



higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATES (VOCATIONAL)

ASSESSMENT GUIDELINES

AUTOMOTIVE REPAIR AND MAINTENANCE

NQF LEVEL 4

IMPLEMENTATION: JANUARY 2015

AUTOMOTIVE REPAIR AND MAINTENANCE - LEVEL 4

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SECTION A: PURPOSE OF THE SUBJECT ASSESSMENT GUIDELINES

This document provides the lecturer with guidelines to develop and implement a coherent, integrated assessment system for *Automotive Repair and Maintenance Level 4* in the National Certificates (Vocational). It must be read with the *National Policy Regarding Further Education and Training Programmes: Approval of the Documents, Policy for the National Certificates (Vocational) Qualifications at Levels 2 to 4 on the National Qualifications Framework (NQF)*. This assessment guideline will be used for National Qualifications Framework Levels 2-4.

This document explains the requirements for internal and external subject assessment. The lecturer must use this document with the *Subject Guidelines: Automotive Repair and Maintenance Level 4* to prepare for and deliver Automotive Repair and Maintenance. Lecturers should use a variety of resources and apply a range of assessment skills in the setting, marking and recording of assessment tasks.

SECTION B: ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

1 ASSESSMENT IN THE NATIONAL CERTIFICATES (VOCATIONAL)

Assessment in the National Certificates (Vocational) is underpinned by the objectives of the National Qualifications Framework (NQF). These objectives are to:

- Create an integrated national framework for learning achievements.
- Facilitate access to and progression within education, training and career paths.
- Enhance the quality of education and training.
- Redress unfair discrimination and past imbalances and thereby accelerate employment opportunities.
- Contribute to the holistic development of the student by addressing:
 - social adjustment and responsibility;
 - moral accountability and ethical work orientation;
 - economic participation; and
 - nation-building.

The principles that drive these objectives are:

- **Integration**

To adopt a unified approach to education and training that will strengthen the human resources development capacity of the nation.

- **Relevance**

To be dynamic and responsive to national development needs.

- **Credibility**

To demonstrate national and international value and recognition of qualification and acquired competencies and skills.

- **Coherence**

To work within a consistent framework of principles and certification.

- **Flexibility**

To allow for creativity and resourcefulness when achieving Learning Outcomes; to cater for different learning styles and use a range of assessment methods, instruments and techniques.

- **Participation**

To enable stakeholders to participate in setting standards and co-ordinating the achievement of the qualification.

- **Access**

To address barriers to learning at each level in order to facilitate students' progress.

- **Progression**

To ensure that the qualification framework permits individuals to move through the levels of the national qualification via different, appropriate combinations of components of the delivery system.

- **Portability**

To enable students to transfer credits of qualifications from one learning institution and/or employer to another.

- **Articulation**

To allow for vertical and horizontal mobility in the education system when accredited pre-requisites have been successfully completed.

- **Recognition of Prior Learning**

To grant credits for a unit of learning following assessment or if a student possesses the capabilities specified in the outcomes statement.

- **Validity of assessments**

To ensure that assessment covers a broad range of the knowledge, skills, values and attitudes (SKVAs) needed to demonstrate applied competency. This is achieved through:

- clearly stating the outcome to be assessed;
- selecting appropriate or suitable evidence;
- matching the evidence with a compatible or appropriate method of assessment; and
- selecting and constructing an instrument(s) of assessment.

- **Reliability**

To ensure that assessment practices are consistent so that the same result or judgement is arrived at if the assessment is replicated in the same context. This demands consistency in the interpretation of evidence; therefore careful monitoring of assessment is vital.

- **Fairness and transparency**

To verify that no assessment process or method hinders or unfairly advantages any student. The following could constitute unfairness in assessment:

- Inequality of opportunities, resources or teaching and learning approaches
- Bias based on ethnicity, race, gender, age, disability or social class
- Lack of clarity regarding Learning Outcome being assessed
- Comparison of students' work with that of other students, based on learning styles and language

- **Practicability and cost-effectiveness**

To integrate assessment practices within an outcomes-based education and training system and strive for cost and time-effective assessment.

2 ASSESSMENT FRAMEWORK FOR VOCATIONAL QUALIFICATIONS

The assessment structure for the National Certificates (Vocational) qualification is as follows:

2.1 Internal continuous assessment (ICASS)

Knowledge, skills values, and attitudes are assessed throughout the year using assessment instruments such as projects, tests, assignments, investigations, role-play and case studies. The internal continuous assessment (ICASS) practical component is undertaken in a real workplace, a workshop or a “Structured Environment”. This component is moderated internally, and externally quality assured by Umalusi. All internal continuous assessment evidence is kept in a Portfolio of Evidence (PoE) and must be readily available for monitoring, moderation and verification purposes.

2.2 External summative assessment (ESASS)

The external summative assessment is either a single or a set of written paper(s) set to the requirements of the subject Learning Outcomes. The Department of Higher Education and Training (DHET) administers the theoretical component according to relevant assessment policies.

A compulsory component of external summative assessment (ESASS) is the **integrated summative assessment task (ISAT)**. This assessment task draws on the students’ cumulative learning throughout the year. The task requires **integrated application of competence** and is executed under strict assessment conditions. The task should take place in a simulated or “Structured Environment”. The ISAT is the most significant test of students’ ability to apply their acquired knowledge.

The integrated assessment approach allows students to be assessed in more than one subject with the same ISAT.

External summative assessments will be conducted annually between October and December, with provision made for supplementary sittings.

3 MODERATION OF ASSESSMENT

3.1 Internal moderation

Assessment must be moderated according to the internal moderation policy of the Further Education and Training (FET) college. Internal college moderation is a continuous process. The moderator’s involvement starts with the planning of assessment methods and instruments and follows with continuous collaboration with and support to the assessors. Internal moderation creates common understanding of Assessment Standards and maintains these across vocational programmes.

3.2 External moderation

External moderation is conducted by the Department of Higher Education and Training, Umalusi and, where relevant, an Education and Training Quality Assurance (ETQA) body

according to South African Qualifications Authority (SAQA) and Umalusi standards and requirements.

The external moderator:

- monitors and evaluates the standard of all summative assessments;
- maintains standards by exercising appropriate influence and control over assessors;
- ensures that proper procedures are followed;
- ensures that summative integrated assessments are correctly administered;
- observes a minimum sample of ten (10) to twenty-five (25) percent of summative assessments;
- gives written feedback to the relevant quality assessor; and
- moderates in case of a dispute between an assessor and a student.

Policy on inclusive education requires that assessment procedures for students who experience barriers to learning be customised and supported to enable these students to achieve to their maximum potential.

4 PERIOD OF VALIDITY OF INTERNAL CONTINUOUS ASSESSMENT (ICASS)

The period of validity of the internal continuous assessment mark is determined by the *National Policy on the Conduct, Administration and Management of the Assessment of the National Certificates (Vocational)*.

The ICASS must be re-submitted with each examination enrolment for which it constitutes a component.

5 ASSESSOR REQUIREMENTS

Assessors must be subject specialists and competent assessors.

6 TYPES OF ASSESSMENT

Assessment benefits the student and the lecturer. It informs students about their progress and helps lecturers make informed decisions at different stages of the learning process. Depending on the intended purpose, different types of assessment can be used.

6.1 Baseline assessment

At the beginning of a level or learning experience, baseline assessment establishes the knowledge, skills, values and attitudes that students bring to the classroom. This knowledge assists lecturers in planning learning programmes and learning activities.

6.2 Diagnostic assessment

This assessment diagnoses the nature and causes of learning barriers experienced by specific students. It is followed by guidance, appropriate support and intervention strategies. This type of assessment is useful for making referrals for students requiring specialist help.

6.3 Formative assessment

This assessment monitors and supports teaching and learning. It determines student strengths and weaknesses and provides feedback on progress. It determines if a student is ready for summative assessment.

6.4 Summative assessment

This type of assessment gives an overall picture of student progress at a given time. It determines whether the student is sufficiently competent to progress to the next level.

7 PLANNING ASSESSMENT

An assessment plan should cover three main processes:

7.1 Collecting evidence

The assessment plan indicates which Subject Outcomes and Assessment Standards will be assessed, what assessment method or activity will be used and when this assessment will be conducted.

7.2 Recording

Recording refers to the assessment instruments or tools with which the assessment will be captured or recorded. Therefore appropriate assessment instruments must be developed or adapted.

7.3 Reporting

All the evidence is put together in a report to deliver a decision for achievement in the subject.

8 METHODS OF ASSESSMENT

Methods of assessment refer to who carries out the assessment and includes lecturer assessment, self-assessment, peer assessment and group assessment.

LECTURER ASSESSMENT	The lecturer assesses students' performances against given criteria in different contexts, such as individual work, group work, etc.
SELF-ASSESSMENT	Students assess their own performance against given criteria in different contexts, such as individual work, group work, etc.
PEER ASSESSMENT	Students assess another student's or group of students' performance against given criteria in different contexts, such as individual work, group work, etc.
GROUP ASSESSMENT	Students assess the individual performance of other students within a group or the overall performance of a group of students against given criteria.

9 INSTRUMENTS AND TOOLS FOR COLLECTING EVIDENCE

All evidence collected for assessment purposes is kept or recorded in the student's Portfolio of Evidence (PoE).

The following table summarises a variety of methods and instruments for collecting evidence. A method and instrument is chosen to give students ample opportunity to demonstrate that the Subject Outcome has been attained. This will only be possible if the chosen methods and instruments are appropriate for the target group and the Specific Outcome being assessed.

