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AUTOMOTIVE MECHATRONICS

TRAINER GUIDE

National Vocational Certificate Level 2

Version 1 - October, 2019

NAVTTC

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Introduction

Competence-based training helps to bridge the gap between what is taught in training and what tasks will be performed on the job. Training trainees to perform actual job functions helps to ensure that future front-line workers have the skills, knowledge and abilities required to perform their jobs properly, safely and effectively. In addition to competence-based training, assessment based on the performance of actual work competencies helps to ensure that:

- trainees are performing their work tasks as safely as possible
- performance gaps are recognized prior to serious incidents
- Training can be implemented to improve competence.

There are significant benefits to competence-based training:

1. **Cost effectiveness**

   Since training activities and assessments in a competence-based approach are goal-oriented, trainers focus on clearly defined areas of skills, knowledge and understanding that their own industry has defined in the competence standards. At the same time, trainees are more motivated to learn when they realize the benefits of improved performance.

2. **Efficiency**

   The transfer gap between the training environment and working on the job is reduced substantially in a competence-based approach. This is because training and assessment are relevant to what needs to be done on the job. As a result, it takes less time for trainees to become competent in the required areas. This, in turn, contributes to improved efficiency where training and assessment are concerned.

3. **Increased productivity**

   When trainees become competent in the competence standards that their own industry has defined, when they know what the performance expectations are and receive recognition for their abilities through successful assessments, they are likely to be more motivated and experience higher job satisfaction. The result is improved productivity for organizations. The communication and constructive feedback between future employers and employees will improve as a result of a competence-based approach, which can also increase productivity.

4. **Reduced risk**

   Using a competence-based approach to training, development, and assessment, employers are able to create project teams of people with complementary skills. A trainee's record of the skills, knowledge and understanding relating to the competence standards they have achieved can be used by a future employer to identify and provide further relevant training and assessment for new skills areas. Competence standards can shape employee development and promotional paths within an organization and give employees the opportunity to learn more competencies beyond their roles. It can also provide organizations with greater ability to scale and flex as needed, thereby reducing the risk they face.

5. **Increased customer satisfaction**

   Employees who have been trained and assessed using a competence-based approach are, by the definition of the relevant competence standards, able to perform the required tasks associated with a job. The knock-on effect is that, in service-related industries, they are able to provide high service levels, thereby increasing customer satisfaction. In production or manufacturing industries, they are able to work closely to industry standards in a more effective and efficient way.

Lesson plans

This manual provides a series of lesson plans that will guide delivery of each module for the *automotive mechatronics* qualification. It is important for trainers to be flexible and be ready to adapt lesson plans to suit the context of the subject and the needs of their trainees.

Good teachers acknowledge that CBT means each and every trainee in the class learns at a different speed. The good teacher is prepared to throw aside the day's lesson plan and do something different (and unplanned) for the class even if it means 'writing' a lesson plan for each trainee to match their learning pace for that day or week.

Learning by doing is different from learning theory and then applying it. To learn to do something, trainees need someone looking over their shoulder saying 'it's not quite like that, it's like this', and 'you do it like this because …', or even 'tell me why you chose to do it like this?'

In this way, trainees learn that theoretical knowledge is meaningless if it is not seen in the context of what they are doing. In other words, if a trainee doesn't know why they do something, they will not do it competently (skills underpinned by knowledge = competent performer).

This is how an *automotive mechatronics* acquires a practical grasp of the standards expected. It's not by learning it in theory, but because those standards are acquired through correction by people who show what the standards are, and correct the trainee where they do not meet those standards, and where they repeat it correction until they have internalized those standards.

Demonstration of skill

Demonstration or modelling a skill is a powerful tool, which is used, in vocational training. The instructions for trainers for demonstration are as under:

a) Read the procedure mentioned in the Trainer Guide for the relevant Learning Unit before demonstration.
b) Arrange all tools, equipment and consumable material, which are required for demonstration of a skill.
c) Practice the skill before demonstration to trainees, if possible.
d) Introduce the skill to trainees clearly at the commencement of demonstration.
e) Explain how the skill relates to the skill(s) already acquired and describe the expected results or show the objects to trainees.
f) Carry out demonstration in a way that can be seen by all trainees.
g) Use the same tools and materials that the learner will be using.
h) Go through EACH of the steps involved in performing the skill.
i) Go SLOWLY - describe each step as it is completed.
j) Encourage the learners to move around and watch what you are doing from a number of different angles.

k) Identify critical or complex steps, or steps that involve safety precautions to be followed.
l) Explain theoretical knowledge where applicable and ask questions to trainees to test their understanding.
m) Try to involve the learners: Ask them questions about why they think the process may work that way.
n) Repeat critical steps in demonstration, if required.
o) Summarize the demonstration by asking questions to trainees.

