A.C condition.                                 |  | involving energy       |
|      | 1.3 Know and understand     | 3.2.9 Observe the effect of passing                            | - Discuss how to calculate                   | stored in a capacitor. |
|      | the application of          | alternating voltage to the capacitor.                          | Energy stored in capacitor.                  |                        |
|      | inductor.                   |  | - Explain why it is stored in the            | Connect capacitors in  |
|      |                             | 3.3.1 Define inductance  | Electric field.                              | series and parallel.   |
|      |                             | 3.3.2 State the types (Air Core Inductor,                      |  |                        |
|      |                             | Preset inductor).  | - Discuss to bring out                       |                        |
|      |                             | 3.3.3 Solve problems involving                                 | inductance of an inductor and                |                        |
|      |                             | inductors in series and parallel.                              | characteristics under D.C                    |                        |
|      |                             | 2.2.4 Eveloin the helps ion of the                             | conditions.                                  |                        |
|      |                             | 3.3.4 Explain the behavior of the inductor under D.C condition | - Discuss to show how to                     |                        |
|      |                             | inductor under D.C condition                                   | identify types of<br>Inductors.              |                        |
|      |                             | 3.3.5 Observe the effect of suddenly                           |  |                        |
|      |                             | applied current into the coil.                                 |  |                        |
|      |                             |  |  |                        |
|      |                             | 3.3.6 Observe the effect of suddenly                           |  |                        |
|      |                             | switch current out from the coil.                              |  |                        |
|      |                             |  |  |                        |

| TASK  | CRITICAL SKILLS                           | SUB SKILLS   | INSTUCTIONAL TECHNIQUES   | ASSESSMENT<br>METHOD  |
|---|---|--|---|---|
|   |   | <ul><li>3.3.7 Explain the behavior of an inductor under A.C condition.</li><li>3.3.8 Observe the effect of passing alternating current through the coil.</li></ul> | - Discuss how to show to solve problems involving inductors connected in series and parallel.   |   |
|   |   | 3.3.9 Observe the effect of connecting two inductors in series to A.C source.  |   |   |
| <b>4.0</b> Understand the concept of alternating current generation(AC) | 4.1 Principle of operation of a generator | <ul><li>4.1.1 Explain the principle of operation.</li><li>4.1.2 List parts of an A.C generator.</li></ul>  | <ul> <li>Through discussion explain<br/>the principle of operation of a<br/>generator.</li> </ul>   | <ul> <li>Explain the<br/>operation of a<br/>generator.</li> </ul>               |
|   |   | 4.1.3 Define various AC quantities.  | - Assist students to list parts of a generator.   | <ul> <li>List parts of a generator.</li> </ul>                                  |
|   |   |  | <ul> <li>Assist students to define<br/>various A.C quantities (RMS,<br/>Peak, Average values, Form<br/>factor, Cycle, Period,<br/>Frequency)</li> </ul> | - Define A.C<br>quantities.   |
| <b>5.0</b> Understanding the  | 5.1 Explain the Construction              | 5.1.1 State the types of transformer (shell and core).   | - Lead students to state the types of transformer   | - Student to list the types of transformer.                                     |
| concept of a<br>transformer.  | of a transformer.                         | <ul><li>5.1.2 Explain the principle of operation.</li><li>5.1.3 Solve problems in transformation ratio</li></ul>   | <ul> <li>Through discussion explain<br/>the principle of operation.</li> <li>Assist students to solve</li> </ul>  | - Student to explain<br>the principle of<br>operation                           |
|   |   | $\underbrace{\underline{V}_{1}}_{V_{2}} = \underbrace{\underline{N}_{1}}_{N_{2}} = \underbrace{\underline{I}_{2}}_{\underline{I}_{1}}$                             | problems on transformation ratio.   | <ul> <li>Students to solve<br/>problems on<br/>transformation ratio.</li> </ul> |