	METHODS FOR COLLECTING EVIDENCE		
	Observation-based (Less structured)	Task-based (Structured)	Test-based (More structured)
Assessment instruments	<ul style="list-style-type: none"> • Observation • Class questions • Lecturer, student, parent discussions 	<ul style="list-style-type: none"> • Assignments or tasks • Projects • Investigations or research • Case studies • Practical exercises • Demonstrations • Role-play • Interviews 	<ul style="list-style-type: none"> • Examinations • Class tests • Practical examinations • Oral tests • Open-book tests
Assessment tools	<ul style="list-style-type: none"> • Observation sheets • Lecturer's notes • Comments 	<ul style="list-style-type: none"> • Checklists • Rating scales • Rubrics 	<ul style="list-style-type: none"> • Marks (e.g. %) • Rating scales (1-7)
Evidence	<ul style="list-style-type: none"> • Focus on individual students • Subjective evidence based on lecturer observations and impressions 	<p>Open middle: Students produce the same evidence but in different ways.</p> <p>Open end: Students use same process to achieve different results.</p>	Students answer the same questions in the same way, within the same time.

10 TOOLS FOR ASSESSING STUDENT PERFORMANCE

Rating scales are marking systems where a symbol (such as 1 to 7) or a mark (such as 5/10 or 50%) is defined in detail. The detail is as important as the coded score. Traditional marking, assessment and evaluation mostly used rating scales without details such as what was right or wrong, weak or strong, etc.

Task lists and **checklists** show the student what needs to be done. These consist of short statements describing the expected performance in a particular task. The statements on the checklist can be ticked off when the student has adequately achieved the criterion. Checklists and task lists are useful in peer or group assessment activities.

Rubrics are a hierarchy (graded levels) of criteria with benchmarks that describe the minimum level of acceptable performance or achievement for each criterion. Using rubrics is a different way of assessing that cannot be compared to tests. Each criterion described in the rubric must be assessed separately. Mainly two types of rubrics are used, namely holistic and analytical.

11 SELECTING AND/OR DESIGNING RECORDING AND REPORTING SYSTEMS

The selection or design of recording and reporting systems depends on the purpose of recording and reporting student achievement. **Why** particular information is recorded and **how** it is recorded determine which instrument will be used.

Computer-based systems, for example spreadsheets, are cost and time effective. The recording system should be user-friendly and information should be easily accessed and retrieved.

12 COMPETENCE DESCRIPTIONS

All assessment should award marks as evaluation of specific tasks. However, marks should be awarded against rubrics and should not simply be a total of ticks for right answers. Rubrics should explain the competence level descriptors for the skills, knowledge, values and attitudes that a student must demonstrate to achieve each level of the rating scale.

When lecturers or assessors prepare an assessment task or question, they must ensure that it addresses an aspect of a Subject Outcome. The relevant Assessment Standard must be used to create the rubric to assess the task or question. The descriptions must clearly indicate the minimum level of attainment for each category on the rating scale.

13 STRATEGIES FOR COLLECTING EVIDENCE

A number of different assessment instruments may be used to collect and record evidence. Examples of instruments that can be (adapted and) used in the classroom include:

13.1 Record sheets

The lecturer observes students working in a group. These observations are recorded in a summary table at the end of each project. The lecturer can design a record sheet to record observations of students' interactive and problem-solving skills, attitudes towards group work and involvement in a group activity.

13.2 Checklists

Checklists should have clear categories to ensure that the objectives are effectively met. The categories should describe how the activities are evaluated and against which criteria they are evaluated. Space for comments is essential.

**ASSESSMENT OF
AUTOMOTIVE REPAIR AND MAINTENANCE
LEVEL 4**

SECTION C: ASSESSMENT IN AUTOMOTIVE REPAIR AND MAINTENANCE - LEVEL 4

1 ASSESSMENT SCHEDULE AND REQUIREMENTS

Internal and external assessments are conducted and the results of both contribute to the final mark of a student in the subject.

The internal continuous assessment (ICASS) mark accounts for 50 percent of the final mark. A student needs a minimum final mark of 50 percent to achieve a pass in the subject.

1.1 Internal assessment

Lecturers must compile a detailed assessment plan and assessment schedule of internal assessments to be undertaken during the year in the subject (e.g. date, assessment task or activity, rating code/marks allocated, assessor, moderator).

All internal assessments are then conducted according to the plan and schedule using appropriate assessment instruments and tools for each assessment task (e.g. tests, assignments, practical tasks/projects and memoranda, rubrics, checklists).

The marks allocated to the minimum number of both practical and written assessment tasks conducted during the internal continuous assessment (ICASS) are kept and recorded in the Portfolio of Evidence (PoE) which is subject to internal and external moderation.

A year mark out of 100 is calculated from the ICASS marks contained in the PoE and submitted to DHET on the due date towards the end of the year.

The following internal assessment units currently **GUIDE** the internal assessment of Automotive Repair and Maintenance Level 4.

TASKS	Time-frame	Type of assessment activity	Minimum time and proposed mark allocation* (can be increased but not reduced)	Scope of assessment	% contribution to the year mark
				Do not confuse the weightings of topics in the Subject Guidelines with the % contribution to the year mark	
1	Term 1	Test	1 hour (50 marks)	Topics completed in Term 1	10
2	Term 1	Practical Assessment/ Assignment	Determined by the scope and nature of the task	One or more of the topics completed as an assignment	25
3	Term 2	Practical Assessment/ Assignment	Determined by the scope and nature of the task	One or more of the topics completed as an assignment	25
4	Term 2	Test*	1 hour (50 marks)	Topics completed in Term 1 and 2	10

5	Term 3	Internal Examination*	As per external examinations (P1 & P2 where applicable)	Topics completed to date (P1 =15 & P2=15, where applicable)	30
TOTAL					100

Specifications for internal assessment may change over time. A separate internal assessment guideline document '*Guidelines for the Implementation of Internal Continuous Assessment (ICASS) in the NC(V) qualifications at FET Colleges*' has been developed, and is updated and available on the Departmental website. The conduct and administration of internal assessments must always comply with specifications contained in the most current version of the guideline document.

2. RECORDING AND REPORTING

Automotive Repair and Maintenance, is assessed according to five levels of competence. The level descriptions are explained in the following table.

Scale of Achievement for the Vocational component

RATING CODE	RATING	MARKS %
5	Outstanding	80 - 100
4	Highly Competent	70 - 79
3	Competent	50 - 69
2	Not yet competent	40 - 49
1	Not achieved	0 - 39

The planned and scheduled assessment should be recorded in the lecturer's Portfolio of Assessment (PoA) for each subject. The minimum requirements for the **Lecturer's Portfolio of Assessment** should be as follows:

- Lecturer information
- A contents page
- Subject and Assessment Guidelines
- A subject year plan /work scheme/pace setter
- A subject assessment plan
- Instrument(s) (tests, assignments, practical) and tools (memoranda, rubrics, checklists) for each assessment task
- A completed pre-moderation checklist for each of the ICASS tasks and their accompanying assessment tools
- A completed post-moderation checklist once the task has been administered and assessed
- Subject record sheets per level/class reflecting the marks achieved by students in the ICASS tasks completed
- Evidence of review – diagnostic and statistical analysis, including notes on improvement of the task for future use.

The college could standardise these documents.

The minimum requirements for the **student's Portfolio of Evidence (PoE)** should be as follows:

- Student information/identification
- Declaration of authenticity form, duly completed (signed and dated)
- A contents page/list of content (for accessibility)
- A subject assessment schedule
- The evidence of marked assessment tasks and feedback according to the assessment schedule
- A summary record of results showing all the marks achieved per assessment for the subject
- Evidence of moderation (only where applicable for students whose tasks were moderated).

Where tasks cannot be contained as evidence in the Portfolio of Evidence, their exact location must be recorded and they must be readily available for moderation purposes.

3. INTERNAL ASSESSMENT OF SUBJECT OUTCOMES IN AUTOMOTIVE REPAIR AND MAINTENANCE – LEVEL 4

Topic 1: Engine configuration and design

SUBJECT OUTCOME	
1.1 Explain the compression ratio	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Advantages and disadvantages of increasing the compression ratio are described. 	<ul style="list-style-type: none"> • Describe the advantages and disadvantages of increasing the compression ratio of an engine
<ul style="list-style-type: none"> • Different methods of increasing the compression ratio are described 	<ul style="list-style-type: none"> • Describe different methods of increasing the compression ratio
<ul style="list-style-type: none"> • The importance of compression pressure is explained 	<ul style="list-style-type: none"> • Explain the importance of compression pressure
<ul style="list-style-type: none"> • Different factors that influence the final compression pressure are named 	<ul style="list-style-type: none"> • Name different factors that influence the final compression pressure.
<ul style="list-style-type: none"> • The importance of volumetric efficiency is explained. 	<ul style="list-style-type: none"> • Explain the importance of volumetric efficiency
<ul style="list-style-type: none"> • Different reasons for low volumetric efficiency are listed 	<ul style="list-style-type: none"> • List different reasons for low volumetric efficiency
<ul style="list-style-type: none"> • Different methods of increasing the volumetric efficiency are described. 	<ul style="list-style-type: none"> • Describe different methods of increasing the volumetric efficiency
<ul style="list-style-type: none"> • The compensation for altitude by a turbo charger is explained. 	<ul style="list-style-type: none"> • Explain the compensation for altitude by a turbo charger
ASSESSMENT TASKS OR ACTIVITIES	