Involvement in the process (actively seeing) is important at this stage. When you work on getting involved, getting people to participate, you make them a part of what is happening. Questions for clarification or explanation are important throughout the demonstration. It is up to the learners to ask questions about things they do not understand, but it is also important for trainers to seek out and elicit questions from learners. A trainer may need to do repeated demonstrations of difficult or complex skills.

Frequently Asked Questions (FAQs)

1. What is Competency Based Training (CBT) and how is it different from currently offered trainings in institutes?	Competency-based training (CBT) is an approach to vocational education and training that places emphasis on what a person can do in the workplace as a result of completing a program of training. Compared to conventional programs, the competency based training is not primarily content based; it rather focuses on the competence requirement of the envisaged job role. The whole qualification refers to certain industry standard criterion and is modularized in nature rather than being course oriented.
2. What is the passing criterion for CBT certificate?	You shall be required to be declared "Competent" in the summative assessment to attain the certificate.
3. How can I progress in my educational career after attaining this certificate?	You shall be eligible to take admission in the National Vocational Certificate Level-3 in Automotive Mechatronics. You shall be able to progress further to National Vocational Certificate Level-4 in Automotive Mechatronics; and take admission in a level-5, DAE or equivalent course. In certain case, you may be required to attain an equivalence certificate from The Inter Board Committee of Chairmen (IBCC).
4. What is the importance of this certificate in National and International job market?	This certificate is based on the nationally standardized and notified competency standards by National Vocational and Technical Training Commission (NAVTTC). These standards are also recognized worldwide as all the standards are coded using international methodology and are accessible to the employers worldwide through NAVTTC website.
5. Which jobs can I get after attaining this certificate? Are there job for this certificate in public sector as well?	You shall be able to take up jobs as an automotive mechatronics technician, spare parts dealers, supervisors and managers.
6. What are possible career progressions in industry after attaining this certificate?	You shall be able to progress up to the level of supervisor after attaining sufficient experience, knowledge and skills during the job. Attaining additional relevant qualifications may aid your career advancement to even higher levels.
7. Is this certificate recognized by any competent authority	This certificate is based on the nationally standardized and notified

in Pakistan?	competency standards by National Vocational and Technical Training Commission (NAVTTC). The official certificates shall be awarded by the relevant certificate awarding body.
8. Is on-the-job training mandatory for this certificate? If yes, what is the duration of on-the-job training?	On-the-job training is not a requirement for final / summative assessment of this certificate. However, taking up on-the-job training after or during the course work may add your chances to get a job afterwards.
9. What is the examination / assessment system in this program?	Competency based assessments are organized by training institutes during the course which serve the purpose of assessing the progress and preparedness of each student. Final / summative assessments are organized by the relevant qualification awarding bodies at the end of the certificate program. You shall be required to be declared "Competent" in the summative assessment to attain the certificate.
10. Does this certificate enable me to work as freelancer?	You can start your small business as an automotive mechatronics technician. You may need additional skills on entrepreneurship to support your initiative.

Overview of the program

Course: Automotive Mechatronics Lev 2 **Total Course Duration:** 6 months

Course Overview:

The purpose of the Automotive Mechatronics course is to provide knowledge, skills and understanding to start this career in Pakistan. This qualification will not only build the capacity of existing workers of automobile industry but also support the youth to acquire skills best fit for this sector. The benefits and impact of development of these qualifications will be on both demand and supply side. The qualification mainly cover competencies along with related knowledge and professional skills which are essential for getting a job or being self-employed.

