





**NATIONAL VOCATIONAL TRAINING INSTITUTE  
TESTING DIVISION**

**TRADE TESTING REGULATIONS AND SYLLABUS**

**TRADE: MOTOR VEHICLE ELECTRICAL**

**LEVEL: CERTIFICATE ONE**

## MOTOR VEHICLE ELETRICAL CERTIFICATE ONE

### 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 reform with the view to opening up further education and training opportunities to TVET graduates.  
The certificate TWO syllabus is designed to respond to the following level descriptors:

QUALIFICATION	KNOWLEDGE LEVEL	SKILLS AND ATTITUDE:
Certificate 1	<ol style="list-style-type: none"><li>1. To demonstrate a broad knowledge base incorporating some technical concepts.</li><li>2. To demonstrate knowledge of the theoretical basis of practical skills.</li><li>3. To demonstrate knowledge in numeracy, literacy, IT and Entrepreneurial skills</li></ol>	<ol style="list-style-type: none"><li>1. Require a wide range of technical skills</li><li>2. Are applied in a variety of familiar and complex contexts with minimum supervision.</li><li>3. Require collaboration with others in a team</li></ol>

- ii. The rationale of this syllabus is to establish the level of knowledge and skills required by mechanics over a wide range of applications, including the development of an ability to diagnose faults, recommend means of rectifying these faults and to test and analyse the performance of the vehicle after repairs or modification has been completed.

## **B. THE GENERAL OBJECTIVES**

On completion of this course, the trainee should be able to:

- i) understand the Basic Electrical operations essential for the repairs and maintenance of Motor Vehicle Electrical Systems
- ii) To give trainee a thorough knowledge of the Motor Vehicle Electrical Systems including their auxiliary systems emphasizing basic similarities and differences.

## **C. THE COURSE COMPONENTS**

Trade Theory  
Science and Calculation  
Trade Drawing  
General Paper  
Trade Practical

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

Practical work must be carefully planned to illustrate application of the theory and to provide maximum opportunity for shop practice, laboratory work and demonstration.

## **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. APPROVAL OF COURSE**

Institutions or other establishments intending to prepare trainees for the Examination must apply to  
THE COMMISSIONER  
TESTING DIVISION  
NVTI, HEAD OFFICE  
P.O. BOX MB 21, ACCRA

## **K ACKNOWLEDGEMENT**

NVTI wishes to acknowledge the preparatory material done by the team of Experts, which have been incorporated into this syllabus.

Mr. B.A. Frimpong (Full Tech. Cert. C&G. HND Auto Dip Transport Mgt. Cert Auto-Electrics (Turkey).

Mr. Nii L. CobbyGold. Head of Department-MVE, KVTI

Mr. Joseph Baiden (Full Tech. C&G. Dip Ed., BSc. Auto Student)

Government's desire to improve the lot of Technical/Vocational Training, which led to the preparation

**CERTIFICATE ONE - TRADE THEORY**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
1.0	SAFETY PRECAUTION	1.1. Personal and Workshop Safety	1.2. Personal safety in the workshop.	1.3. Discuss with students the following. <ul style="list-style-type: none"> <li>• Importance of safety in the workshop</li> <li>• Importance of safety in the workshop.</li> <li>• Differentiate between personal and customer safety</li> <li>• Effects on non adherence to safety practices</li> </ul>
2.0	TESTING AND MEASURING INSTRUMENT	2.1. Identify the types of measuring devices	2.2. Types of measuring devices <ul style="list-style-type: none"> <li>• Rule</li> <li>• Micrometer</li> <li>• Internal and external calipers</li> <li>• Digital micrometer</li> <li>• Tachometer</li> <li>• Stroboscopic timing light</li> </ul>	2.3. Guide students to use the various testing and measuring instrument listed in the sub-points. Through identification with trainee participation
3.0	EQUIPMENT AND TOOLS	3.1. Types of equipment: <ul style="list-style-type: none"> <li>• Battery charger</li> <li>• Power tools</li> <li>• Growler</li> <li>• Hand tools, etc.</li> </ul>	3.1. State the purpose of the equipment and tools. Safety care and maintenance	3.3. Assist trainees identify using real objects or chart and demonstrate its uses.