<ul style="list-style-type: none"> • Evaluation of students' feedback • Written test at the end of Subject Outcome • Demonstration with models • Written questions in addition to the exercises. 	
SUBJECT OUTCOME	
1.2 Explain thermal efficiency in an engine	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • The concept of thermal efficiency is explained. 	<ul style="list-style-type: none"> • Explain the concept '<i>thermal efficiency</i>'.
<ul style="list-style-type: none"> • The effect of altitude on engine power is described. 	<ul style="list-style-type: none"> • Describe the effect of altitude on engine power
<ul style="list-style-type: none"> • Petrol and diesel engines are compared. 	<ul style="list-style-type: none"> • Compare petrol engines with diesel engines.
<ul style="list-style-type: none"> • Compression ratio of an engine is calculated 	<ul style="list-style-type: none"> • Calculate the compression ratio of an engine
<ul style="list-style-type: none"> • The concept of '<i>Air Standard Efficiency</i>' (ASE) is explained. 	<ul style="list-style-type: none"> • Explain the concept '<i>Air Standard Efficiency</i>' (ASE)
<ul style="list-style-type: none"> • The Air Standard Efficiency(ASE) of an engine is calculated 	<ul style="list-style-type: none"> • Calculate the Air Standard Efficiency(ASE) of an engine
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Evaluation of students' feedback • Written questions in addition to the exercises 	
SUBJECT OUTCOME	
1.3 Explain different types of crankshaft design	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Static and dynamic crankshaft balancing are explained. 	<ul style="list-style-type: none"> • Explain static and dynamic crankshaft balancing.
<ul style="list-style-type: none"> • Different types of crankshafts are named. <i>Range: throw, crankpin, web journals</i> 	<ul style="list-style-type: none"> • Name different types of crankshafts.
<ul style="list-style-type: none"> • Power and mechanical balances are explained. 	<ul style="list-style-type: none"> • Explain power and mechanical balances.
<ul style="list-style-type: none"> • The function of vibration dampers is described. 	<ul style="list-style-type: none"> • Describe the function of vibration dampers.
<ul style="list-style-type: none"> • Different crankshaft layouts and firing orders are explained 	<ul style="list-style-type: none"> • Explain different crankshaft layouts and firing orders.
<ul style="list-style-type: none"> • Different methods to increase the compression ratio are explained. 	<ul style="list-style-type: none"> • Explain different methods to increase the compression ratio.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Evaluation of students' feedback • Written questions in addition to the exercises 	

Topic 2: Automatic transmission types and maintenance

SUBJECT OUTCOME	
2.1 List and describe different types of automatic transmissions	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Various types of automatic transmissions are listed and described <i>Range: conventional hydraulic, hydraulic/electronic, CVT, Multitronic, Tiptronic and Steptronic</i> 	<ul style="list-style-type: none"> List and describe various types of automatic transmissions
<ul style="list-style-type: none"> The advantages of automatic transmissions are explained 	<ul style="list-style-type: none"> Explain the advantages of automatic transmissions
<ul style="list-style-type: none"> The working principles of different types of planetary gear sets and torque converters are explained 	<ul style="list-style-type: none"> Explain the working principles of different types of planetary gear sets and torque converters
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks. 	

SUBJECT OUTCOME	
2.2 Describe the construction of an automatic transmission	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Automatic transmission components are identified and their operation described <i>Range: gears, clutches, brake belts, governors, pump, hydraulic unit, dampers, cooler</i> 	<ul style="list-style-type: none"> Identify automatic transmission components and describe their operation (gears, clutches, brake belts, governors, pump, hydraulic unit, dampers, cooler)
<ul style="list-style-type: none"> Automatic transmission power flow is traced in different situations on a given diagram <i>Range: drive, reverse, 2,1, park</i> 	<ul style="list-style-type: none"> Trace on a given diagram automatic transmission power flow in different situations
<ul style="list-style-type: none"> Hydraulic pressure flow is traced in different situations on a given diagram 	<ul style="list-style-type: none"> Trace on a given diagram hydraulic pressure flow in different situations
<ul style="list-style-type: none"> Torque converter and lock-up constructions are explained. 	<ul style="list-style-type: none"> Explain torque converter lock-up constructions.
<ul style="list-style-type: none"> Overdrive/hold switches are explained in relation to the shifting pattern. 	<ul style="list-style-type: none"> Explain overdrive/hold switches in relation to the shifting pattern.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. 	

- Assignment/tasks.

SUBJECT OUTCOME	
2.3 Perform basic maintenance and repairs on an automatic transmission	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • A regular service is performed on automatic transmission <i>Range: oil level check, oil and filter change</i> 	<ul style="list-style-type: none"> • Perform a regular service on an automatic transmission
<ul style="list-style-type: none"> • An explanation is provided how to perform a stall test to identify possible mechanical or hydraulic faults. 	<ul style="list-style-type: none"> • Describe how to perform a stall test to identify possible mechanical or hydraulic faults.
<ul style="list-style-type: none"> • An explanation is provided on appropriate equipment used for reading fault codes from the transmission control unit to correctly drawn conclusions according to factory specifications. 	<ul style="list-style-type: none"> • Describe the appropriate equipment used to read out fault codes from the transmission control unit to draw conclusions according to factory specifications.
<ul style="list-style-type: none"> • The checking of different electrical circuits that affect the performance of the automatic transmission is explained <i>Range: selector switch, temperature sensor, turbine speed sensor, vehicle speed sensor, solenoid valves</i> 	<ul style="list-style-type: none"> • Explain the checking of the different electrical circuits that affect the performance of the automatic transmission.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Observations. • Class tests. • Demonstrations. • Practical tests. • Assignment/tasks. 	

Topic 3: Conventional final drives

SUBJECT OUTCOME	
3.1 Understand conventional final drive differentials	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • The operation of a conventional final drive differential is described. 	<ul style="list-style-type: none"> • Describe the operation of a conventional final drive differential.
<ul style="list-style-type: none"> • The functions of differential parts are identified and explained. 	<ul style="list-style-type: none"> • Identify conventional final drive differential parts and explain their functions.
<ul style="list-style-type: none"> • The method used for reconditioning conventional final drive differentials is explained. 	<ul style="list-style-type: none"> • Explain the reconditioning of conventional final drive differentials.
<ul style="list-style-type: none"> • Procedures for testing and checking differentials prior to dismantling and after reconditioning are explained. 	<ul style="list-style-type: none"> • Explain procedures to test and check differentials prior to dismantling and after reconditioning

<ul style="list-style-type: none"> The methods of assessing serviceability of differential parts are explained. 	<ul style="list-style-type: none"> Explain the methods of assessing serviceability of differential parts.
<ul style="list-style-type: none"> The procedure for ordering replacement parts is explained 	<ul style="list-style-type: none"> Explain the procedure for ordering replacement parts
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Class tests. Demonstrations Practical tasks 	

SUBJECT OUTCOME	
3.2 Identify and select correct tools and equipment	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Job instructions are read and interpreted, and a sequence of operations is determined according to worksite procedures. 	<ul style="list-style-type: none"> Read and interpret job instructions and determine a sequence of operations according to worksite procedures.
<ul style="list-style-type: none"> Appropriate personal protective equipment (PPE) is identified and selected according to statutory requirements. 	<ul style="list-style-type: none"> Identify and select appropriate personal protective equipment (PPE) according to statutory requirements.
<ul style="list-style-type: none"> Appropriate tools and equipment are identified and selected according to job requirements and worksite procedures 	<ul style="list-style-type: none"> Identify and select appropriate tools and equipment according to job requirements and worksite procedures.
<ul style="list-style-type: none"> Appropriate measuring instruments are identified and selected, and instruments related to differential reconditioning are cared for. 	<ul style="list-style-type: none"> Identify and select appropriate measuring instruments and care for the instruments related to differential reconditioning.
<ul style="list-style-type: none"> Manufacturer's manuals and/or specifications are used according to job requirements, and reasons for their use are given. 	<ul style="list-style-type: none"> Use, and give reasons for using, manufacturer's manuals and/or specifications according to job requirements.
<ul style="list-style-type: none"> Work area and differential are prepared according to safety, worksite and manufacturer's procedures, and reasons given for doing so. 	<ul style="list-style-type: none"> Prepare work area and differential according to safety, worksite and manufacturer's procedures, and give reasons for doing so.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks -compile checklists to indicate and select all equipment, PPE, manufacturer's manuals, service manuals and special tools prior to repairs on conventional final drive differentials. 	