Module	Learning Unit	Duration
Module 1: Comply Personal Health and Safety Guidelines **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to comply personal health and safety guidelines	**LU 1:** Identify Personal Hazards at Workplace **LU 2:** Apply Personal Protective and Safety Equipment (PPE) **LU 3:** Comply Occupational Safety and Health (OSH) **LU 4:** Dispose of hazardous Waste/materials from the designated area	30 Hrs
Module 2: Communicate the Workplace Policy and Procedure **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to communicate the workplace policy and procedure	**LU 1:** Identify workplace communication procedures **LU 2:** Communicate at workplace **LU 3:** Draft Written Information **LU 4:** Review Documents	20 Hrs

Module	Learning Unit	Duration
Module 3: Perform Basic Communication (Specific) **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perform basic communication (specific)	**LU 1:** Communicate in a team to achieve intended outcomes **LU 2:** Follow Supervisor's instructions as per organizational SOPs **LU 3:** Develop Generic communication skills at workplace	30 Hrs
Module 4: Perform Basic Computer Application (Specific) **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perform basic computer application (specific)	**LU 1:** Create Word Documents **LU 2:** Use internet for Browsing	40 Hrs
Module 5: Maintain Engine Assembly **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain engine assembly	**LU 1:** Remove & Refit Engine Head Assembly **LU 2:** Remove & Refit Engine Block Assembly **LU 3:** Set Engine Timings **LU 4:** Couple Engine & Transmission	50 HRS
Module 6: Maintain Fuel System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain fuel system	**LU 1:** Service Fuel Injectors and Rail **LU 2:** Repair Fuel Pump **LU 3:** Perform Carburettor Service **LU 4:** Perform Throttle Body Service	50 HRS

Module	Learning Unit	Duration
Module 7: Service Engine Cooling System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to service engine cooling system	**LU 1:** Perform Radiator Service **LU 2:** Perform Radiator Fan Service **LU 3:** Evaluate Thermos tat Valve Performance **LU 4:** Evaluate Water Pump Performance	50 HRS
Module 8: Maintain Engine Lubrication System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain engine lubrication system	**LU 1:** Test Performance of Oil Pressure Switch **LU 2:** Service Oil Pump **LU 3:** Investigate & Repair Oil Leakages	30 HRS
Module 9: Maintain Brake System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain brake system	**LU 1:** Perform Maintenance of Mechanical Brake System **LU 2:** Perform Maintenance of Hydraulic Brake System **LU 3:** Perform Maintenance of Pneumatic Brake System	50 HRS

Module	Learning Unit	Duration
Module 10: Maintain Suspension System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain suspension system	**LU 1:** Check Performance of McPherson Strut **LU 2:** Check Tie Rod Performance **LU 3:** Check Performance of Coil Spring Sagging **LU 4:** Test Performance of Stabilizer Bar **LU 5:** Test Knuckle Assembly Operations **LU 6:** Check Performance of Upper & Lower Suspension Arms **LU 7:** Test Differential System **LU 8:** Test Axle Assembly **LU 9:** Maintain Wheel Alignment **LU 10:** Maintain Wheel Balancing	60 HRS
Module 11: Check Vehicle Transmission System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to check vehicle transmission system	**LU 1:** Check Performance of Manual Transmission **LU 2:** Check Performance of Mechanical Clutch System **LU 3:** Check Performance of Hydraulic Clutch System	50 HRS
Module 12: Service Electrical System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to service electrical system	**LU 1:** Check Performance of Ignition System **LU 2:** Test Performance of Fuses & Relays **LU 3:** Service Lighting System **LU 4:** Test Performance of Alternator **LU 5:** Service Self-Starting System	70 HRS

Module	Learning Unit	Duration
Module 13: Perform On-Board Diagnostic (OBD-II) Scanner Operations **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perform On-Board diagnostic scanner operation	**LU 1:** Perform Scanning & Diagnoses **LU 2:** Investigate OBD-II for Fault Analysis **LU 3:** Check Vehicle's Mechanical Parameters of OBD-II Operations **LU 4:** Maintain OBD-II Scanner	50 HRS