**CERTIFICATE ONE - TRADE THEORY**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
4.0	MAIN COMPONENT OF AUTO ELECTRICAL SYSTEM	4.1 Components <ul style="list-style-type: none"> <li>• Battery system</li> <li>• Charging system</li> <li>• Starting system</li> <li>• Ignition system</li> <li>• Lighting system</li> <li>• Auxiliary circuit</li> </ul>	4.2 Functions of the components listed in the critical points.	4.3 Guide the students to state the functions of the components. Discuss and demonstrate functions
5.0.	BATTERY	5.1 Purpose of battery	5.2 Components of the battery	5.3 Guide students to discuss the purpose of battery
6.0.	TYPES OF BATTERY	6.1. The two types of battery used on motor vehicle	6.2. a) Lead-acid	6.3 Use chart, sketches, simulators and real objects. Guide students to identify between lead-acid and alkaline battery and its construction
7.0.	ELECTROLYTE PREPARATION	7.1 Breaking of acid	7.2 Precaution to: a) to be observed (add acid to water and not vice versa)	7.3 Guide student to observe precautions and correct mixture ratio
8.0	CELL ACTION	8.1 Charged and discharged state of battery.	8.2 Chemical changes in the battery. <ul style="list-style-type: none"> <li>• Charged</li> <li>• Discharged</li> </ul>	8.3 Use sketches diagrams and graphs to explain to students the chemical changes in a battery during charge and discharge



**CERTIFICATE ONE - TRADE THEORY**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
9.0	CIRCUITS	9.1 Basic electrical circuits	9.2. Circuits <ul style="list-style-type: none"> <li>• Closed electric circuit</li> <li>• Open electric circuit</li> <li>• Short circuit</li> </ul>	9.3 To guide students to explain the following circuit mentioned in the sub-point.
10.0	FLOW OF CURRENT AND ITS EFFECT	10.1 Types of directional flow of current and its effect.	10.2.1 Using appropriate means to determine the flow of current 10.2.2 Effect of current (Heating, chemical and magnetic effect).	10.3 To assist students to determine the flow of current and its effect.
11.0	RELATIONSHIP BETWEEN CURRENT, VOLTAGE AND RESISTANCE	11.1 Ohms law	11.2 Define the following: <ul style="list-style-type: none"> <li>• Current</li> <li>• Voltage</li> <li>• Resistance</li> </ul>	11.3 Guide students to define the following electrical terms listed in the sub-point.
12.0	CIRCUITS	12.1 Types of circuit and power	12.2 With the aid of a diagram define the following circuit; <u>Types</u> <ul style="list-style-type: none"> <li>• Series-circuit</li> <li>• Parallel circuit</li> <li>• Series parallel circuit</li> <li>• Power in series and parallel circuits</li> </ul>	12.3 Guide trainees to explain the terms listed in the sub-points
13.0	BATTERY CAPACITY	13.1 Reserve capacity (Ampere – hour capacity)	13.2 Explanation of these terms: <ol style="list-style-type: none"> <li>a) Capacity</li> <li>b) Ampere hour</li> </ol>	13.3 Guide trainees to explain the terms listed in the sub-points

**CERTIFICATE ONE - TRADE THEORY**

	<b>TASK</b>	<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
14.0	VARIATION IN VOLTAGE AND RELATIVE DENSITY	14.1 How to vary voltage and electrolyte density during charge and discharge of the lead-acid battery		
15.0	DEFECTS OF A BATTERY	15.1 Sulphation, internal short, open-circuit bubbled plate and self discharge	15.2 State the causes and effects of the following listed defects in the critical-points	15.3 Assist students to explain the causes and effect mentioned in the sub-point.
16.0	BATTERY TESTING INSTRUMENTS	16.1 The various instrument used in testing battery are as follows; <ul style="list-style-type: none"> <li>• Hydrometer</li> <li>• High rate discharged tester</li> <li>• voltmeter</li> </ul>	16.2 <ul style="list-style-type: none"> <li>• Specific gravity</li> <li>• Capacity test</li> <li>• Voltage</li> </ul>	16.3 Demonstrate to students how the following instrument are used
17.0	BATTERY MAINTENANCE	17.1 Types of maintenance <ul style="list-style-type: none"> <li>• Visual inspection</li> <li>• Topping up electrolyte</li> <li>• Cleaning of battery terminals</li> </ul>	•	
18.0	CABLES	18.1 Types of cables and their application.	18.2 Cable sizes and its uses	18.3 Guide students to identify cable sizes and its uses
19.0	CIRCUIT PROTECTION	19.1 Fuses, circuit-breaker and fusible links	19.2 Types of circuit protector and its uses	19.3 Through discussion, guide the students to state the types of fuse, circuit-breakers, fusible-link and their uses