| TASK  | CRITICAL SKILLS                                     | SUB SKILLS   | INSTUCTIONAL TECHNIQUES   | ASSESSMENT<br>METHOD  |
|---|---|--|---|---|
| 6.0 Differentiate<br>between types of Active<br>component | 6.1 Identify semiconductor diode.                   | <ul> <li>6.1.1 State function.</li> <li>6.1.2 Draw symbol.</li> <li>6.1.3 State types (LED, rectifier diode, zener diode, PIN Diodes, Varactor diode.)</li> <li>6.1.4 Test semiconductor diode.</li> <li>6.1.5 Explain the difference between the forward and reverse bias with reference to PN junction diode.</li> </ul>   | <ul> <li>Lead students to draw symbol<br/>of PN Junction.</li> <li>Assist students to perform<br/>experiment to determine the<br/>V/I characteristics of a diode.</li> <li>Assist students to state types<br/>of semiconductors diodes.</li> </ul>  | <ul> <li>State the functions<br/>of diode.</li> <li>Draw symbols of<br/>various types of<br/>junction diodes as<br/>listed.</li> <li>Draw the V/I curve.</li> <li>Connect and<br/>determine the V/I<br/>characteristics in a<br/>simple circuit.</li> </ul> |
|   | 6.2 Identify Bipolar Junction<br>Transistor.        | <ul> <li>6.2.1 State and describe the operation<br/>of Bipolar Junction transistor.</li> <li>6.2.2 Draw symbol.</li> <li>6.2.3 State types (PNP, NPN)</li> <li>6.2.4 Determine the DC bias of Bipolar<br/>junction transistor.</li> <li>6.2.5 Explain V/I Characteristics of<br/>Bipolar Junction Transistor.</li> <li>6.2.6 Configuration of Bipolar Junction<br/>Transistor .</li> <li>6.2.7 Test and identify types of<br/>Transistors using multimeter.</li> </ul> | <ul> <li>Through discussion explain<br/>the biasing of NPN and PNP<br/>Transistor.</li> <li>Assist students to draw and<br/>explain the 3 configuration of<br/>common base, common emitter<br/>and common collector.</li> <li>Through discussion explain<br/>each characteristics; (C.B., C.E.,<br/>and C.C).</li> <li>Through discussion identify<br/>the Q point on the<br/>characteristics curve.</li> </ul> | <ul> <li>Draw the V/I<br/>characteristics of<br/>common emitter and<br/>label it correctly.</li> <li>Draw the 3<br/>configuration diagram.</li> </ul>   |
|   | 6.3 Explain principle and operation of oscillators. | <ul><li>6.3.1 Explain the principle of oscillators.</li><li>6.3.2 State the types of oscillators</li><li>(Colpitt, Hartley and Phase shift ).</li><li>6.3.3 State the application.</li></ul>   | <ul> <li>Through discussion explain the principle of oscillation.</li> <li>Assists the student to state the types of oscillators</li> <li>Assist the student to state the application</li> </ul>  | <ul> <li>Explain the principle<br/>of oscillators.</li> <li>Student should state<br/>the types of<br/>oscillators.</li> <li>Student should state<br/>the application of<br/>oscillators.</li> <li>List types of batteries.</li> </ul>                       |