FORMAT FOR LESSON PLAN			
Module 5: Maintain Engine Assembly			
Learning Unit 1: Remove & Refit Engine Head Assembly			
Methods	Key Notes The tools, techniques and processes used for removing and refitting engine head assemblies	Media	Time
	Introduction		
	This session will introduce learners to the tools, techniques and processes used for removing and refitting engine head assemblies, using presentation, demonstration, question and answer, and practical skills development.		
	Main Body		
	• Engine types (2 stroke, 4 stoke, Petrol Engine, Diesel Engine etc.) • Main parts of engine head assembly (i.e. Cylinder Head, Tappet Cover, Valves, Valve Guides, Cam Shaft, Intake Manifold, Exhaust Manifold) • Function of inlet and exhaust manifold • Valve timing and valve mechanism of engine • Procedure of disassembly and assembly of cylinder head including checking of cylinder head for warpage • Variable valve timing with intelligence (VVTI) and variable valve timing & lift electronic control (VTEC) • Knowledge of Magnetic Particle Inspection		
	Conclusion		
	To conclude the session, review the tools, techniques and processes used for removing and refitting engine head assemblies. Give learners the opportunity to ask questions.		
	<u>Assessment</u> Question and answer, discussion groups with feedback, observation of practice skills development		
		Total time:	

Trainer's guidelines

Module 1: Comply Personal Health and Safety Guidelines			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Identify Personal Hazards at Workplace			
LU 2: Apply Personal Protective and Safety Equipment (PPE)			
LU 3: Comply Occupational Safety and Health (OSH)			
LU 4: Dispose of hazardous Waste/materials from the designated area			

Module 2: Communicate the Workplace Policy and Procedure			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Identify workplace communication procedures			
LU 2: Communicate at workplace			
LU 3: Draft Written Information			
LU 4: Review Documents			

Module 3: Perform Basic Communication (Specific)			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Communicate in a team to achieve intended outcomes			
LU 2: Follow Supervisor's instructions as per organizational SOPs			
LU 3: Develop Generic communication skills at workplace			

Module 4: Perform Basic Computer Application (Specific)			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Create Word Documents			
LU 2: Use internet for Browsing			

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Remove & Refit Engine Head Assembly	Deliver an illustrated presentation about Remove & Refit Engine Head Assembly. Ensure that the presentation focuses on the following key points: • Engine types (2 stroke, 4 stoke, Petrol Engine, Diesel Engine etc.) • Main parts of engine head assembly (i.e. Cylinder Head, Tappet Cover, Valves, Valve Guides, Cam Shaft, Intake Manifold, Exhaust Manifold) • Function of inlet and exhaust manifold • Valve timing and valve mechanism of engine • Procedure of disassembly and assembly of cylinder head including checking of cylinder head for warpage • Variable valve timing with intelligence (VVTI) and variable valve timing & lift electronic control (VTEC) • Knowledge of Magnetic Particle Inspection Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about Remove & Refit Engine Head Assembly. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group.	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Compression Tester Valve Lifter Ring Compressor Ring Expander Plier set Engine Hoist Hydraulic Jack Combination Spanner Set Allen key Set Socket Set Wheel Spanner Oil filter spanner Torque Wrench Tool Trolley Engine mounts. Hammer Mallet Clutch plate alignment tool

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for Remove & Refit Engine Head Assembly. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. After activity, demonstrate the above stated competence for better understanding of the trainees. Where facilities exist at the training provider's premises, enable learners to practice using the appropriate tools and equipment for Removing & Refitting Engine Head Assembly in a controlled environment Learners must be able to practice and develop their knowledge and skills relating to Removing & Refitting		Engine Oil Multimedia Videos Handouts Learner's guide White board Board markers Kerosene Oil Lock Tight Silicon Tube Engine Gasket Set Emery Paper Cotton Waste Relevant PPEs

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Engine Head Assembly in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 2: Remove & Refit Engine Block Assembly	Deliver an illustrated presentation on how to Remove & Refit Engine Block Assembly. Ensure you focus on the following key points: • The importance of PPEs when remove and refit engine block assembly • Main parts of engine block assembly (i.e. Cylinder Block, Crankshaft, Piston, Rings, Connecting Rod, Flywheel, Main seal housing) • Knowledge of crankshaft and camshaft function and their location • Function of engine components (i.e. Piston, Piston Rings, Cylinder Liner, Oil Galleries, Thrust Bearings) • Types of Engine blocks (i.e. V Engine, Inline Block, Boxer Engines) • Procedure of disassembly and assembly of engine block as per vehicle's manual Learners need to devise 10 quiz questions with answers based on Remove & Refit Engine Block Assembly. They must make sure their questions cover key topics for Remove & Refit Engine Block	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Compression Tester Valve Lifter Ring Compressor Ring Expander Plier set Engine Hoist Hydraulic Jack Combination Spanner Set Allen key Set Socket Set Wheel Spanner Oil filter spanner