**CERTIFICATE ONE - TRADE THEORY**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
20.0	SWITCHES	20.1 Types of switches	20.2 State the various types of switches such as magnetic switch, etc.	20.3 Guide trainees with the aid of simple sketches to explain the difference between earth return and insulated return, including advantages and disadvantages
21.0	TYPES OF WIRING ON A MOTOR VEHICLE	22.1 Earth return system 22.2 Insulated return system	21.2 Differentiate between earth return system and the insulated return system. State their advantages and disadvantages	21.3 Guide trainees to identify the various types of switches and application.
22.0	FLASHER UNIT	22.1 Types of flasher units and their main features.	22.2 Application of flasher units	22.3 Guide trainees using the real object to identify the types and the main features of flasher unit
23.0	GAUGES/CIRCUIT DIAGRAMS	23.1 Various kinds of gauges used in motor vehicle	23.2 Types of gauges: <ul style="list-style-type: none"> <li>• Temperature gauge</li> <li>• Fuel gauge</li> <li>• Oil gauge etc.</li> </ul>	23.3 With the aid of a circuit diagram, explain the functions of the gauges listed at sub-point.
24.0	FANS	24.1 Types of fan; <ul style="list-style-type: none"> <li>• Mechanical</li> <li>• Electrically operated</li> <li>• Viscous</li> </ul>	24.2 Functions, features and advantages of the fan listed in sub-points.	24.3 With real object demonstrate to trainees the main features of the various types of fans and their advantages

**CERTIFICATE ONE - TRADE THEORY**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
25.0	LIGHTING SYSTEM	25.1 Internal and external lighting system	25.2 Legal requirement and their effects on lamps and lighting. <ul style="list-style-type: none"> <li>• System characteristics</li> <li>• Lamp mounting positions</li> </ul>	25.3 Guide trainees using simple sketches to explain the difference between internal and external lighting system and their characteristics, mounting positions
26.0	WINDSCREEN WIPER MOTORS	26.1 Constructional features of wind screen wiper motors.	26.2 Principles of operation and their advantages	26.3 Guide trainees, using real object to explain constructional features, operational principle and advantages
27.0	LAMPS AND BULBS	27.1 Types of lamps and bulbs e.g. <ul style="list-style-type: none"> <li>• Halogen</li> <li>• Filament lamps, etc.</li> </ul>	27.2 Bulb ratings and their applications	27.3 Assist trainees to select according to their ratings
28.0	STARTING SYSTEM	28.1 Types of starter motors	28.2 State the difference between the following starter motors and their advantages <ol style="list-style-type: none"> <li>a) Pre-engagement</li> <li>b) Inertia engagement</li> </ol> Advantages and disadvantages	28.3 With real object, guide trainees to identify and know the difference between the two types and their advantages listed in sub-point.
29.0	GENERATORS	29.1 Types of generators: <ul style="list-style-type: none"> <li>• A.C. generator</li> <li>• D.C. generator</li> </ul>	29.2 State the difference between AC and DC generators including advantages and disadvantages	29.3 Assist trainees using chart and real object to differentiate between AC and DC generators, advantages and disadvantages

**CERTIFICATE ONE - TRADE THEORY**

	<b>TASK</b>	<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
30.0	VOLTAGE REGULATORS AND CUT-OUT	30.1 Types and main features of cut-out and voltage regulators	30.2 State the difference between the cut-out and the voltage regulator and how they operate.	30.3 Using real object demonstrate to trainees the operation of voltage regulator and cut-out
31.0	BASIC ELECTRONICS	31.1 Main component of electronics in motor vehicle	31.2 Functions of the main components such as: a) Diode b) Transistor c) Thermostat, etc.	31.3 Using real object, guide students to identify the component part of the electronic and their functions.