SUBJECT OUTCOME	
3.3 Assess a conventional final drive differential	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> The differential is cleaned before assessment, according to manufacturer's, worksite and safety procedures. 	<ul style="list-style-type: none"> Clean differential before assessment, according to manufacturer's, worksite and safety procedures.
<ul style="list-style-type: none"> The differential is disassembled as per manufacturer's specifications and procedures 	<ul style="list-style-type: none"> Disassemble differential as per manufacturer's specifications and procedures.
<ul style="list-style-type: none"> The parts are neatly laid out on a clean surface, giving reasons for doing so. 	<ul style="list-style-type: none"> Lay out the parts neatly on a clean work surface, giving reasons for doing so.
<ul style="list-style-type: none"> Parts are visually inspected for defects according to manufacturer's guidelines. 	<ul style="list-style-type: none"> Inspect parts visually for defects, according to manufacturer's guidelines.
<ul style="list-style-type: none"> Appropriate measuring instruments are used to measure parts according to manufacturer's procedures, and the actual measurements are recorded. 	<ul style="list-style-type: none"> Use appropriate measuring instruments to measure parts according to manufacturer's procedures and record the actual measurements.
<ul style="list-style-type: none"> Measurements are compared to manufacturer's specifications for serviceability. 	<ul style="list-style-type: none"> Compare measurements to manufacturer's specifications for serviceability.
<ul style="list-style-type: none"> Unserviceable parts are separated and marked according to worksite and quality procedures. 	<ul style="list-style-type: none"> Separate and mark unserviceable parts according to worksite and quality procedures
<ul style="list-style-type: none"> A condition report is compiled to identify unserviceable parts, giving reasons for their not being serviceable. 	<ul style="list-style-type: none"> Compile a condition report that identifies unserviceable parts, giving reasons for their not being serviceable.
<ul style="list-style-type: none"> Replacement parts are ordered according to worksite procedures. 	<ul style="list-style-type: none"> Order replacement parts according to worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks - compiling a condition report.(e.g. For serviceability of components and true measurements versus manufacturing specifications on double drives) 	

SUBJECT OUTCOME	
3.4 Assemble a conventional final drive differential	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> The principles of using lubricants related to differentials are described. 	<ul style="list-style-type: none"> Describe the principles of using of lubricants related to differentials.
<ul style="list-style-type: none"> Safety procedures related to reconditioning differentials are explained. 	<ul style="list-style-type: none"> Explain safety procedures related to reconditioning differentials.
<ul style="list-style-type: none"> Parts are cleaned before assembly according 	<ul style="list-style-type: none"> Clean parts before assembly according to

to safety and worksite procedures.	safety and worksite procedures.
<ul style="list-style-type: none"> The differential is assembled as per manufacturer's specifications, worksite procedures and timetables 	<ul style="list-style-type: none"> Assemble the differential according to manufacturer's specifications, worksite procedures and timetables.
<ul style="list-style-type: none"> Attachment agents are applied according to manufacturer's procedures and job requirements 	<ul style="list-style-type: none"> Apply attachment agents according to manufacturer's procedures and job requirements.
<ul style="list-style-type: none"> Reasons are given for using specified lubricants during assembly 	<ul style="list-style-type: none"> Provide reasons for using specified lubricants during assembly.
<ul style="list-style-type: none"> Measurements and/or adjustments are performed during assembly according to manufacturer's specifications and procedures 	<ul style="list-style-type: none"> Perform measurements and/or adjustments during assembly according to manufacturer's specifications and procedures.
<ul style="list-style-type: none"> Post checks are performed where necessary, on completion of the reconditioning procedures according to manufacturer's and worksite procedures. 	<ul style="list-style-type: none"> Perform post checks, where necessary, according to manufacturer's and worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks -compiling checklists.(The logic order of assembling double drives and special equipment needed prior to assembly) 	

SUBJECT OUTCOME	
3.5 Complete documentation and report on conditions	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> The purpose of documentation is explained. 	<ul style="list-style-type: none"> Explain the purpose of documentation
<ul style="list-style-type: none"> Documentation is completed in accordance with worksite procedures. 	<ul style="list-style-type: none"> Complete documentation according to worksite procedures.
<ul style="list-style-type: none"> Reasons are given for preparing vehicle differential sub-assembly for storage. 	<ul style="list-style-type: none"> Give reasons for preparing vehicle differential sub-assembly for storage.
<ul style="list-style-type: none"> Differential is prepared for storage according to manufacturer's and worksite procedures. 	<ul style="list-style-type: none"> Prepare differential for storage according to manufacturer's and worksite procedures.
<ul style="list-style-type: none"> Work area is restored to a serviceable condition according to worksite procedures. 	<ul style="list-style-type: none"> Restore work area to serviceable condition according to worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests Assignment/tasks. 	

Topic 4: Double reduction drives

SUBJECT OUTCOME	
4.1 Understand double reduction drive differentials	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> The operation of a single speed double reduction differential is explained. 	<ul style="list-style-type: none"> Explain the operation of a single speed double reduction differential.
<ul style="list-style-type: none"> The operation of a two speed double reduction differential is explained 	<ul style="list-style-type: none"> Explain the operation of a two speed double reduction differential.
<ul style="list-style-type: none"> Reduction type differential parts are identified and their functions explained. 	<ul style="list-style-type: none"> Identify reduction type differential parts and explain their functions
<ul style="list-style-type: none"> The reconditioning of reduction type differentials is explained. 	<ul style="list-style-type: none"> Explain the reconditioning of reduction type differentials.
<ul style="list-style-type: none"> The testing and checking of reduction type differentials after reconditioning and prior to dismantling is explained. 	<ul style="list-style-type: none"> Explain the testing and checking of reduction type differentials after reconditioning and prior to dismantling
<ul style="list-style-type: none"> The assessment of differential parts for serviceability is explained. 	<ul style="list-style-type: none"> Explain the methods of assessing differential parts for serviceability.
<ul style="list-style-type: none"> The procedure for ordering replacement parts is explained. 	<ul style="list-style-type: none"> Explain the procedure for ordering replacement parts.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. 	

SUBJECT OUTCOME	
4.2 Identify and select correct tools and equipment	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Job instructions are read, interpreted and a sequence of operations is determined according to worksite procedures. 	<ul style="list-style-type: none"> Read and interpret job instructions and determine a sequence of operations according to worksite procedures.
<ul style="list-style-type: none"> Appropriate personal protective equipment (PPE) is identified and selected according to statutory requirements. 	<ul style="list-style-type: none"> Identify and select appropriate personal protective equipment (PPE) according to statutory requirements.
<ul style="list-style-type: none"> Appropriate tools and equipment are identified and selected according to job requirements and worksite procedures. 	<ul style="list-style-type: none"> Identify and select appropriate tools and equipment according to job requirements and worksite procedures.
<ul style="list-style-type: none"> Appropriate measuring instruments are identified and selected, and the instruments related to differential reconditioning are cared for. 	<ul style="list-style-type: none"> Identify and select appropriate measuring instruments and care for the instruments related to differential reconditioning.
<ul style="list-style-type: none"> Manufacturer's manuals and/or specifications 	<ul style="list-style-type: none"> Use, and give reasons for using,

are used according to job requirements, and reasons for their use are given.	manufacturer's manuals and/or specifications according to job requirements.
<ul style="list-style-type: none"> Work area and differential are prepared according to safety, worksite and manufacturer's procedures, and reasons given for doing so. 	<ul style="list-style-type: none"> Prepare work area and differential according to safety, worksite and manufacturer's procedures, and give reasons for doing so.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks - compiling checklists.(The logic order of disassemble and assembling double drives) 	

SUBJECT OUTCOME	
4.3 Assess double reduction drive differentials	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Parts are cleaned before assessment, according to manufacturer's, worksite and safety procedures. 	<ul style="list-style-type: none"> Clean parts before assessment according to manufacturer's worksite and safety procedures.
<ul style="list-style-type: none"> A reduction type differential is disassembled as per manufacturer's specifications and procedures 	<ul style="list-style-type: none"> Disassemble a reduction type differential as per manufacturer's specifications and procedures.
<ul style="list-style-type: none"> The parts are neatly laid out on a clean surface, and reasons given for doing so 	<ul style="list-style-type: none"> Neatly lay out the parts on a clean work surface, giving reasons for doing so.
<ul style="list-style-type: none"> Parts are visually inspected for defects according to manufacturer's guidelines. 	<ul style="list-style-type: none"> Inspect parts visually for defects according to manufacturer's guidelines.
<ul style="list-style-type: none"> Appropriate measuring instruments are used to measure parts according to manufacturer's procedures. 	<ul style="list-style-type: none"> Use appropriate measuring instruments and measure parts according to manufacturer's procedures
<ul style="list-style-type: none"> Measurements are recorded and compared to manufacturer's specifications for serviceability. 	<ul style="list-style-type: none"> Record and compare measurements to manufacturer's specifications for serviceability.
<ul style="list-style-type: none"> Unserviceable parts are separated and marked according to worksite and quality procedures. 	<ul style="list-style-type: none"> Separate and mark unserviceable parts according to worksite and quality procedures.
<ul style="list-style-type: none"> A condition report is compiled to identify unserviceable parts, giving reasons for their not being serviceable. 	<ul style="list-style-type: none"> Compile a condition report that identifies unserviceable parts, giving reasons for their not being serviceable.
<ul style="list-style-type: none"> Replacement parts are ordered according to worksite procedures. 	<ul style="list-style-type: none"> Order replacement parts according to worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. 	