| TASK               | CRITICAL SKILLS               | SUB SKILLS                              | INSTRUCTIONAL<br>TECHNIQUES      | ASSESSMENT<br>METHOD    |
|--------------------|-------------------------------|---|----------------------------------|-------------------------|
| 7.0 Understand the | 7.1 Understand the            | 7.1.1 State how it works.               | - Lead students to understand    | METHOD                  |
| basic operation of | construction of the battery   |   | the construction and operation   |                         |
| Analogue circuit   | construction of the suttery   | 7.1.2 State types of batteries used as  | of batteries.                    |                         |
|                    |                               | DC source.                              | - Lead students to state the     |                         |
|                    |                               |   | types of batteries.              |                         |
|                    |                               | 7.1.3 State the Safe use of batteries.  | - Lead student to state the safe |                         |
|                    |                               |   | use and disposal of batteries.   |                         |
|                    | 7.2 Describe the operation of | 7.2.1 Draw block diagram of AC to DC    | - Assist students to draw block  | - Student to draw       |
|                    | Power Supply Unit. And also   | Power Supply.                           | diagram of AC to DC power        | block diagram and       |
|                    | understand the principle and  | 7.2.2 State functions of the block.     | supply.                          | state functions of each |
|                    | operation of doubler circuit. | 7.2.3 State the types (Half wave, Full  |                                  | block.                  |
|                    |                               | wave and full wave Bridge rectifier     | - Assist student to connect half |                         |
|                    |                               | Power Supply).                          | and full wave rectification      | - Explain the principle |
|                    |                               | 7.2.4 Draw and connect simple           | circuits.                        | of rectification.       |
|                    |                               | Regulated Power Supply Circuit.         | - Through discussion and         |                         |
|                    |                               | 7.2.5 Understand and explain the action | explain the principle of         | - State types of        |
|                    |                               | of halfwave doubler circuit .           | rectification and filtration.    | rectification.          |
|                    |                               | 7.2.6 Understand and explain the action | - Through discussion state the   |                         |
|                    |                               | of fullwave doubler.                    | function of each block in the    | - Draw simple           |
|                    |                               |   | power supply unit                | regulated power         |
|                    |                               |   | - Guide students to draw a       | supply circuit.         |
|                    |                               |   | simple regulated power supply    | -Students to explain    |
|                    |                               |   | circuit.                         | the action of halfwave  |
|                    |                               |   | -Through discussion explain the  | and fullwave doubler    |
|                    |                               |   | action of halfwave doubler       | circuit.                |
|                    |                               |   | circuit                          |                         |
|                    |                               |   | -Through discussion explain the  |                         |
|                    |                               |   | action of fullwave doubler       |                         |
|                    |                               |   | circuit.                         |                         |
|                    |                               |   | - Through discussion explain     |                         |
|                    |                               |   | the method of Biasing in the     |                         |
|                    |                               |   | circuit diagram                  |                         |
|                    |                               |   | - Assist student to draw a       |                         |
|                    | 7.3 Describe the operation of | 7.3.1 Define C E Voltage Amplifier      | single stage CE Voltage          | - Explain the functions |
|                    | voltage Amplifier.            |   | Amplifier.                       | of the components in    |

| TASK   | CRITICAL SKILLS                               | SUB SKILLS   | INSTRUCTIONAL<br>TECHNIQUES   | ASSESSMENT<br>METHOD  |
|--|---|--|---|---|
|  |   | 7.3.2 State types of class of Bias (class A,<br>Class B, Class AB, Class C)  | Demonstrate an<br>operation of a typical CE<br>Voltage Amplifier.   | the single stage CE<br>voltage Amplifier.   |
|  | 7.4 Describe the operation of                 | 7.3.3 Draw and explain Single Stage CE<br>Voltage Amplifier (Biasing, loading<br>emitter stabilizing circuits, coupling and<br>decoupling)   | <ul><li>Assists the students to measure the voltage gain.</li><li>Through discussion explain</li></ul>  | <ul> <li>Construct a single</li> <li>stage CE Voltage</li> <li>Amplifier.</li> <li>Perform an</li> </ul>  |
|  | wave shaping circuit.                         | 7.3.4 Connect and Test a typical CE Voltage Amplifier.   | differentiator and integrator circuits.   | experiment in a wave<br>shaping circuit for a<br>given input signal.  |
|  |   | 7.4.1 State the types (Differentiator,<br>Integrator Circuit).   | <ul> <li>Lead student to draw and<br/>explain the difference<br/>between the input and<br/>output signal of the two</li> </ul>  |   |
|  |   | 7.4.2 Draw the types of circuit.   | wave shaping circuits<br>(differentiator and<br>integrator). Limiting it to C-<br>R wave shaping circuit.   |   |
| 8.0 Understand the basic operation of Logic Circuit. | 8.1 Understand the concept of number systems. | <ul><li>8.1.1 Convert denary to binary and vice versa</li><li>8.1.2 Perform basic binary calculation (Addition and Subtraction).</li></ul>   | <ul> <li>Through discussion<br/>explain the various number<br/>system.</li> <li>Assist student to convert<br/>denary to binary.</li> </ul>  | <ul> <li>Convert denary to<br/>binary and vice versa.</li> <li>Draw the logic gate<br/>symbols.</li> <li>Draw the various<br/>truth table and timing</li> </ul> |
|  | 8.2 Understand the concept of Logic Gates.    | <ul> <li>8.2.1 Define logic gate.</li> <li>8.2.2 Draw symbols of basic logic gate (AND, NAND, NOT ,NOR, EXOR, EXNOR).</li> <li>8.2.3 Draw Truth table and Timing Diagram</li> <li>8.2.4 Draw logic circuits using switches.</li> <li>8.2.5 Wire logic gates using switches (AND, NOT, NAND, OR NOR)</li> </ul> | <ul> <li>Assist student to draw the logic gate symbols.</li> <li>Assist student to draw the truth table and the timing diagram.</li> <li>Guide student to wire logic gate using switches</li> </ul> | diagram.  |

