



NATIONAL VOCATIONAL TRAINING INSTITUTE
TESTING DIVISION

TRADE TESTING REGULATIONS AND SYLLABUS

TRADE: MOTOR VEHICLE MECHANIC

LEVEL: CERTIFICATE TWO

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 II	<ul style="list-style-type: none">1. To demonstrate broad knowledge base with substantial depth in area(s) of study.2. To demonstrate a command of analytical interpretation of range of data.3. To present results of study accurately and reliably.	<ul style="list-style-type: none">1. Needs varied skills and competencies in different tasks under various contexts.2. Require a wide range of technical and supervisory skills.3. Would be employed in different contexts.

- 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 by 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

The objectives of this course are to give the apprentices a systematic training both theoretically and practically. It is expected that much emphasis will be laid on the practical aspect of the training during in-school and on-the-job training. About 60% could be allocated to practical training centres and other institutions approved by the National Vocational Training Institute.

This training syllabus is prepared to serve as a guide for employers, instructors and other parties concerned with training in the preparation of their individual programmes. It is necessary that training become effectively planned and controlled as effectively as possible so that apprentices derive much benefit from their training.

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/Fail

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

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.

I. 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

J. ACKNOWLEDGEMENT

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

RECOMMENDED BOOKS FOR MVM

1. The Repair of Vehicle Bodies
(Allan Robinson)
2. Principles of Auto Body Repairing and repainting
(A. G. Deroche)
3. Auto Body Repair and Refinishing
(John W. Hogg)
4. Fundamentals of Motor Vehicle Technology by: V.A.W. Hillier and E. Pittuck (4th Edition)
5. Motor Vehicle Technology and Practical Work by: J.A. Dolan (Combined Volume Part 1&2)
6.
 - i. Technology for Motor Mechanic Part 1 (Book 1) Tools and Materials 3rd Edition by S.C. Mudd
 - ii. Part 2 (Book 2) Vehicle & Electrical Technology by S.C. Mudd (3rd Edition)
 - iii. Part 3. Technology for Motor Mechanics Vehicle and Electrical Technology by S.C. Mudd (3rd Edition)
7. Part 4 (Book 4) Vehicle Technology Diesel (C.I. Engines) By S.C. Mudd (3rd Edition)

SCIENCE AND CALCULATIONS

8.
 - i) Motor Vehicle Science and Calculations Book 1 & 2 By R.C. Champion and E.C. Arnold (New Edition)
 - ii) Motor Vehicle Science and Calculations Book 1 & 2 By Zammit, Saviour J. (3rd Edition).

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9. TECHNICAL AND ENGINEERING DRAWING

- i) Engineering Drawing with CAD Applications by Ostrowsky and Edward Arnold

10. MOTOR VEHICLE ELECTRICAL AND ELECTRONICS (M.V.E.)

- i. Motor Vehicle Electrical and Electronics by V.A.W. Hillier and E. Pittuck 3rd or 4th Edition

TOOLS

1. Set of flat spanners
2. set of ring spanners
3. set of socket wrenches
4. set of Allen keys
5. set of flat screw drivers
6. set of Philip (star) screw drivers
7. Pliers
8. Adjustable spanners (small, medium and large sizes)
9. Feeler gauge
10. Torque wrench
11. Valve lapping (grinding) stick and paste
12. Ball pein hammer
13. Rawhide/mallet hammer
14. Hacksaw frame and blades
15. Chisels
16. Files (single cut, double and rasp cut)
17. Tin shears
18. Scrapers
19. Reamers and punches
20. Piston clamp
21. Oil can
22. Grease gun

EQUIPMENT

1. Vice
2. 5 tonnes hydraulic jack
3. Drilling machine
4. Surface plate
5. Vee blocks
6. Angle plate
7. Try square/steel rule
8. micrometer - 0 – 25mm range
 25 – 50mm range
 50 – 75mm range
9. Venier caliper
10. Internal micrometer
11. Dial gauge
12. Alignment gauge
13. Timing light (stroboscope)
14. Hydrometer