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Assembly. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side. They then need to devise a two-part question for each card about a key topic relating to Remove & Refit Engine Block Assembly. The first part of the question should ask for a fact about Remove & Refit Engine Block Assembly. The second part should need an explanation or an example. On the reverse of the card, they should write an appropriate two-part answer to their question. An explanation should be short and concise. If examples are requested, the learner must provide two or three alternative examples. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer **both parts of** the question. Discuss the answer with the group and ask the group to determine if the answer is correct. If either part of the answer is not correct, the question passes to all players in Team B to answer. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) Under the appropriate teams score column, the scorekeeper records 2 mark for each correct part of the answer given by the original player answering the question. If play passes to the whole team, only 1 mark is recorded for each part of the question.		Torque Wrench Tool Trolley Engine mounts. Hammer Mallet Clutch plate alignment tool Engine Oil Kerosene Oil Lock Tight Silicon Tube Engine Gasket Set Cotton Waste Emery Paper Relevant PPEs

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After quiz session, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Remove & Refit Engine Block Assembly in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Use appropriate resources (see Media column) to reinforce various points.		
LU 3: Set Engine Timings	Deliver an illustrated presentation to Set Engine Timings. Ensure you focus on the following key points: • Operational knowledge of tools/equipment, required to set engine timings • Importance of engine timings • Procedure to adjusting timing gears • Importance of workshop manual Display a slide or flip chart with a key question relating	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Compression Tester

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	to Set Engine Timings. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to Set Engine Timings. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Set Engine Timings in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Use appropriate resources (see Media column) to reinforce various points.		Plier set Engine Hoist Hydraulic Jack Combination Spanner Set Allen key Set Socket Set Torque Wrench Tool Trolley Engine mounts Hammer Mallet Clutch plate alignment tool Silicon Tube Cotton Waste Relevant PPEs

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 4: Couple Engine & Transmission	Lead a brainstorm session on how to Couple Engine & Transmission. Ensure you focus on the following key points: • function of clutch assembly • Parts (i.e. Clutch plate, Pressure plate, Flywheel, Clutch bearing) of clutch assembly • Procedure of disassembly/assembly of coupling engine and transmission • The importance of PPEs when Couple Engine & Transmission • Importance of health and safety Display a flip chart showing the following key question: *'What are the challenges when* Coupling Engine & Transmission*?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Plier set Engine Hoist Hydraulic Jack Combination Spanner Set Allen key Set Socket Set Torque Wrench Tool Trolley Engine mounts. Hammer Mallet Clutch plate alignment tool Silicon Tube Cotton Waste Relevant PPEs

Module 5: 071400942 Maintain Engine Assembly			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After the discussion, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Coupling Engine & Transmission in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Use appropriate resources (see Media column) to reinforce various points.		

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Service Fuel Injectors and Rail	Deliver an illustrated presentation on the importance of Service Fuel Injectors and Rail. Ensure that the presentation addresses the following points, including demonstrations of equipment, preparation and methods where appropriate: • function and working of fuel system • types of fuel used in vehicles gasoline (Petrol), Diesel, LPG (Liquid petroleum gas) and CNG (compressed natural gas) • Parts of fuel system (i.e. Fuel Tanks, Fuel Pipes and rails, Fuel Pump, Fuel filter, Fuel injectors) • Function of fuel injectors • Understanding purpose and method to assemble air cleaner • Servicing of injectors as per vehicle's manual • The importance of PPEs when service fuel injectors and rail • Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating to Service Fuel Injectors and Rail. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important.	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Injector cleaner Petrol Kerosene Oil Cotton waste Emery paper Silicon tube Teflon tape Relevant PPEs

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Step 2 – Pair For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to Service Fuel Injectors and Rail. Ensure that learners have the opportunity to ask questions to support their understanding. Arrange a question and answer session to clarify trainee understanding. After activity, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to Service Fuel Injectors and Rail in a real or realistic environment.		
LU 2: Repair Fuel Pump	Deliver an illustrated presentation to Repair Fuel Pump. Ensure the presentation focuses on the following key points: • knowledge and understanding of tools/equipment, required to repair fuel pump • types of fuel pumps (mechanical fuel pump,	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop	Multimedia Videos Handouts Learner's guide White board