- Class tests.
- Demonstrations.
- Practical tests.
- Assignment/tasks - Compiling a condition report.(e.g. For serviceability of components and true measurements versus manufacturing specifications on double drives)

SUBJECT OUTCOME	
4.4 Assemble double reduction drive differentials	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • The principles of lubrication related to differentials are explained. 	<ul style="list-style-type: none"> • Explain the principles of lubrication related to differentials.
<ul style="list-style-type: none"> • Safety procedures to recondition differentials are described. 	<ul style="list-style-type: none"> • Describe safety procedures related to reconditioning reduction type differentials.
<ul style="list-style-type: none"> • Parts are cleaned before assembly according to safety and worksite procedures. 	<ul style="list-style-type: none"> • Clean parts before assembly according to safety and worksite procedures.
<ul style="list-style-type: none"> • A reduction type differential is assembled as per manufacturer's specifications, worksite procedures and time tables. 	<ul style="list-style-type: none"> • Assemble a reduction type differential according to manufacturer's specifications, worksite procedures and time tables.
<ul style="list-style-type: none"> • Attachment agents are applied according to manufacturer's procedures and job requirements 	<ul style="list-style-type: none"> • Apply attachment agents according to manufacturer's procedures and job requirements.
<ul style="list-style-type: none"> • Reasons are provided for using specified lubricants during assembly. 	<ul style="list-style-type: none"> • Provide reasons for using specified lubricants during assembly.
<ul style="list-style-type: none"> • Measurements and/or adjustments are performed during assembly according to manufacturer's procedures and specifications 	<ul style="list-style-type: none"> • Perform measurements and/or adjustments during assembly according to manufacturer's procedures and specifications.
<ul style="list-style-type: none"> • Post checks are performed where necessary or possible, on completion of the reconditioning procedures according to manufacturer's and worksite procedures. 	<ul style="list-style-type: none"> • Perform post checks, where necessary or possible, on completion of the reconditioning procedures according to manufacturer's and worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Observations. • Class tests. • Demonstrations. • Practical tests. • Assignment/tasks – Compile checklists.(The order of disassemble and assembling and also for post-checks on assembly of double drives) 	

SUBJECT OUTCOME	
4.5 Complete documentation and a report on the condition of components	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • The purpose of documentation is explained. 	<ul style="list-style-type: none"> • Explain the purpose of documentation.

<ul style="list-style-type: none"> Documents are completed according to worksite procedures. 	<ul style="list-style-type: none"> Complete documentation according to worksite procedures.
<ul style="list-style-type: none"> Reasons are provided for preparing vehicle differential sub-assembly for storage. 	<ul style="list-style-type: none"> Provide reasons for preparing vehicle differential sub-assembly for storage.
<ul style="list-style-type: none"> Differential is prepared for storage according to manufacturer's and worksite procedures. 	<ul style="list-style-type: none"> Prepare differential for storage according to manufacturer's and worksite procedures.
<ul style="list-style-type: none"> Work area is restored to a serviceable condition according to worksite procedures. 	<ul style="list-style-type: none"> Restore work area to a serviceable condition according to worksite procedures.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks - Compile checklists.(e.g. The order of disassemble and assembling double drives) 	

Topic 5: Electronic engine management systems (petrol)

SUBJECT OUTCOME	
5.1 Test and diagnose faults in the EFI system of an engine	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Various types of electronic fuel injections systems are described 	<ul style="list-style-type: none"> Describe various types of electronic fuel injection systems
<ul style="list-style-type: none"> Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> The fuel system and the engine compartment are checked visually to ensure no obvious faults exist. 	<ul style="list-style-type: none"> Check the fuel system and the engine compartment visually to ensure no obvious faults exist.
<ul style="list-style-type: none"> Suitable test instruments and equipment are selected and used to enable a system test to be conducted without damaging circuit components and electronic devices. 	<ul style="list-style-type: none"> Select and use suitable test instruments and equipment to enable a system test to be conducted without damaging electronic and circuit components
<ul style="list-style-type: none"> The self-test codes are activated, read, and interpreted to identify faulty circuits. 	<ul style="list-style-type: none"> Activate, read and interpret the self-test codes and identify faulty circuits.
<ul style="list-style-type: none"> The circuit indicated by the self-test codes is tested, and the fault is located and identified. 	<ul style="list-style-type: none"> Test the faulty circuit indicated by the self-test codes and locate and identify the fault.
<ul style="list-style-type: none"> EFI circuits not monitored by the self-test system are tested, and faults are located and identified. 	<ul style="list-style-type: none"> Test the EFI circuits not monitored by the self-test system, to identify and locate faults.
<ul style="list-style-type: none"> The results of the test performed are recorded and compared with the vehicle specification. Results are analysed to locate and identify the cause of any fault. 	<ul style="list-style-type: none"> Record and compare the results of the tests performed to the vehicle specification. Analyse the results to locate and identify the cause of any fault.
ASSESSMENT TASKS OR ACTIVITIES	

<ul style="list-style-type: none"> • Observations. • Class tests. • Demonstrations. • Practical tests. • Assignment/tasks.

SUBJECT OUTCOME	
5.2 Replace EFI system components of an engine	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> • Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> • Any faulty EFI system components are replaced with parts that meet manufacturer's specifications in a manner prescribed by the manufacturer. 	<ul style="list-style-type: none"> • Replace any faulty EFI system components with parts that meet manufacturer's specifications in a manner prescribed by the manufacturer.
<ul style="list-style-type: none"> • The system is tested to ensure that the integrity of the wiring is in a serviceable condition. 	<ul style="list-style-type: none"> • Test the system to ensure that the integrity of the wiring is in a serviceable condition.
<ul style="list-style-type: none"> • The system is tested to ensure there are no air or fuel leaks. 	<ul style="list-style-type: none"> • Test the system to ensure there are no air or fuel leaks.
<ul style="list-style-type: none"> • All adjustments are checked and where necessary, are corrected to comply with manufacturer's specifications. 	<ul style="list-style-type: none"> • Check all adjustments and, where necessary, correct to comply with manufacturer's specifications.
<ul style="list-style-type: none"> • The EFI system operates and performs according to manufacturer's specifications. 	<ul style="list-style-type: none"> • Confirm the EFI system is performing according to manufacture specifications.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Observations. • Class tests. • Demonstrations. • Practical tests. • Assignment/tasks. 	

SUBJECT OUTCOME	
5.3 Test and diagnose faults in an electronic ignition computer system of an engine. <i>NOTE: Tasks to be performed only on a practical simulator</i>	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> • Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> • The electronic ignition system and the engine compartment are checked visually to ensure that no obvious faults exist. 	<ul style="list-style-type: none"> • Check the electronic ignition system and the engine compartment visually to ensure that no obvious faults exist.
<ul style="list-style-type: none"> • Suitable test instruments and equipment are 	<ul style="list-style-type: none"> • Select and use suitable test instruments and

selected and used to enable system tests to be completed without damaging circuit components and electronic devices	equipment to enable the completion of a system test without damaging electronic and circuit components.
<ul style="list-style-type: none"> The self-test codes are activated, read, and interpreted to identify any circuit that has a fault 	<ul style="list-style-type: none"> Activate, read and interpret the self-test codes and identify any faulty circuit.
<ul style="list-style-type: none"> The faulty circuit indicated by the self-test codes is tested, and the fault is located and identified. 	<ul style="list-style-type: none"> Test the faulty circuit indicated by the self-test codes to locate and identify the fault.
<ul style="list-style-type: none"> Electronic ignition circuits not monitored by the self-test system are tested, and any faults are located and identified. 	<ul style="list-style-type: none"> Test the electronic ignition circuits not monitored by the self-test system, to locate and identify any faults.
<ul style="list-style-type: none"> The results of the above tests are recorded and compared with the vehicle specification. Results are analysed to locate and identify the cause of any fault. 	<ul style="list-style-type: none"> Record and compare the results of the performed tests with the vehicle specification. Analyse results to locate and identify the cause of any fault.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Assignment/tasks. 	

SUBJECT OUTCOME	
5.4 Replace electronic ignition system components of an engine	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> Faulty electronic ignition system components are replaced with parts that meet manufacturer's specifications. 	<ul style="list-style-type: none"> Remove and replace faulty electronic ignition system components with parts that meet manufacturer's specifications.
<ul style="list-style-type: none"> The system is tested to ensure that the integrity of the wiring is in a serviceable condition. 	<ul style="list-style-type: none"> Test the system to ensure that the integrity of the wiring is in a serviceable condition.
<ul style="list-style-type: none"> All adjustments are checked and where necessary, corrected to comply with manufacturer's specifications. 	<ul style="list-style-type: none"> Check all adjustments and, where necessary, correct to comply with manufacturer's specifications.
<ul style="list-style-type: none"> The electronic ignition system operates and performs to manufacturer's specifications. 	<ul style="list-style-type: none"> Confirm if the electronic ignition system operates according to manufacturer's specifications.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. 	

- Practical tests.
- Assignment/tasks.

Topic 6: Electronic engine management systems (diesel)

SUBJECT OUTCOME	
6.1 Test and diagnose faults in a diesel engine management system on an engine	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • Various types of diesel engine management systems are described. <p><i>Range: conventional type, common rail and electronic injection</i></p>	<ul style="list-style-type: none"> • Describe various types of diesel engine management systems
<ul style="list-style-type: none"> • Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> • Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> • The air intake system is checked for blockages and leaks to determine if it is operating correctly. 	<ul style="list-style-type: none"> • Check the air intake system for blockages and leaks and determine if it is operating correctly.
<ul style="list-style-type: none"> • The fuel system and the engine compartment are checked visually to ensure no obvious faults exist. 	<ul style="list-style-type: none"> • Check the fuel system and the engine compartment visually to ensure no obvious faults exist.
<ul style="list-style-type: none"> • Suitable equipment is selected and used to enable system tests to be conducted. 	<ul style="list-style-type: none"> • Select and use suitable equipment to enable system test to be conducted.
<ul style="list-style-type: none"> • Circuit components are tested using test instruments without causing damage to circuit components and electronic devices. 	<ul style="list-style-type: none"> • Use test instruments and test circuit components without damaging circuit components and electronic devices.
<ul style="list-style-type: none"> • The self-test codes are activated, read, and interpreted to identify any faulty circuits. 	<ul style="list-style-type: none"> • Activate, read and interpret the self-test codes to identify any faulty circuits.
<ul style="list-style-type: none"> • The faulty circuit indicated by the self-test codes is tested on a simulator/running engine and the fault is located and identified. 	<ul style="list-style-type: none"> • Use a simulator/running engine to test the faulty circuit indicated by the self-test codes to locate and identify any faulty circuits.
<ul style="list-style-type: none"> • Electronic diesel circuits not monitored by the self-test system are tested to identify and locate faults. 	<ul style="list-style-type: none"> • Test the electronic diesel circuits not monitored by the self-test system, to identify and locate any faults.
<ul style="list-style-type: none"> • The fuel supply system is tested for operating pressure, pressure retention, and fuel flow rate. 	<ul style="list-style-type: none"> • Test the fuel supply system for operating pressure, pressure retention, and fuel flow rate.
<ul style="list-style-type: none"> • The results of the tests performed are recorded and compared with the vehicle specification. • Results are analysed to locate and identify the cause of any fault. 	<ul style="list-style-type: none"> • Record and compare the results of the performed tests with the vehicle specification. • Analyse results to locate and identify the cause of any fault.
ASSESSMENT TASKS OR ACTIVITIES	

- Observations.
- Class tests.
- Demonstrations.
- Practical tests.
- Assignment/tasks.