| ТАЅК  | CRITICAL SKILLS  | SUB SKILLS  | INSTRUCTIONAL<br>TECHNIQUES  | ASSESSMENT<br>METHOD   |
|---|--|---|--|--|
| 9.0 Understand the principle operation of measuring instruments | 9.1 Understand use and care of an Analogue Multimeter.                       | <ul> <li>9.1.1 Describe the construction of moving coil instrument.</li> <li>9.1.2 Explain the operation.</li> <li>9.1.3 Convert a moving coil galvanometer using shunt and multipliers.</li> <li>9.1.4 Solve problems involving shunt and multiplier.</li> </ul> | <ul> <li>Through the discussion, describe the construction of moving coil instrument.</li> <li>Through the discussion explain the principle of operation.</li> </ul>   | <ul> <li>Explain the operation of moving coil instrument</li> <li>Solve problems involving shunt and multiplier</li> </ul>   |
|   | 9.2 Understand the use and care of digital multimeter.                       | <ul> <li>9.1.5 Use bridge network in measuring<br/>(Temperature, Pressure, etc).</li> <li>9.1.6 Explain sensitivity of multimeter</li> <li>9.2.1 Explain the operation.</li> <li>9.2.2 State advantages of Digital over<br/>Analogue multimeter.</li> </ul>       | <ul> <li>Assist students to solve<br/>problems involving shunt<br/>and multiplier.</li> <li>Through discussion<br/>describe the operation of<br/>digital multimeter.</li> <li>Through discussion<br/>explain the function of<br/>controls in C R O.</li> </ul> | <ul> <li>Student to explain<br/>the operation.</li> <li>Student to explain<br/>the function of CRO<br/>controls.</li> </ul>  |
|   | 9.3 Understand the operation of oscilloscope.                                | <ul><li>9.3.1 Explain the functions of the controls on the (CRO). Cathode Ray Oscilloscope.</li><li>9.3.2 CRO to observe waveforms.</li></ul>   | - Through discussion<br>explain the use of CRO to<br>observe waveforms.  | <ul> <li>Student to observe<br/>waveform on<br/>oscilloscope.</li> </ul>   |
| 10.0 Understand the concept of communication.                   | 10.1 State the relationship<br>between velocity wavelength and<br>frequency. | 10.1.1 Define velocity, frequency   | - Assist student to explain<br>the relationship between<br>velocity wave length and<br>frequency.  | <ul> <li>Student to define<br/>wave length,<br/>frequency and<br/>velocity.</li> <li>Student to calculate<br/>the frequency<br/>wavelength, velocity.</li> <li>Student should</li> </ul> |
|   | 10.2 Explain the process of modulation.                                      | <ul> <li>10.2.1 Describe modulation (AM,FM)</li> <li>10.2.2 Draw the wave forms (AM, FM)</li> <li>10.2.3 Explain how these waveform come about.</li> <li>10.2.4 State the advantages of FM over AM .</li> </ul>   | <ul> <li>Assist student to sketch<br/>and explain the waveform<br/>of AM, FM.</li> <li>Assist student to state the<br/>advantages of FM over AM.</li> </ul>  | sketch and label<br>modulation waveform<br>(AM,FM).<br>- Student to state<br>the advantages of FM<br>over AM.  |

#### LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE TRADE THEORY

| NO  | TOPIC             | COGNITIVE<br>KNOWLEDGE | AFFECTIVE<br>UNDERSTANDING | PSYCHOMOTOR<br>APPLICATION | TOTAL |
|-----|-------------------|------------------------|----------------------------|----------------------------|-------|
| 1.  | Ref. to task 1.0  | 1.1                    |                            | 1.1                        | 3     |
| 2.  | Ref. to task 2.0  | 2.3                    | 2.1, 2.3, 2.4              | 2.2, 2.3                   | 2     |
| 3.  | Ref. to task 3.0  | 3.2, 3.3               | 3.2                        | 3.1, 3.2, 3.3              | 2     |
| 4.  | Ref. to task 4.0  | 4.1                    | 4.1                        |                            | 2     |
| 5.  | Ref. to task 5.0  | 5.1                    |                            | 5.1                        | 2     |
| б.  | Ref. to task 6.0  | 6.1, 6.3               | 6.3                        | 6.1, 6.2                   | 2     |
| 7.  | Ref to task 7.0   | 7.2                    | 7.2, 7.3                   | 7.2                        | 2     |
| 8.  | Ref to task 8.0   |                        |                            | 8.1                        | 4     |
| 9.  | Ref to task 9.0   | 9.1                    | 9.1, 9.2                   | 9.1, 9.3                   | 2     |
| 10. | Ref. To task 10.0 | 10.1, 10.2             |                            | 10.1                       | 4     |
|     |                   |                        |                            |                            |       |

#### LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE TRADE SCIENCE AND CALCULATIONS

| NO  | TOPIC             | COGNITIVE<br>KNOWLEDGE | AFFECTIVE<br>UNDERSTANDING | PSYCHOMOTOR<br>APPLICATION | TOTAL |
|-----|-------------------|------------------------|----------------------------|----------------------------|-------|
| 1.  | Ref. to task 1.0  |                        |                            | 2.2.                       |       |
| 2.  | Ref. to task 2.0  |                        |                            | 3.1, 3.2, 3.3              | 3     |
| 3.  | Ref. to task 3.0  |                        |                            | 4.1                        | 1     |
| 4.  | Ref. to task 4.0  |                        |                            | 5.1                        | 1     |
| 5.  | Ref. to task 5.0  |                        |                            |                            |       |
| 6.  | Ref. to task 6.0  |                        |                            |                            |       |
| 7.  | Ref to task 7.0   |                        |                            | 7.4                        | 1     |
| 8.  | Ref to task 8.0   |                        |                            | 8.1                        | 1     |
| 9.  | Ref to task 9.0   |                        |                            | 9.1                        | 1     |
| 10. | Ref. To task 10.0 |                        |                            | 10.1                       | 1     |
|     |                   |                        |                            |                            |       |

#### LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE TRADE PRACTICALS

| NO | TOPIC            | COGNITIVE<br>KNOWLEDGE | AFFECTIVE<br>UNDERSTANDING | PSYCHOMOTOR<br>APPLICATION | TOTAL |
|----|------------------|------------------------|----------------------------|----------------------------|-------|
| 1. | Ref. to task 1.0 |                        |                            |                            |       |
| 2. | Ref. to task 2.0 |                        |                            |                            |       |
| 3. | Ref. to task 3.0 |                        |                            |                            |       |
| 4. | Ref. to task 4.0 |                        |                            |                            |       |
| 5. | Ref. to task 5.0 |                        |                            |                            |       |
| 6. | Ref. to task 6.0 |                        |                            |                            |       |
| 7. | Ref to task 7.0  |                        |                            | 7.2, 7.3                   | 2     |
| 8. | Ref to task 8.0  |                        |                            |                            |       |
| 9. | Ref to task 9.0  |                        |                            |                            |       |

#### LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE TRADE DRAWING

| NO  | ТОРІС             | COGNITIVE<br>KNOWLEDGE | AFFECTIVE<br>UNDERSTANDING | PSYCHOMOTOR<br>APPLICATION | TOTAL |
|-----|-------------------|------------------------|----------------------------|----------------------------|-------|
| 1.  | Ref. to task 1.0  |                        |                            |                            |       |
| 2.  | Ref. to task 2.0  |                        |                            |                            |       |
| 3.  | Ref. to task 3.0  |                        |                            |                            |       |
| 4.  | Ref. to task 4.0  |                        |                            |                            |       |
| 5.  | Ref. to task 5.0  |                        |                            |                            |       |
| 6.  | Ref. to task 6.0  |                        |                            | 6.1, 6.2                   | 4     |
| 7.  | Ref to task 7.0   |                        |                            | 7.2                        | 2     |
| 8.  | Ref to task 8.0   |                        |                            | 8.1, 8.2                   | 4     |
| 9.  | Ref to task 9.0   |                        |                            |                            |       |
| 10. | Ref. To task 10.0 |                        |                            |                            |       |
|     |                   |                        |                            |                            | 10    |