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB - POINTS	INSTRUCTIONAL TECHNIQUES
1.0 FUEL SUPPLY SYSTEM	1.1 Components: i) Injectors types ii) The purpose and types of governors	1.2 Injector types: i) Single hole ii) Multi hole iii) Pintle iv) Pintaux Types of governors: i) Mechanical ii) hydraulic	1.3 Assist students to perform simple injector tests such as leak test, nozzle seat test, etc. Explain the operation of the two basic types of governors.
2.0 COLD STARTING DEVICES	2.1 The common types of cold starting aids	2.2 Types of cold starting aids: i) Heater plugs ii) Decompression device iii) Ether spray	2.3 Guide student to explain the various types of cold starting devices listed in the sub-skills.
3.0 COMPRESSION IGNITION ENGINE (CIE)	3.1 Operational and constructional difference between CI and SI engines.	3.2 i) Comparison between CI and SI engine components. ii) Operational characteristics of both CI and SI engines.	3.3 Guide students by using real objects to identify the differences between CI and SI engines.
4.0 COMBUSTION	4.1 Phases of combustion, direct and indirect combustion chambers.	4.2 Phases of combustion: i) Ignition delay period ii) Flame spread iii) Direct burning	4.3 Use charts or sketches to explain the different types of combustion chamber and the phases of combustion.
5.0 FUEL SUPPLY SYSTEM (CI)	5.1 Identify the types of fuel system and the various components.	5.2 Fuel pumps/component i) In-line fuel injection pump. ii) Distributor fuel injection pump (DPA) iii) Common rail injection pump	5.3 Assist students to identify the various types of pumps.

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
6.0 ELECTRONIC FUEL INJECTION SYSTEM.	6.1 Basic operating principle of EFI	6.2 The functions of the following sensors i) Air flow meter ii) Water temperature sensor iii) Intake air temperature sensor iv) Throttle position sensor v) Oxygen sensor	6.3 Use sketch or real object, assist students to identify the location of the various sensors listed in the sub-skills
7.0 CHECKING AND TESTING OF FUEL INJECTORS	7.1 Conduct injector tests; i) Injector resistance test ii) Injector flow (volume test) iii) Injector leakage test. iv) Injector performance test	7.2 Types of injection system; i) Single point iii) Multi point	7.3 Guide students to use multimeter to perform the tests Listed in the critical skills.
8.0 TRANSMISSION SYSTEM	8.1 Clutches: i) The purpose of clutch. ii) Construction and operation of single plate and multi plate clutch.	8.2 Advantages and disadvantages of; i) Coil spring clutch ii) Diaphragm clutch	8.3 Assist students to compare the advantages of multi-spring and diaphragm spring clutches
9.0 FLUID FLYWHEEL AND TORQUE CONVERTOR	9.1 The construction and operation of the fluidwheel and torque convertors. Compare the friction clutch to the fluid flywheel and torque convertor	9.2 Construction and operation Friction clutch and fluid flywheel.	9.3 Use sketches or chats to; i) Explain the constructional difference between a friction clutch, torque convertor and fluid flywheel.

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
10.0 GEAR BOX SELECTOR MECHANISM	10.1 The various types of selector and interlock mechanism. The operating principles of the selector and the interlock mechanisms	10.2 Selector and interlock mechanisms	10.3 Guide students to; i) dismantle, identify and examine the following parts of a gear box, a) selector shaft and fork b) interlock mechanism. Discuss the operating principles of the selector and interlock mechanisms
11.0 AUTOMATIC GEAR BOX	11.1 Introduction to basic automatic transmission system	11.2 The main components of the epicyclic gear train: a) planet gear b) sun gears c) Annulus	11.3 Guide students to dismantle an automatic gear box and identify the various parts.
12.0 PROPELLER SHAFT AND UNIVERSAL JOINTS	12.1 The functions and construction of the propeller shaft	12.2 Purpose of the sliding joint and centre bearing	12.3 Guide students to dismantle and re-assemble the propeller shaft and universal joints.
13.0 REAR AXLE AND DRIVE (HALF) SHAFTS	12.1 Method of supporting; i) Semi-floating ii) three-quarter floating iii) fully-floating	12.2 The three methods of supporting the axle shafts and the advantages and disadvantages.	12.3 Use sketches, chart or real objects to explain the constructional features of the three methods of supporting the axle shafts.