**CERTIFICATE ONE - TRADE SCIENCE AND CALCULATIONS**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
1.0	HEAT AND TEMPERATURE	1.1. Conduction, convection and radiation. Thermal expansion, linear expansion, superficial and cubical expansion, heat capacity and co-efficient of linear expansion	1.2. Methods of measuring temperature, freezing and boiling point of water, expansion and contraction of solids, liquid and gases.	1.3 Guide trainees to solve simple problems related to the motor vehicle on heat and temperature
2.0	DENSITY	2.1 Definition of density and relative density	2.2. Simple calculation on density and relative density	2.3 Guide trainees to solve simple problems on density and relative density
3.0	THERMOMETERS	3.1. Types of thermometers <ul style="list-style-type: none"> <li>• Liquid in glass</li> <li>• Bi-metallic gas thermometer</li> <li>• Pyrometers</li> </ul>	3.2 The working principles of the various types of thermometers stated in the sub-point	3.3. Assist trainees to know about thermometers. Laboratory – demonstration to explain types and principles
4.0	ENERGY	4.1 Types E.g. Potential, kinetic and chemical energy	4.2. Simple calculations relating to motor vehicle electrical	4.3 Guide trainees to define energy. Simple problems on energy relating to motor vehicle electrical
5.0	MATTER	5.1 Atomic structures of some element e.g. copper, aluminium, gold etc.	5.2 Definition of element <ol style="list-style-type: none"> <li>i. Electron</li> <li>ii Proton</li> <li>iii. Neutron and their atomic structure</li> </ol>	5.3 With the aid of simple sketches explain the following structures mentioned in sub-point and define each.
6.0	POWER	6.1 Unit of power	6.2 Simple calculation relating to electric power on the motor vehicle	6.3 Assist trainees to define power. Simple calculation on electric power in the motor vehicle

**CERTIFICATE ONE - TRADE SCIENCE AND CALCULATIONS**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
7.0	PRINCIPLES OF ELECTRICITY, DRY AND WET CELLS	7.1 D.C and A.C current, Ohms law		
8.0	MAGNETISM	8.1. Magnetic material and its effect on electric current	8.2 Definition of magnetism. <ul style="list-style-type: none"> <li>• Law of magnetism</li> <li>• Effects of magnetism</li> </ul>	8.3 Guide trainees to define and state the laws, effects of magnetism.
9.0	ELECTRICAL TORQUE	9.1 Electrical torque in starter motors	9.2 Simple calculations on electric torque	9.3 Assist trainees to define torque and perform simple calculations on electric torque
10.0	INTRODUCTION TO FRICTION	10.1 Effects and laws of friction	10.2 Types of friction and its applications on the motor vehicle	10.3 Assist trainees to define friction and state its effect on motor vehicle electrical component
11.0	MACHINES	11.1 Describe machine as a device for changing the magnitude and line of action of a force.	11.2 Force ratio, movement ration and efficiency of simple machine system	11.3 Guide trainees to know about simple machines and solve problems relating to motor vehicle
12.0	MOMENTS	12.1 Principle of moments, centre of gravity.	12.2 Class of levers, simple calculations on moment, centre of gravity and torque.	12.3 Assist trainees to define moment and solve calculations on moments, torque, relating to motor vehicle.
13.0	STRESS AND STRAIN	13.1 Stress and strain, tensile, compressive and shear stress. Hooke's law, Young modulus in relation to the stiffness of material.	13.2 Solve problem involving direct stress and strain. Make load extension graph for mild steel.	13.3 Guide trainees to solve simple problems involving stress and strain. Assist trainees to define stress and strain.

**CERTIFICATE ONE – TRADE DRAWING**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
1.0	INTRODUCTION TO ELECTRICAL SYMBOLS	1.1 Sketching of electrical symbols	1.2 Cell, battery, switches, fuse, circuit breakers	1.3 Guide trainees to sketch the symbols listed in sub-point
2.0	BASIC ELECTRICAL CIRCUIT	2.1 Sketching of simple tools	2.2 Flat, ring spanners, screw drivers, auto-testers, etc.	2.3 Assist trainees to sketch the simple tools listed in sub-point
3.0	ELECTRICAL COMPONENT	3.1 Sketching of basic electrical circuits	3.2 Simple electrical circuit series circuit, parallel circuit, series parallel, close circuit, short circuit, open-circuit	3.3 Guide trainees to sketch the following circuits in sub point.
4.0	GRAPHS	4.1 Sketching of electrical components	4.2 Battery, generator, motors, ignition coil, distributor, etc.	4.3 Assist trainees to sketch the following symbols listed in sub-point
5.0	MEASURING INSTRUMENTS	5.1 Drawing of graphs	5.2 State of charge, discharge and relative density of batteries	5.3 Guide trainees to draw the graph stated at sub-point.
6.0	MEASURING INSTRUMENTS	6.1 Sketching of measuring instruments	6.2 Ammeter, voltmeter, Ohmmeter, hydrometer, high rate discharged tester, etc.	6.3 Assist trainees to sketch the following measuring instruments listed in sub-point
7.0	CABLES	7.1 Sketching of cables	7.2 Types of cables, stranded and solid types.	7.3 Guide trainees to sketch stranded and solid types cables.
8.0	LAMP CIRCUIT	8.1 Sketching of lamp circuit	8.2 Fuses, brake-light, reverse light, hand brake light etc.	8.3 Assist trainees to sketch the following lamp circuit listed in sub-point
9.0	WIRING CIRCUIT	9.1 Sketching of wiring circuits	9.2 Insulated return system and earth return system.	9.3 Assist trainees to sketch the gauges in sub-point