SUBJECT OUTCOME	
6.2 Rectify electronic diesel injection system faults on an engine	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> • Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> • Any faulty electronic diesel injection system components are replaced with parts that meet manufacturer's specifications as prescribed by the manufacturer. 	<ul style="list-style-type: none"> • Replace any faulty electronic diesel injection system components with parts that meet manufacturer's specifications as prescribed by the manufacturer.
<ul style="list-style-type: none"> • A simulator/running engine is used to test the system and ensure the integrity of the wiring is in a serviceable condition. 	<ul style="list-style-type: none"> • Use a simulator/running engine and test the system to ensure that the integrity of the wiring is in a serviceable condition.
<ul style="list-style-type: none"> • A simulator/running engine is used to test the system and ensure there are no fuel blockages. 	<ul style="list-style-type: none"> • Use a simulator/running engine and test the system to ensure there are no fuel blockages.
<ul style="list-style-type: none"> • A simulator/running engine is used to test the system and ensure there are no air or fuel leaks. 	<ul style="list-style-type: none"> • Use a simulator/running engine and test the system to ensure that there are no air or fuel leaks.
<ul style="list-style-type: none"> • All adjustments are checked and where necessary, corrected to comply with manufacturer's specifications. 	<ul style="list-style-type: none"> • Check all adjustments and where necessary, correct to comply with manufacturer's specifications.
<ul style="list-style-type: none"> • The electronic diesel injection system operates and performs to manufacturer's specifications. 	<ul style="list-style-type: none"> • Confirm the electronic diesel injection system operates and performs to manufacturer's specifications.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Observations. • Class tests. • Demonstrations. • Practical tests. • Assignment/tasks. 	

Topic 7: Diagnosis and rectification of faults in power assisted steering systems

SUBJECT OUTCOME	
7.1 Explain the functioning of power assisted steering systems	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • The operation of hydraulic assisted power 	<ul style="list-style-type: none"> • Explain the operation of hydraulic assisted

steering is explained	power steering
<ul style="list-style-type: none"> Individual parts of hydraulic assisted power steering are identified and their purpose is explained 	<ul style="list-style-type: none"> Identify and explain the purpose of the individual parts of hydraulic assisted power steering.
<ul style="list-style-type: none"> The operation of electronically controlled hydraulic assisted power steering is explained. 	<ul style="list-style-type: none"> Explain the operation of electronically controlled hydraulic assisted power steering.
<ul style="list-style-type: none"> Individual parts of electronically controlled hydraulic assisted power steering are identified and their purpose is explained 	<ul style="list-style-type: none"> Identify and explain the purpose of the individual parts of electronically controlled hydraulic assisted power steering.
<ul style="list-style-type: none"> The operation of electronically controlled electric assisted power steering is explained. 	<ul style="list-style-type: none"> Explain the operation of electronically controlled electric assisted power steering.
<ul style="list-style-type: none"> Individual parts of electronically controlled electric assisted power steering are identified and their purpose is explained. 	<ul style="list-style-type: none"> Identify and explain the purpose of the individual parts of electronically controlled electric assisted power steering.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Written test at the end of Subject Outcome Demonstration with models 	

SUBJECT OUTCOME	
7.2 Test and service power assisted steering	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Safe working practices are followed throughout the task. 	<ul style="list-style-type: none"> Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> Suitable tools and equipment are selected and used to enable tests and service work to be carried out. 	<ul style="list-style-type: none"> Select and use suitable tools and equipment to enable tests and service work to be carried out.
<ul style="list-style-type: none"> All necessary factory data in relation to servicing the steering is acquired. 	<ul style="list-style-type: none"> Acquire all necessary factory data in relation to servicing the steering.
<ul style="list-style-type: none"> The hydraulic fluid in the steering system is checked, and if necessary replaced. 	<ul style="list-style-type: none"> Check, and if necessary replace the hydraulic fluid in the steering system.
<ul style="list-style-type: none"> The tension of the drive belt driving the hydraulic pump is checked and if necessary adjusted 	<ul style="list-style-type: none"> Check, and if necessary adjust the tension of the drive belt driving the hydraulic pump.
<ul style="list-style-type: none"> The free-play between the rack and pinion of the steering housing is checked, and if necessary adjusted. 	<ul style="list-style-type: none"> Check, and if necessary adjust the free-play between the rack and pinion of the steering housing.
<ul style="list-style-type: none"> A visual check on the steering system is performed to determine possible faults and repair advice is provided. 	<ul style="list-style-type: none"> Check the steering system to determine possible faults and provide repair advice
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Evaluation of students' feedback Evaluate different practical exercises on service of power assisted steering. 	

- Written questions in addition to the exercises

SUBJECT OUTCOME	
7.3 Diagnose faults in an electronic power assisted steering system	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Safe working practices are applied throughout the task 	<ul style="list-style-type: none"> • Investigate and apply safe working practices throughout the task.
<ul style="list-style-type: none"> • A description is provided how to test a system and read out trouble codes using a diagnostic tool/scanner (in case of electronic power assisted steering) 	<ul style="list-style-type: none"> • Describe how to test the system and read out trouble codes using a diagnostic tool/scanner (in case of electronic power assisted steering).
<ul style="list-style-type: none"> • Any faulty components are replaced with parts that meet the manufacturer's specifications as prescribed by the manufacturer. 	<ul style="list-style-type: none"> • Replace any faulty components with parts that meet the manufacturer's specifications as prescribed by the manufacturer.
<ul style="list-style-type: none"> • The system is tested to ensure the integrity of the wiring is in a serviceable condition. 	<ul style="list-style-type: none"> • Test the system to ensure that the integrity of the wiring is in a serviceable condition.
<ul style="list-style-type: none"> • The system tested to ensure there are no electrical or hydraulic problems. 	<ul style="list-style-type: none"> • Test the system to ensure there are no electrical or hydraulic problems.
<ul style="list-style-type: none"> • The system is tested to ensure there are no leaks. 	<ul style="list-style-type: none"> • Test the system to ensure there are no leaks.
<ul style="list-style-type: none"> • All adjustments are checked and where necessary, corrected to comply with manufacturer's specifications. 	<ul style="list-style-type: none"> • Check all adjustments and where necessary, correct to comply with manufacturer's specifications.
<ul style="list-style-type: none"> • The system is operated and performs according to manufacturer's specifications. 	<ul style="list-style-type: none"> • Confirm the system performs according to manufacturer's specifications.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Evaluation of students' feedback • Evaluate different practical exercises on rectifying faults in power assisted steering systems. • Written questions in addition to the exercises 	

Topic 8: Diagnosis of electronic systems

SUBJECT OUTCOME	
8.1 Inspect and replace an electronic system	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • Relevant service information is located and used <p><i>Range: Includes diagnostic procedures, flow charts, and wiring diagrams.</i></p>	<ul style="list-style-type: none"> • Locate and use relevant service information.
<ul style="list-style-type: none"> • Electrical connector terminals, seals, and locks are inspected and replaced. 	<ul style="list-style-type: none"> • Inspect and replace electrical connector terminals, seals, and locks.

<ul style="list-style-type: none"> Sensors, controls, actuator components, and circuits are inspected and tested, and adjusted or replaced as needed. 	<ul style="list-style-type: none"> Inspect and test sensors, controls, actuator components, and circuits; adjust or replace as needed.
<ul style="list-style-type: none"> Customer parameters are accessed and changed, using recommended electronic diagnostic tools. <p><i>Range: Includes PC based software and/or data scan tools</i></p>	<ul style="list-style-type: none"> Access and change customer parameters, using recommended electronic diagnostic tools
<ul style="list-style-type: none"> A cylinder contribution is tested using the recommended electronic diagnostic tool 	<ul style="list-style-type: none"> Perform a cylinder contribution test using the recommended electronic diagnostic tool
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Evaluation of students' feedback Evaluate different practical exercises on inspecting and replacing electronic systems. Written questions in addition to the exercises 	

SUBJECT OUTCOME	
8.2 Use advanced electronic diagnostic tools to trace faults	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> A digital multi-meter is used to measure frequency, duty-cycle/pulse of electronic signals. 	<ul style="list-style-type: none"> Use a digital multi-meter to measure frequency, duty-cycle/pulse of electronic signals.
<ul style="list-style-type: none"> A lab-scope is used to measure different wave forms. 	<ul style="list-style-type: none"> Use a lab-scope to measure different wave forms.
<ul style="list-style-type: none"> A scanning tool is used to retrieve fault codes from various control units in the car. 	<ul style="list-style-type: none"> Use a scanning tool to retrieve fault codes from various control units in the car.
<ul style="list-style-type: none"> A scanning tool is used to capture live data from different sensors/actuators of electronic circuits. 	<ul style="list-style-type: none"> Use a scanning tool to capture live data from different sensors/actuators of electronic circuits.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Evaluation of students' feedback Evaluate different practical exercises on the use of advanced electronic diagnostic tools. Written questions in addition to the exercises 	

SUBJECT OUTCOME	
8.3 Construct and test advanced electronic circuits	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> The fundamentals of advanced electronic circuits are described and explained. 	<ul style="list-style-type: none"> Describe the fundamentals of advanced electronic circuits.
<ul style="list-style-type: none"> The operation of advanced electronic circuits is explained 	<ul style="list-style-type: none"> Explain the operation of advanced electronic circuits.