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	electrical fuel pump) • function of fuel pump • servicing fuel pumps including diagnostic techniques (i.e. pressure of fuel, vacuum of fuel) • The importance of PPEs to repair fuel pump • Importance of health and safety • Importance of housekeeping Display a flip chart showing the following key question: *'What are the challenges when* Repairing Fuel Pump*?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss	with required tools and equipment	Board markers Petrol Kerosene Oil Cotton waste Emery paper Silicon tube Relevant PPEs

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After activity, demonstrate the above stated competence for better understanding of the trainees. Trainees need to practice their skills in using basic methods and equipment to Repair Fuel Pump in a real or realistic environment. After the practical sessions are complete, lead a feedback session. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		
LU 3: Perform Carburettor Service	Lead a discussion to Perform Carburettor Service. Use real examples to support the discussion and ensure the discussion considers: • Types of carburettor and its various circuits. • Operational knowledge and understanding of main parts of carburettor • Identifying air filter • method to remove air filter • procedure of disassembly and assembly of carburettor including its service method as per workshop manual • purpose of mixture screws	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Petrol Kerosene Oil Cotton waste Emery paper

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• procedure to adjust mixture screws to get smooth idling of engine • The importance of PPEs to perform carburettor service • Importance of health and safety Display a slide or flip chart with a key question relating to Perform Carburettor Service. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to Perform Carburettor Service. Learners must be able to practice and develop their knowledge and skills relating to Perform Carburettor Service in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		Silicon tube Relevant PPEs

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 4: Perform Throttle Body Service	Deliver an illustrated presentation on the procedure to Perform Throttle Body Service. Ensure the presentation focuses on the following key points: • throttle body assembly with accessories (pressure regulator, injector or injectors, TP sensor, idle speed control motor, throttle shaft) • function of throttle body • servicing procedure of throttle body • The importance of PPEs to perform throttle body service • Importance of health and safety Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for Perform Throttle Body Service. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for Perform Throttle Body Service. Discuss these main points briefly with	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Repair manual Wrench Socket Set Screwdriver Set Needle nose pliers Impact screw driver Combination Spanner Set Pressure Gauge Vacuum Gauge Digital Multimeter Diagnostic Scanner Relevant PPEs

Module 6: 071400943 Maintain Fuel System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Perform Throttle Body Service in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. After the practical sessions are complete, lead a feedback session. Ask questions to confirm their understanding.		

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Perform Radiator Service	Deliver an illustrated presentation on how to Perform Radiator Service. Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to perform radiator service • The importance of using the correct tools and equipment (as per job requirement), to perform the competence • Operational knowledge and understanding of function and basic parts of cooling system (i.e. Radiator, Hoses, Water Jackets, Thermostat valve, Temperature Switch, Cooling Fan, Water Pump) • purpose and function of coolant in cooling system • function of (heat exchanger) Radiator • Identifying components of Radiator (i.e. Fins, Upper Tank, Lower Tank, Tubes, Pressure Cap and Drain Plug etc.) • function of pressure cap valves (i.e. Pressure relief valve and Vacuum valve) • The importance of PPEs when perform radiator service • Importance of health and safety Prepare either: • A flip chart	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Relevant PPEs Wire Brush Combination Pliers Nose Plier Spanner set Coolant drain tray Fiber brush Phillips Screw Driver Set Flat Screw Driver Set Pressure Cap Tester Thermometer

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• A PowerPoint slide • A handout …showing key topics for Perform Radiator Service . Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for Perform Radiator Service. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Perform Radiator Service in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 2: Perform Radiator Fan Service	Lead a discussion on ways to Perform Radiator Fan Service. Be sure to cover the following points: • Operational knowledge and understanding of tools/equipment, required to perform radiator fan service • types of cooling system (i.e. Air cooling system, Water cooling system) • Percentage of direct air cooling (29%) and water cooling (71%) • The importance of PPEs when perform radiator fan service • Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating to Perform Radiator Fan Service. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share**	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment Classroom/Demonstration room workshop	Multimedia Videos Handouts Learner's guide White board Board markers Wire Brush Combination Pliers Nose Plier Spanner set Coolant drain tray Fiber brush Phillips Screw Driver Set Flat Screw Driver Set Pressure Cap Tester Thermometer Relevant PPEs