**CERTIFICATE ONE – TRADE DRAWING**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
10.0	GAUGES	10.1 Sketching of gauges	10.2 Fuel, temperature oil gauges, etc.	10.3 Assist trainees to sketch the gauges in sub-point.
11.0	WIPER MOTOR CIRCUIT	11.1 Sketching of wiper motor circuit	11.2 Wiper motor with relay. Wiper motor without relay	11.3 Guide trainees to sketch the following wiper motor relay listed at sub-point
12.0	BULBS	12.1 Sketching of bulbs	12.2 Halogen bulbs, twin filament, single filament, etc.	12.3 Assist trainees to sketch the bulbs listed in sub-points
13.0	GENERATORS	13.1 Sketching of generators	13.2 AC and DC generator	13.3 Guide trainees to sketch generators listed in sub-point
14.0	CHARGING CIRCUIT	14.1 Sketching of charging circuit	14.2 Star, delta charging circuit	14.3 Assist trainees to draw the circuits listed in sub-points
15.0	INTRODUCTION TO DRAWING	15.1 Types of lines, construction and lettering	15.2 Firm lines, broken lines, centre lines, etc.	15.3 Guide trainees to draw the circuit listed in sub-points
16.0	INTERPRETATION OF SIMPLE SKETCHES OF SOLIDS	16.1 The purpose and the use of dimensions in sketches and drawings	16.2 Uses of line diagram to illustrate various components	16.3 Guide trainees to use lines in simple sketches of solids
17.0	GEOMETRIC CONSTRUCTION	17.1 Triangles, squares, rectangles, ellipse, circles and its parts.	17.2 Prisms, frustum of cones	17.3 Assist trainees to construct geometric drawings

**CERTIFICATE ONE – TRADE DRAWING**

<b>TASK</b>		<b>CRITICAL POINTS</b>	<b>SUB-POINTS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
18.0	ORTHOGRAPHIC PROJECTIONS	18.1 Sketching and drawing of simple components and orthographic projection (first and third angles with dimensions).	18.2 Drawing of three views e.g. front, plan and end.	18.3 Assist trainees to draw orthographic projection
19.0	DRAWINGS OF POLYGONS	19.1 Pentagon, hexagon, octagon, etc. using the division of lines and general method	19.2 Drawing of bolts with given specifications	19.3 Help trainees to construct the various polygons by using the division of lines and general method

**CERTIFICATE ONE – TRADE PRACTICAL**

<b>TASK</b>		<b>CRITICAL SKILLS</b>	<b>SUB-SKILLS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
1.0	SAFETY PRECAUTIONS	1.1 differentiate between the various types of safety in a workshop	1.2 Note types of safety in the workshop. a) Personal safety in the workshop i) Good ventilation ii Proper storage of inflammable materials	1.3 Discuss with the trainees the following: a) Importance of safety in a workshop b) Differentiate between personal and customer safety. c) Effects of non adherence to safety practices
2.0	TOOLS AND EQUIPMENT	2.1. Select the correct tool or equipment for a given operation  <u>Tools</u> E.g. <ul style="list-style-type: none"> <li>• Cutting</li> <li>• Measuring</li> <li>• Striking</li> </ul> <u>Equipment</u> E.g. <ul style="list-style-type: none"> <li>• Cutting</li> <li>• Measuring</li> </ul>	2.2 The trainees should use the following: a) Hand tools: i. File ii. Chisel iii. Hammer iv. Spanner v. Calipers vi. Wire gauge b) Other workshop equipment i. Drilling machine ii. Air compressor iii. Axle stands iv. Bench vice v. Grinding machine vi Multi-meter vii. Hydrometer viii. High rate discharge tester ix. Oscilloscope x. Stroboscopic timing light xi. Oscilloscope	2.3 Using hand tools help trainees to learn the safe use of the tools  Discuss how the measuring instruments and other equipment listed are used in the auto industry  Discuss, demonstrate and practice the use of measuring instruments and other equipment listed.