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
14.0 FAULT DIAGNOSIS OF AXLE SHAFT	14.1 Checking and rectifying rear axle faults	14.2 Fault diagnosis a) Noise b) Oil leakage c) Excessive backlash, etc.	14.3 Assist students to dismantle rear axle and look out for faulty parts; a) Worn and broken gear teeth. b) Broken axle shaft. c) Worn out bearings. d) defective seals, etc
15.0 BRAKE SERVE	15.1 Explain the purpose of the serve unit	15.2 Purpose of serve unit	15.3 Use sketches or charts to: a) explain the purpose and operation of the serve unit b) guide students to identify the servo unit in the braking system.
16.0 PREUMATIC BRAKES	16.1 The reason for the use of pneumatic brakes.	16.2 Air brakes	16.3 Explain the reason for the use of preumatic brakes
17.0 FAULT DIAGNOSIS	17.1 Rectifying simple brake faults on pneumatic brakes. Compare the braking systems/for cars/light duty vehicles and heavy duty trucks in terms of efficiency and maintenance costs	17.2 Brake faults; a) lack of stopping power b) grabbing brakes c) brake pulling to one side d) spongy pedal comparison of braking system for saloon cars and heavy duty trucks	17.3 Guide students to diagnose brake faults on a vehicle and rectify Assist students to compare the braking system for two categories of vehicles in the sub-skills and give reasons for the choice of braking system

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
18.0 SUSPENSION SPRINGS	<p>18.1 The purpose of springs in the suspension system.</p> <p>Different types of spring.</p> <p>The construction and operation of the leaf and coil springs and their comparative advantages</p>	<p>18.2 Springs</p> <p>Identification of spring;</p> <ul style="list-style-type: none"> a) semi elliptic b) coil spring c) rubber spring d) torsion bar e) air spring <p>Construction, operation and advantages of;</p> <ul style="list-style-type: none"> i) leaf spring ii) coil spring 	<p>18.3 Use sketches, chart or real object to explain the purpose of springs in vehicles.</p> <p>Use different types of springs to show the difference in the springs used for the suspension system of a vehicle.</p> <p>Outline the necessary maintenance requirement for leaf springs.</p>
19.0 STEERING GEOMETRY	<p>19.1 Ackerman principle.</p> <p>Castor, camber King Pin inclination (KPI) and Toe in/Toe out and their effect on the steering system.</p> <p>The front wheels to steer without wandering.</p>	<p>19.2 Ackerman principle:</p> <ul style="list-style-type: none"> - Castor - Camber - KPI - Toe -in/Toe out <p>Setting the front wheels</p>	<p>19.3 Use sketches or charts to explain the Ackerman principle.</p> <p>Assist students to discuss the principle underlying the terms listed in the sub-skills, and their role and effect on the steering system.</p> <p>Use castor camber and KPI gauges to set the front wheels to steer without wandering.</p>

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
20.0 WHEEL ALIGNMENT	<p>20.1 Repairs on the steering system.</p> <p>Checking wheel alignment</p>	<p>20.2 Steering faults;</p> <p>a) ball joints b) tie rod ends c) Steering gear boxes d) wheel hub</p> <p>wheel alignment process:</p> <p>a) Checking , removing and replacement of faulty part. b) Adjust steering boxes and wheel hub where necessary c) Wheel alignment</p>	<p>20.3 Use a vehicle to guide students to check and rectify minor steering faults.</p> <p>Guide students to</p> <p>i) Adjust front hub ii) Carry out the wheel alignment process using the alignment gauge to measure toe-in and toe-out</p>
21.0 TYRES	<p>21.1 The 2 types of tyre</p> <p>The construction of tyres and the meaning of the marking on the tyre</p>	<p>21.2 Types of tyre;</p> <p>a) tubed b) tubeless</p> <p>Constructional difference between tubed and tubeless tyres assembled.</p> <p>Advantages and disadvantages of tubeless and tubed tyres.</p> <p>Tyre construction;</p> <p>i) Radial ii) Cross ply iii) Tyre size and markings</p>	<p>21.3 Using real examples, assist students to identify tubed and tubeless tyres</p> <p>Using real objects, assist students to discuss the constructional difference between tubed and tubeless tyres.</p> <p>Assist students to discuss the advantages and disadvantages of tubeless and tubed tyres</p> <p>Use sketches or real object to explain the tyre constructional features.</p>