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to Perform Radiator Fan Service. Learners must be able to practice and develop their knowledge and skills relating to Perform Radiator Fan Service in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. After discussion, demonstrate the above stated competence for better understanding of the trainees. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions. Trainees need to practice their skills in using basic methods and equipment to Perform Radiator Fan Service, in a real or realistic environment. After the practical sessions are completed, lead a feedback session.		
LU 3: Evaluate Thermostat Valve Performance	Deliver an illustrated presentation on Evaluation of Thermostat Valve Performance. Ensure the presentation focuses on the following key points: • Operational knowledge and understanding of	Class room with multimedia aid and flip charts	Multimedia Videos Handouts Learner's guide

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	tools/equipment, required to evaluate thermostat valve performance • Operational knowledge and understanding of function of thermostat valve • material used in thermostat valve (i.e. Wax pellet) • Knowledge of operating temperature of thermostat valves • The importance of PPEs when evaluate thermostat valve performance • Importance of health and safety • Importance of housekeeping Learners need to devise 05 quiz questions with answers based on Evaluation of Thermostat Valve Performance. They must make sure their questions cover key topics for masonry works. Issue each learner with 05 blank cards. Each learner should number the cards and write their name on one side. They then need to devise a two-part question for each card about a key topic relating to performing masonry works. The first part of the question should ask for a fact about Evaluation of Thermostat Valve Performance. The second part should need an explanation or an example. On the reverse of the card, they should write an appropriate two-part answer to their question. An explanation should be short and concise. If examples are requested, the learner must provide two or three alternative examples.	Or Access to an Automobile Workshop with required tools and equipment	White board Board markers Combination Pliers Nose Plier Spanner set Phillips Screw Driver Set Flat Screw Driver Set Relevant PPEs

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer **both parts of** the question. Discuss the answer with the group and ask the group to determine if the answer is correct. If either part of the answer is not correct, the question passes to all players in Team B to answer. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) Under the appropriate team's score column, the scorekeeper records 2 mark for each correct part of the answer given by the original player answering the question. If play passes to the whole team, only 1 mark is recorded for each part of the question. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After the activity, demonstrate the above stated competence for better understanding of the trainees.		

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Ask questions to confirm their understanding. Trainees need to practice their skills in Evaluation of Thermostat Valve Performance, in a real or realistic environment. After the practical sessions are completed, lead a feedback session. Provide opportunities for trainees to ask their own questions.		
LU 4: Evaluate Water Pump Performance	Deliver an illustrated presentation on Evaluation of Water Pump Performance. Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to evaluate water pump performance • parts of water pump (i.e. Propeller, Bearing, Fan pulley) • procedure of disassembly and assembly of water pump including its connections (i.e. Water connections) • The importance of PPEs when evaluate water pump performance • Importance of health and safety • Importance of housekeeping	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Combination Pliers Nose Plier Spanner set Coolant drain tray Phillips Screw Driver Set Flat Screw Driver Set Relevant PPEs

Module 7: 071400944 Service Engine Cooling System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for Evaluation of Water Pump Performance. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for Evaluation of Water Pump Performance. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Learners must be able to practice and develop their knowledge and skills relating to Evaluation of Water Pump Performance in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 8: 071400945 Maintain Engine Lubrication System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Test Performance of Oil Pressure Switch	Begin this session with an illustrated presentation on Test Performance of Oil Pressure Switch. Ensure that the presentation addresses the following points: • Operational knowledge and understanding of tools/equipment, required to test performance of oil pressure switch • types of lubrication system (i.e. splash system, pressure feed system, combined splash and pressure feed system) • main functions of engine lubrication system (i.e. reducing frictional effect, cooling effect, sealing effect and cleaning effect) • Parts of lubrication system (oil sump, oil pump, oil filter, oil galleries, oil pressure switch and pressure relief valve etc.) • Main purpose of oil pressure relief valve. • Function of oil pressure switch • The importance of PPEs when test performance of oil pressure switch • Importance of health and safety • Importance of housekeeping The next short activity is a collaborative activity on Test Performance of Oil Pressure Switch. The tutor should display a slide or flip chart with a key question relating to Test Performance of Oil Pressure Switch. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Oil filter Kerosene oil Silicon Tube Spanner set Socket set Screw driver set Combination Plier Hammer Seals Relevant PPEs