**CERTIFICATE ONE – TRADE PRACTICAL**

<b>TASK</b>		<b>CRITICAL SKILLS</b>	<b>SUB-SKILLS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
2.0			xii. Battery charger xiii. Diagnostic machine (E.g. OBDI and OBD II)	
3.0	BASIC COMPONENTS OF AUTO ELECTRICAL SYSTEM	3.1 Components in Auto electrical system	3.2. The main components are; a. Battery b. Charging system c. Starting system d. Ignition system e. Lighting system f. Auxiliary g. Electronic fuel injection	3.3. Guide trainees to identify the components/parts using real objects, charts, schematic drawings.
4.0.	BATTERY	4.1 The two main types of battery	4.2 Inspection of the various lead acid battery. 4.2.1 The specific gravity test of the electrolyte. 4.2.2 Preparation of electrolyte. 5.2.3 Battery capacity test.	4.3 Guide trainees to inspect the various types of lead acid battery. 4.3.1 Discuss and demonstrate the specific gravity test with student activity 4.3.2 Discuss with trainees how to prepare electrolyte 4.3.3 Discuss with students how to carry out capacity test.

**CERTIFICATE ONE – TRADE PRACTICAL**

<b>TASK</b>		<b>CRITICAL SKILLS</b>	<b>SUB-SKILLS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
5.0	CABLE	5.1 Cable rating and application	5.2 Different types of cables.	5.3 Guide trainees to carry out lamp circuits with the following components listed.  Create a lamp circuit with the following components. a) Battery i. Cable (14/0.30mm) ii. Switch (one way) iii. Fuse iv. Lamp
6.0.	SOLDERING	6.1 Usage of soft solder Types of soldering bit. E.g. Hand and electric soldering iron	6.2 Preparation of soldering	6.3 Guide and demonstrate preparation of soldering
7.0	FUSE	7.1 Types of fuse and their ratings	7.2 Location of fuse box	7.3 Guide trainees to locate fuse box, demonstrate process of testing fuse and purpose of rating
8.0	FAULT IN WIRING CIRCUIT	8.1 Types of faults in wiring circuits	8.2 Faults a) Open circuit b) Short circuit c) Ground circuits	8.3 Discuss and demonstrate with the students to identify circuit faults listed in the sub-skills.
9.0	SWITCHES	9.1 Types of switches	9.2 Types a) Magnetic switch b) Transistorized switch c) Mechanical switch	9.3 Identify and demonstrate with the students where these switches are used. (Using real objects, charts, etc.

**CERTIFICATE ONE – TRADE PRACTICAL**

<b>TASK</b>		<b>CRITICAL SKILLS</b>	<b>SUB-SKILLS</b>	<b>INSTRUCTIONAL TECHNIQUE</b>
10.0	FLASHER UNITS	10.1 Types of flasher units	10.2 <u>Types</u> a) Vane type b) Capacitor type c) Electronic type	10.3 Guide trainees to identify types of flasher unit and demonstrate connection procedure
11.0	GAUGES	11.1 Types of gauges	11.2 Types a) Fuel b) Temperature c) Oil	11.3 Guide trainees to examine the various forms of sensors or transmitters and indicators and removal of fuel tank.
12.0	FANS	12.1 Types of fans in motor vehicles	12.2 Types of fans a) Electrically operated b) Mechanically operated	12.3 Demonstrate to trainees how to test cooling fan motors, including current consumption, diagnosis and rectification of faults
13.0	LIGHTING SYSTEM	13.1 Classification of lighting system	13.2 Internal and external lighting system	13.3 Guide trainees to wire a head lamp system including parking, and number plate light. Demonstrate and practice
14.0	DISMANTLE AND REASSEMBLE OF WIPER MOTORS	14.1 Removal and testing of wiper motor	14.2 Fault diagnosis and rectification of wiper motors	14.3 Demonstrate with trainees removal and testing procedure of wiper motors
15.0	REMOVAL OF HEAD LAMS	15.1 Visual inspection of head lamps	15.2 a) Head lamp setting b) Head lamp adjustment	15.3 Demonstrate with trainees, how to remove, inspect, mount and adjust head lamp.
16.0	DISMANTLE AND RE-ASSEMBLE OF GENERATORS	16.1 Method of testing various components	16.2 Diagnosis and rectification of faults	16.3 Guide trainees to diagnose and rectify faults in generator

**LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE  
(TRADE THEORY)**

NO	TOPIC	COGNITIVE/ KNOWLEDGE		AFFECTIVE/ UNDERSTANDING		PSYCHOMOTOR APPLICATION		TOTAL
		OBJ.	SUB.	OBJ.	SUB.	OBJ.	SUB.	
1.	Safety precautions	2	3	1	-	-	-	
2.	Testing and measuring instruments	2	2	1	-	-	-	
3.	Equipment and tools	2	2	1	-	-	-	
4.	Main component of auto electrical system	2	3	-	-	-	-	
5.	Battery	1	2	1	-	-	-	
6.	Types of battery	2	3	1	2	-	-	
7.	Electrolyte preparation	1	2	1	-	-	-	
8.	Cell action	1	1	2	-	-	-	
9.	Circuits	2	3	1	-	-	-	
10.	Flow of current and its effects	1	1	2	-	-	-	
11.	Relationship between voltage and resistance	2	2	1	1	-	-	
12.	Circuits	1	2	1	1	-	-	
13.	Battery capacity	1	1	2	-	-	-	
14.	Variation in voltage and relative density	1	1	2	1	-	-	
15.	Defects of a battery	1	2	2	-	-	-	
16.	Battery testing instruments	2	1	1	1	-	-	
17.	Battery maintenance	1	1	2	1	-	-	
18.	Cables	2	2	-	-	-	-	
19.	Circuit protection	1	2	1	1	-	-	
20.	Switches	2	1	1	1	-	-	
21.	Types of wiring on a motor vehicle	1	2	2	2	-	-	
22.	Flasher unit	2	2	2	2	-	-	

23.	Gauges circuit diagrams	1	3	1	2	-	-	8
24.	Fans	2	3	1	2	-	-	6
25.	Lighting system	1	1	2	2	-		

**LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE  
(TRADE SCIENCE AND CALCULATIONS)**

NO	TOPIC	COGNITIVE/ KNOWLEDGE		AFFECTIVE/ UNDERSTANDING		PSYCHOMOTOR APPLICATION		TOTAL
		OBJ.	SUB.	OBJ.	SUB.	OBJ.	SUB.	
1.	Heat and temperature	3	2	-	-			
2.	Density	2	1	1	1			
3.	Thermometers	2	1	-	-			
4.	Energy	3	1	1	1			
5.	Matter	2	1	-	-			
6.	Power	2	1	1	1			
7.	Principles of electricity (Dry and wet cell)	3	1	1	1			
8.	Magnetism	3	1	1	1			
9.	Electrical torque	3	1	1	1			
10.	Introduction to friction	2	1	2	1			
11.	Machines	3	1	2	-			
12.	Moments	2	1	-	-			
13.	Stress and strain	2	1	-	-			



**LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE  
(TRADE DRAWING)**

<b>NO</b>	<b>TOPIC</b>	<b>COGNITIVE/ KNOWLEDGE</b>	<b>AFFECTIVE UNDERSTANDING</b>	<b>PSYCHOMOTOR APPLICATION</b>	<b>TOTAL</b>
1.	Introduction to electrical symbols	1	-	-	1
2.	Simple tools	2	-	-	2
3.	Basic electrical circuit	3	-	-	3
4.	Electrical components	1	-	-	1
5.	Graphs	1	-	2	3
6.	Measuring components	1	-	-	1
7.	Cables	2	-	-	2
8.	Lamps circuits	2	-	-	2
9.	Wiring circuits	2	-	-	2
10.	Gauges	2	-	-	2
11.	Wiper motor circuits	1	-	2	3
12.	Bulbs	2	-	-	2
13.	generators	1	-	2	3
14.	Charging circuit	1	-	2	3
15.	Introduction to drawing	1	2	-	3
16.	Interpretation of simple sketches of solids	1	-	3	4
17.	Geometric construction	2	-	3	5
18.	Orthographic projection	2	-	3	5
19	Drawing of polygon	2	-	3	5