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
22.0 TYRE INFLATION	22.1 The importance of inflating pressure in relating to load, tyre life and vehicle handling and tyre balancing	22.2 The correct pressure in relation to load and tyre life, dynamic and static balancing.	22.3 Take students to a workshop which has such facility for tyre balancing for students to observe the equipment and the tyre balancing process
23.0 AUTO ELECTRICALS	23.1 The purpose of the starting system, and the function of the main components of starting system.	23.2 Layout and components i) armature ii) casing iii) brushes, etc	23.3 Guide students to identify the main objects with either a chart or real object. Sketching layout and labeling component parts.
24.0 CHARGING	24.1 Describe the construction and operation of the charging system. DC and AC generators and state their advantages.	24.2 Comparison of DC and AC generators ; i) Dynamo (DC) ii) Alternator (AC)	24.3 Guide students to discuss DC and AC generators

CERTIFICATE TWO – TRADE THEORY

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
25.0 LIGHTING	<p>25.1 The purpose of lighting system, sketching the layout of a simple lighting system, and labeling the main components and state their functions.</p> <p>Types of bulbs on motor vehicles and the purpose of anti-dazzling device in the lighting system</p>	<p>25.2 Layout of lighting system and main components of lighting system</p> <ul style="list-style-type: none"> i) switch ii) fuse iii) lamp <p>Identification of bulbs;</p> <ul style="list-style-type: none"> i) single contrast ii) double contrast iii) pre-focus iv) tungsten -halogen v) 	<p>25.3 Discuss the main components and describe their functions.</p> <p>Discuss the different types of bulb listed and the place where each of the bulb is used</p>
26.0 AUXILIARY CIRCUIT	26.1 Component in the auxiliary circuit and their functions.	<p>26.2 Auxiliary unit;</p> <ul style="list-style-type: none"> i) Intrament panel ii) Wiper iii) Horn, etc. 	26.3 Guide students to identify the following auxiliary units and explain their operation and function.

CERTIFICATE TWO – TRADE SCIENCE AND CALCULATIONS

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
1.0 DYNAMICS	1.1 Speed, velocity, acceleration, braking efficiency and how it relates to the load of the vehicle. Definition of uniform velocity and variable velocity	1.2 Simple calculations involving speed, velocity, acceleration and braking efficiency.	1.3 Assist students to know about dynamics and simple calculations involving speed, acceleration, velocity and braking efficiency.
2.0 MACHINES	2.1 Definition of common types of machines found in a motor vehicle workshop. Definition of velocity ratio, mechanical advantage and efficiency.	2.2 Solve problems involving in these quantities in relation to simple machine such as life jack and gear box.	2.3 Guide students to know about machines and solve problems in relation to simple machines such as lift jack and gear box.
3.0 ENGINE POWER AND FUEL	3.1 Descriptions of constant volume, constant pressure cycles, torque, break power and thermal efficiency. Describe an engine test using a dynameters to determine torque and break power, indicate power and mechanical efficiency by Morse test and thermal efficiency.	3.2 Definition of calorific value, volatility, flash point, octane rating, cetane rating and ignition quality.	3.3 Assist students to know engine power, fuel, and the terminologies relating to it. Assist trainees carry out test using dynameter