<ul style="list-style-type: none"> Advanced electronic circuit diagrams are read and interpreted 	<ul style="list-style-type: none"> Read and interpret advanced electronic circuit diagrams.
<ul style="list-style-type: none"> Advanced electronic and related components are identified and selected for circuit construction. 	<ul style="list-style-type: none"> Identify and select advanced electronic and related components for circuit construction.
<ul style="list-style-type: none"> A requisition form is completed 	<ul style="list-style-type: none"> Complete a requisition form.
<ul style="list-style-type: none"> Appropriate tools, personal and automobile protective equipment are selected and used correctly. 	<ul style="list-style-type: none"> Select and use appropriate tools, personal and automobile protective equipment correctly.
<ul style="list-style-type: none"> Appropriate hand tools and test equipment are correctly identified and used. 	<ul style="list-style-type: none"> Identify and use appropriate hand tools and test equipment correctly.
<ul style="list-style-type: none"> Advanced electronic circuits are constructed. 	<ul style="list-style-type: none"> Construct advanced electronic circuits.
<ul style="list-style-type: none"> Advanced electronic circuits are tested for static and dynamic voltages. 	<ul style="list-style-type: none"> Test advanced electronic circuits for static and dynamic voltages.
<ul style="list-style-type: none"> Circuits are operated according to manufacturers' specifications. 	<ul style="list-style-type: none"> Operate circuit according to manufacturers' specifications.
<ul style="list-style-type: none"> The relevant safety procedures are applied when working with electronic equipment. 	<ul style="list-style-type: none"> Apply the relevant safety procedures when working with electronic equipment.
<ul style="list-style-type: none"> Incidents and problems related to advanced electronic work are described 	<ul style="list-style-type: none"> Describe incidents and problems related to advanced electronic work.
<ul style="list-style-type: none"> A fault finding report is compiled. 	<ul style="list-style-type: none"> Compile a fault finding report.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Evaluation of students' feedback Evaluate different practical exercises on constructing and testing of advanced electronic circuits. Written questions in addition to the exercises 	

Topic 9: Air-conditioning in cars

SUBJECT OUTCOME	
9.1 Explain basic operation of air-conditioning systems	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Relevant safety practices and procedures when working with air conditioning systems are investigated and described. 	<ul style="list-style-type: none"> Investigate and describe relevant safety practices and procedures when working with air conditioning systems.
<ul style="list-style-type: none"> The basic operating principles of the refrigeration cycle are explained 	<ul style="list-style-type: none"> Explain the basic operating principles of the refrigeration cycle.
<ul style="list-style-type: none"> The components of an automobile air-conditioning system are named and their functions explained. 	<ul style="list-style-type: none"> Name the components of an automobile air-conditioning system and explain their functions.

<ul style="list-style-type: none"> Different types of air-conditioning systems used in cars are named and the differences between them are explained. <p><i>Range: manual, semi-automatic and full climate control systems</i></p>	<ul style="list-style-type: none"> Name different types of air-conditioning systems used in cars and explain the differences between them.
<ul style="list-style-type: none"> The functions of different refrigerant gases and their advantages and disadvantages are explained. 	<ul style="list-style-type: none"> Explain the functions of different refrigerant gases. Explain the advantages and disadvantages of different refrigerant gases
<ul style="list-style-type: none"> International laws on the use of different gas in automobile refrigerant systems are discussed 	<ul style="list-style-type: none"> List and describe international laws on the use of different gases in automobile refrigerant systems
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. Demonstrations. Practical tests. Interviews. Assignment/tasks. 	
SUBJECT OUTCOME	
9.2 Perform basic checks and maintenance on air-conditioning systems in cars	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> Appropriate tools, test equipment and components are identified and selected. 	<ul style="list-style-type: none"> Identify and select appropriate tools, test equipment and components.
<ul style="list-style-type: none"> Air-conditioning electrical circuit diagrams and component symbols are read and interpreted. 	<ul style="list-style-type: none"> Read and interpret air-conditioning electrical circuit diagrams and component symbols.
<ul style="list-style-type: none"> Air-conditioning problems are tested and diagnosed without connecting pressure gauges or gas bottles. 	<ul style="list-style-type: none"> Test and diagnose air-conditioning problems without connecting pressure gauges or gas bottles.
<ul style="list-style-type: none"> A requisition form is compiled 	<ul style="list-style-type: none"> Compile a requisition form.
<ul style="list-style-type: none"> Automobile air-conditioning systems are serviced and maintained according to manufacturer's specifications. 	<ul style="list-style-type: none"> Service and maintain automobile air-conditioning systems according to manufacturer's specifications.
<ul style="list-style-type: none"> The air-conditioning system is checked to see if it is operating according to manufacturer's specifications. 	<ul style="list-style-type: none"> Check that the air-conditioning system is operating according to manufacturer's specifications.
<ul style="list-style-type: none"> Incidents and problems related to automobile air-conditioning systems are described and reported in a fault finding report. 	<ul style="list-style-type: none"> Compile fault finding report on automobile air-conditioning systems.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Observations. Class tests. 	

<ul style="list-style-type: none"> • Demonstrations. • Practical tests. • Interviews. • Assignment/tasks. 	
SUBJECT OUTCOME	
9.3 Repair and rebuild air-conditioning systems in cars	
ASSESSMENT STANDARD	LEARNING OUTCOME
<ul style="list-style-type: none"> • Appropriate tools for emptying, disassembling, assembling and refilling air-conditioning systems are identified and selected. 	<ul style="list-style-type: none"> • Identify and select appropriate tools for emptying, disassembling, assembling and refilling air-conditioning systems.
<ul style="list-style-type: none"> • The appropriate filling station is used to recover the refrigerant gas from the air-conditioning system. 	<ul style="list-style-type: none"> • Use appropriate filling station to recover the refrigerant gas from the air-conditioning system.
<ul style="list-style-type: none"> • Different parts in the system renewed. <i>Range: condenser, evaporator, filter/dryer, pipes, expansion valve</i> 	<ul style="list-style-type: none"> • Renew different parts in the system.
<ul style="list-style-type: none"> • The system is tested for leakage (vacuum) and refilled with the right amount of refrigerant using the appropriate filling station. 	<ul style="list-style-type: none"> • Test the system for leakage (vacuum) and refill it with the right amount of refrigerant using the appropriate filling station.
<ul style="list-style-type: none"> • Fault codes are read out from electronic climate control systems and the repair procedure determined according to factory specifications. 	<ul style="list-style-type: none"> • Read out fault codes from electronic climate control systems and determine the repair procedure according to factory specifications.
<ul style="list-style-type: none"> • The performance of the system tested according to factory specifications and a report on the repair written. 	<ul style="list-style-type: none"> • Test the performance of the system according to factory specifications and write a report on the repair.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Observations. • Class tests. • Demonstrations. • Practical tests. • Interviews. • Assignment/tasks. 	

Topic 10: ABS/TCS/ESC systems in vehicles

SUBJECT OUTCOME	
10.1 Explain vehicle dynamics during braking, accelerating and cornering	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • The braking, acceleration and cornering forces between tyre and road surface are explained. 	<ul style="list-style-type: none"> • Explain the braking, acceleration and cornering forces between tyre and road surface.