CERTIFICATE TWO – TRADE SCIENCE AND CALCULATIONS

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
4.0 ENGINE POWER AND TORQUE	4.1 Calculating the power and torque transmitted by clutch, gear box and final drive unit	4.2 Definition of speed and velocity rates in chain drive, belt drive and gear drive system.	4.3 Assist students to know engine power torque and calculate power transmitted by clutch, gear box and final drive unit.
5.0 FRICTION	5.1 Definition of friction. Types of friction and problems involving frictional torque in vehicle clutches, disc and drum brakes.	5.2 Solving simple problems involving friction in motor vehicle components.	5.3 Guide students to know about friction and solve simple problems involving friction in motor vehicle components.
6.0 PRESSURE	6.1 Definition of absolute pressure and absolute temperature. Calculation on Boyle's and Charles Law.	6.2 Applying the gas law in solving simple related motor vehicle problems	6.3 Assist students to know about absolute pressure and absolute temperature and solve simple problems on gas law relating to motor vehicle
7.0 ELECTRICITY	7.1 The functions of insulators and conductors. Drawing simple circuit diagrams to show resistors connected in series and parallel.	7.2 Solving simple problems involving up to three resistors connected in series and parallel.	7.3 Guide students to know functions of insulators and conductors and solve simple problems on series and parallel circuit.
8.0 LUBRICATION	8.1 Properties of oil and grease. Definition of viscosity, viscosity index, SAE numbers and properties of oil such as body and flow.	8.2 Solving simple calculation in steering geometry.	8.3 Assist students to know about lubrication, properties of oil, viscosity, viscosity index, SAE numbers and solve simple problems in steering geometry.

CERTIFICATE TWO – TRADE DRAWING

TASK	CRITICAL POINTS	SUB -POINTS	INSTRUCTIONAL TECHNIQUES
1.0 PICTORIAL DRAWING	1.1 Constructing isometric and representation of components from first and third angle drawing. Constructing oblique and representation of components from first and third angle drawing.	1.2 Drawing pictorial views of various components relating to motor vehicle	1.3 Assist students to draw pictorial views of motor vehicle components.
2.0 ORTHOGRAPHIC PROJECTION	2.1 Drawing first and third angle projection of various engineering components.	2.2 Drawing the various elevations that is front, end and plan.	2.3 Guide students to draw the three views of orthographic projection.
3.0 GEOMETRICAL CONSTRUCTION	3.1 Tangents, Triangle, Parallelogram and a square in a circle.	3.2 Drawing various type of tangents. Example, Tangents from a point to a circle, internal and external tangent.	3.3 Assist students to draw the various types of tangents.
4.0 FREE HAND SKETCH	4.1 Sketching single and multiplate clutches, ball and roller bearings, types of universal joint, rear axle, single and twin axle, disc and drum brakes, leaves and coil springs, types of rim and tyre profile, line diagrams of electronic fuel injection system (EFI), charging, starting and lighting system.	4.2 Using free hands or line diagram to sketch simple components in first and third angle projections.	4.3 Assist students to sketch simple components in first and third angle projections.

CERTIFICATE TWO – TRADE PRACTICAL

TASK	CRITICAL SKILLS	SUB -SKILLS	INSTRUCTIONAL TECHNIQUES
1.0 ENGINE TESTING AND USE OF INSTRUMENTS	1.1 Checking the ignition timing with the test lamp (static timing). Checking ignition timing using stroboscopic light (Dynamic timing). Using a multi-meter to set the idling speed of an engine. Using compression tester to test the compression of an engine.	1.2 The timing marks of the engine and the correct procedure of setting the instruments.	1.3 Guide students to use the various testing instruments. Correct safety precaution to be observed in case
2.0 CLUTCHES	2.1 Dismantling inspection, identification of the main parts and reassemble the clutch unit. Check free play and make the necessary adjustment where necessary	2.2 Assemble the following clutches; Single plate clutch, multi-plate clutch, diaphragm spring clutch and the coil spring type. Clutch adjustment	2.3 Assist students to dismantle, inspect identify the main parts of clutch and reassemble the various types of clutch
3.0 C. I. ENGINE	3.1 The difference between the combustion chambers (Direct and Indirect)and to be able to know which of them uses cold Starting Aid. E.g. Heater plugs. Removing and installing in-line injection plump and carryout, phasing, calibration and rack adjustment. Timing fuel injection pump to the engine	3.2 Removing, testing, examining and re-assembling heater plugs. General overhauling of SI and CI Engines	3.3 Guide students to use live engine and the test bench to perform the practical operations.

CERTIFICATE TWO – TRADE PRACTICAL

TASK	CRITICAL SKILLS	SUB -SKILLS	INSTRUCTIONAL TECHNIQUES
4.0 CARBURETION	4.1 Dismantling and identifying the various types of carburetor components	4.2 Examine the following circuits; idling, acceleration, part throttle, full throttle, cold starting systems	4.3 Assist the students to dismantle carburetor and identify the parts
5.0 FUEL INJECTION SYSTEM	5.1 Inspection of various fuel injection systems and identifying the location of various, sensor and actuators. Checking the injectors for correct spray patterns	5.2 Check and measure the voltage and the current flowing in each sensor. Strict observation of safety precautions.	5.3 Guide students to use multi-meter to measure the current and the voltage of various sensors
6.0 GEAR BOX AND DRIVES	6.1 Dismantle and identify the components.. (Synchronizers) bearing, input shaft and selector mechanism. Dismantling,, identifying and assembling all the principal components of automatic gear box.	6.2 Examining the gear box for leakages and checking the seal for defect.	6.3 Assist students to dismantle and identify the components of gear box and identify the faulty parts.
7.0 PROPELLER SHAFT UNIVERSAL JOINTS AND FINAL DRIVE	7.1 Dismantling constant velocity universal joint, examine and assemble. Dismantling the Hotchkiss drive, examine and reassemble. Carrying out the necessary arrangement or rear axle to obtain the correct tooth contact.	7.2 Checking propeller shaft for misalignment and the universal joint for defect.	7.3 Guide students to dismantle universal joint (constant velocity) and check propeller shaft for misalignment and carry out the need adjustments on the rear axle gears.

CERTIFICATE TWO – TRADE PRACTICAL

TASK	CRITICAL SKILLS	SUB -SKILLS	INSTRUCTIONAL TECHNIQUES
8.0 BRAKING SYSTEM	8.1 Dismantling, inspection and measure parts of breaking system. The main parts in disc and drum breaking system and reassemble.	8.2 Bleeding of hydraulic braking system. Dismantling a break adjuster, examine and carry out adjustment for specification.	8.3 Assist students to dismantle braking system, inspect and measure the parts and bleeding procedure.
9.0 SUSPENSION SYSTEM	9.1 Removal, installation, and identification of Suspension System, components such as shock absorbers, springs, bump stop. Differentiate between the rubber suspension, air suspension and Hydro elastic suspension, etc	9.2 Dismantling and assembling different types of steering gear boxes including power steering.	9.3 Assist students to remove, install and identify suspension system components that is dampers, springs, etc.
10.0 STEERING SYSTEM	10.1 Wheel alignment: Adjustment, camber, caster, Toe-in, toe-out, king pin inclination.	10.2 Dismantling and assembling different types of steering gear boxes including power steering.	10.3 Guide students to carry wheel alignment and adjustment of camber, caster, toe-in, toe-out and Kingpin inclination.
11.0 WHEELS AND TYRES	11.1 Checking wheel alignment using optical gauge and electronic wheel balancing.	11.2 Tyre rotation and carrying out outer cover repair.	11.3 Assist students to check wheel alignment and wheel balancing with various instruments.

CERTIFICATE TWO – TRADE PRACTICAL

TASK	CRITICAL SKILL	SUB -SKILL	INSTRUCTIONAL TECHNIQUES
12.0 ELECTRICALS	12.1 Identifying faults in the charging system and remedying them. The principal components of electronic ignition system, the electronic fuel injection system and maintenance.	12.2 Testing various sensors, actuators, alternator. Carrying out systematic test on a diesel electronic system.	12.3 Guide students to identify faults in the charging system. Identify main components of electronic ignition and fuel injection system.