<ul style="list-style-type: none"> The coefficient of friction and slip are explained. 	<ul style="list-style-type: none"> Explain the coefficient of friction and slip.
<ul style="list-style-type: none"> The Anti-lock Brake System (ABS) control is explained. 	<ul style="list-style-type: none"> Explain the Anti-lock Brake System (ABS) control.
<ul style="list-style-type: none"> The difference between 'select high' and 'select low' control is explained. 	<ul style="list-style-type: none"> Explain the difference between 'select high' and 'select low' control.
<ul style="list-style-type: none"> The Traction Control System (TCS) is explained. 	<ul style="list-style-type: none"> Explain the Traction Control System (TCS).
<ul style="list-style-type: none"> The Electronic Stability Control (ESC) is explained. 	<ul style="list-style-type: none"> Explain the Electronic Stability Control (ESC).
<ul style="list-style-type: none"> Braking and acceleration control on low and high traction surfaces is described. 	<ul style="list-style-type: none"> Describe braking and acceleration control on low and high traction surfaces.
<ul style="list-style-type: none"> Braking and acceleration control in cornering is described. 	<ul style="list-style-type: none"> Describe braking and acceleration control in cornering.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Written test at the end of Subject Outcome Demonstration with models 	

SUBJECT OUTCOME	
10.2 Explain the operation of the ABS/ TCS/ ESC system	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Differential parts of an ABS system are identified and their functions explained. 	<ul style="list-style-type: none"> Identify and explain the functions of differential parts of an ABS system.
<ul style="list-style-type: none"> The functions of different wheel sensors used in modern ABS systems are explained. 	<ul style="list-style-type: none"> Explain the functions of different wheel sensors used in modern ABS systems.
<ul style="list-style-type: none"> The working of the Hydraulic Electronic Control Unit (HECU) is explained. 	<ul style="list-style-type: none"> Explain the working of the Hydraulic Electronic Control Unit (HECU).
<ul style="list-style-type: none"> The electric circuit diagram of a basic ABS system is explained. 	<ul style="list-style-type: none"> Explain the electric circuit diagram of a basic ABS system.
<ul style="list-style-type: none"> Additional circuits in the wiring diagram are identified for the ABS system to work as a TCS and/or ESC system as well. 	<ul style="list-style-type: none"> Identify additional circuits in the wiring diagram for the ABS system to work as a TCS and/or ESC system as well.
<ul style="list-style-type: none"> The working of Electronic Brake Distribution (EBD) is explained as part of the ABS control system. 	<ul style="list-style-type: none"> Explain the working of Electronic Brake Distribution (EBD).as part of the ABS control system.
<ul style="list-style-type: none"> The working of Hydraulic Brake Assist (HBA) as part of the ABS system is explained. 	<ul style="list-style-type: none"> Explain the working of Hydraulic Brake Assist (HBA) as part of the ABS system.
<ul style="list-style-type: none"> Important safety issues when working on the 	<ul style="list-style-type: none"> List the important safety issues when working

ABS/TCS/ESC system are listed.	on the ABS/TCS/ESC system.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Written test at the end of Subject Outcome • Demonstration with models 	

Topic 11: SRS systems in vehicles

SUBJECT OUTCOME	
11.1 Understand dynamic safety issues in a car	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • The impact forces on a car in the event of a collision are explained. 	<ul style="list-style-type: none"> • Explain the impact forces on a car in the event of a collision.
<ul style="list-style-type: none"> • The importance of 'crumple zones' in a car is explained. 	<ul style="list-style-type: none"> • Explain the importance of 'crumple zones' in a car.
<ul style="list-style-type: none"> • Internationally recognised crash tests and 'star' ratings for cars are explained. 	<ul style="list-style-type: none"> • Explain internationally recognised crash tests and 'star' ratings for cars.
<ul style="list-style-type: none"> • The importance of active headrests and ISO fix systems for child seats is explained. 	<ul style="list-style-type: none"> • Explain the importance of active headrests and ISO fix systems for child seats.
<ul style="list-style-type: none"> • The term 'Supplementary Restraint System' is explained in relation to the use of seat belts. 	<ul style="list-style-type: none"> • Explain the term 'Supplementary Restraint System' in relation to the use of seat belts.
<ul style="list-style-type: none"> • The importance of the seat/ driver/ passenger position in case of a collision is explained. 	<ul style="list-style-type: none"> • Explain the importance of the seat/ driver/ passenger position in case of a collision.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Written test at the end of Subject Outcome • Demonstration with models 	

SUBJECT OUTCOME	
11.2 Explain the operation of the SRS system	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> • The different parts of a SRS system are identified and their functions are explained. 	<ul style="list-style-type: none"> • Identify different parts of a SRS system and explain their functions.
<ul style="list-style-type: none"> • Additional parts are identified when the SRS system is equipped with Passenger Airbag Deactivating device (PAD). 	<ul style="list-style-type: none"> • Identify additional parts when the SRS system is equipped with Passenger Airbag Deactivating device (PAD).
<ul style="list-style-type: none"> • Additional parts are identified when the SRS system is equipped with Passenger Presence Detecting (PPD) device. 	<ul style="list-style-type: none"> • Identify additional parts when the SRS system is equipped with Passenger Presence Detecting device (PPD).
<ul style="list-style-type: none"> • The deployment conditions of the different SRS devices are explained. 	<ul style="list-style-type: none"> • Explain the deployment conditions of the different SRS devices.
<ul style="list-style-type: none"> • Airbag classification standards are explained 	<ul style="list-style-type: none"> • Explain airbag classification standards

<ul style="list-style-type: none"> The electric circuit diagram of an SRS system is explained. 	<ul style="list-style-type: none"> Explain the electric circuit diagram of an SRS system.
<ul style="list-style-type: none"> Additional circuits in the wiring diagram are identified if the SRS is equipped with PAD and/or as PPD. 	<ul style="list-style-type: none"> Identify additional circuits in the wiring diagram if the SRS is equipped with PAD and/or as PPD.
<ul style="list-style-type: none"> The firing sequence of the different SRS devices is explained 	<ul style="list-style-type: none"> Explain the firing sequence of the different SRS devices.
<ul style="list-style-type: none"> The interpretation of the warning light for the driver is explained. 	<ul style="list-style-type: none"> Explain the interpretation of the warning light for the driver.
<ul style="list-style-type: none"> The safety issues that are important for working on the SRS system are listed. 	<ul style="list-style-type: none"> List the safety issues that are important for working on the SRS system.
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Written test at the end of Subject Outcome Demonstration with circuit diagrams 	

Topic 12: Hybrid and electric drivelines in vehicles

SUBJECT OUTCOME	
12.1 Explain the operation of the hybrid/ electrical driveline in a vehicle	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Different parts of a hybrid/ electrical driveline are identified and their functions are explained. <p><i>Range: Combustion engine, electro motor/generator unit, DC-DC converter, inverter, converter, batteries (both high voltage and low voltage), ECU and safety switch.</i></p>	<ul style="list-style-type: none"> Identify different parts of a hybrid/ electrical driveline and explain their functions.
<ul style="list-style-type: none"> The climate control system of the hybrid/ electrical driveline is explained. 	<ul style="list-style-type: none"> Explain the climate control system of the hybrid/electrical driveline.
<ul style="list-style-type: none"> The brake system of the hybrid/ electrical driveline is explained. 	<ul style="list-style-type: none"> Explain the brake system of the hybrid/ electrical driveline.
<ul style="list-style-type: none"> The cooling system of the hybrid/ electrical driveline is explained. 	<ul style="list-style-type: none"> Explain the cooling system of the hybrid/ electrical driveline.
<ul style="list-style-type: none"> The electric circuit diagram of a hybrid/ electrical driveline system is drawn. 	<ul style="list-style-type: none"> Draw the electric circuit diagram of an hybrid/ electrical driveline system
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> Written test at the end of Subject Outcome 	
SUBJECT OUTCOME	
12.2 Explain the advantages and safety risks of hybrid and electrical cars	
ASSESSMENT STANDARDS	LEARNING OUTCOMES
<ul style="list-style-type: none"> Advantages of using hybrid or electrical drivelines in cars are described. 	<ul style="list-style-type: none"> Describe the advantages of using hybrid or electrical drivelines in cars.

<ul style="list-style-type: none"> • Safety distinctions are made between hybrid and conventional drivelines. 	<ul style="list-style-type: none"> • Distinguish between the hybrid and conventional drivelines in terms of safety.
<ul style="list-style-type: none"> • The important safety issues when working on the hybrid/ electrical driveline system are listed. 	<ul style="list-style-type: none"> • List the important safety issues when working on the hybrid/ electrical driveline system.
<ul style="list-style-type: none"> • The consequences of starting a hybrid vehicle with a low 12 V battery are explained. 	<ul style="list-style-type: none"> • Explain the consequences of starting a hybrid vehicle with a low 12 V battery
<ul style="list-style-type: none"> • The internationally recognised safety regulations when working on hybrid and electrical vehicles are explained. 	<ul style="list-style-type: none"> • Explain the internationally recognised safety regulations when working on hybrid and electrical vehicles.
<ul style="list-style-type: none"> • Different ways of charging the battery in a hybrid/electrical driveline are explained. 	<ul style="list-style-type: none"> • Explain different ways of charging the battery in a hybrid/electrical driveline
<ul style="list-style-type: none"> • Appropriate tools and protection when working on hybrid and electrical vehicles is explained. 	<ul style="list-style-type: none"> • Explain appropriate tools and protection when working on hybrid and electrical vehicles
ASSESSMENT TASKS OR ACTIVITIES	
<ul style="list-style-type: none"> • Written test at the end of Subject Outcome 	

4 SPECIFICATIONS FOR EXTERNAL ASSESSMENT IN AUTOMOTIVE REPAIR AND MAINTENANCE – LEVEL 4

4.1 Integrated summative assessment task (ISAT)

A compulsory component of the external assessment (ESASS) is the **integrated summative assessment task (ISAT)**. The ISAT draws on the students' cumulative learning achieved throughout the year. The task requires **integrated application of competence** and is executed and recorded in compliance with assessment conditions.

Two approaches to the ISAT may be as follows:

The students are assigned a task at the beginning of the year which they must complete in phases throughout the year to obtain an assessment mark. A final assessment is made at the end of the year when the task is completed.

OR

Students achieve the competencies throughout the year but the competencies are assessed cumulatively in a single assessment or examination session at the end of the year.

The integrated ISAT is set by an externally appointed examiner and is conveyed to colleges in the first quarter of the year.

The integrated assessment approach enables students to be assessed in more than one subject with the same ISAT.

4.2 National Examination

A National Examination is conducted annually in October or November by means of a paper(s) set and moderated externally. The following distribution of cognitive application should be followed:

LEVEL 4	KNOWLEDGE AND COMPREHENSION	APPLICATION	ANALYSIS, SYNTHESIS AND EVALUATION
	30%	50%	20%