Module 8: 071400945 Maintain Engine Lubrication System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for the tutor to invite different pairs to share the ideas they have discussed in response to the key question relating to Test Performance of Oil Pressure Switch. After activity, demonstrate the above stated competence for better understanding of the trainees. Arrange a question and answer session to clarify trainee understanding. To prepare for the practical sessions, divide the trainees in small groups and allocate each group one task to Test Performance of Oil Pressure Switch. Check that each group understand their task.		
LU 2: Service Oil Pump	Begin this session with an illustrated presentation on servicing of oil pump. Ensure that the presentation addresses the following points: • Operational knowledge and understanding of tools/equipment, required for servicing of oil pump	Class room with multimedia aid and flip charts	Multimedia Videos Handouts Learner's guide White board

Module 8: 071400945 Maintain Engine Lubrication System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Different types of oil pumps (rotor type, gear type) • Operational knowledge and understanding of function of oil pump • Structure and parts of oil pump (i.e. oil strainer , oil pump rotor and shaft ,oil seals) • Pressure and pressure of oil pump h(which ranges from 30-40 PSI) • The importance of PPEs when service oil pump • Importance of health and safety • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about how to service oil pump. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flip chart. Put up the flip chart where it can be easily	Or Access to an Automobile Workshop with required tools and equipment	Board markers Oil filter Kerosene oil Silicon Tube Spanner set Socket set Screw driver set Combination Plier Hammer Seals and gasket Relevant PPEs

Module 8: 071400945 Maintain Engine Lubrication System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	seen by other learners. Ask the group to share the main points they have recorded for their key topic for how to service oil pump. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flip chart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Service of Oil Pump in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. After the practical sessions are completed, lead a feedback session.		
LU 3: Investigate & Repair Oil Leakages	Lead a discussion about how to investigate & repair oil leakages. Use examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required for investigate &	Class room with multimedia aid and flip charts Or	Multimedia Videos Handouts Learner's guide

Module 8: 071400945 Maintain Engine Lubrication System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	repair oil leakages • Reasons of oil leakage • Signs of oil leakage (black spot, wet parts) • Function of oil cooler • Repairing of oil leakages • The importance of PPEs when investigate & repair oil leakages • Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating to investigate & repair oil leakages. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to investigate & repair oil leakages.	Access to an Automobile Workshop with required tools and equipment	White board Board markers Oil filter Kerosene oil Silicon Tube Spanner set Socket set Screw driver set Combination Plier Hammer Seals Engine oil Relevant PPEs

Module 8: 071400945 Maintain Engine Lubrication System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to investigate & repair oil leakages in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. After the practical sessions are completed, lead a feedback session.		

Module 9: 071400946 Maintain Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Perform Maintenance of Mechanical Brake System	Begin this session with an illustrated presentation on how to perform maintenance of mechanical brake system. Ensure that the presentation addresses the following points: • Operational knowledge and understanding of tools/equipment, required to perform maintenance of mechanical brake system • Identification of brake system • Function of brake system • Types of brake system (i.e. Mechanical, Pneumatic, Hydraulic, Power Brake, ABS) • Identification of components of mechanical brake system (i.e. Hand lever, cable, Brake assembly) • Types of brake assembly (i.e. Shoe/Drum type, Disc/Pad type) • Inspection and service of mechanical brake systems • Method of installing wheel bearing • The importance of PPEs when perform maintenance of mechanical brake system • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to perform maintenance of mechanical brake system. They must make sure their questions cover key topics for how to perform maintenance of mechanical brake system.	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Cotton waste Brake Shoes Brake Pads Petrol Emery paper Relevant PPEs

Module 9: 071400946 Maintain Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about how to perform maintenance of mechanical brake system. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Arrange a question and answer session to clarify		

Module 9: 071400946 Maintain Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	trainee's understanding. Trainees need to practice their skills in maintenance of mechanical brake system, in a real or realistic environment.		
LU 2: Perform Maintenance of Hydraulic Brake System	Lead a brainstorm on ways to perform maintenance of hydraulic brake system. Use ideas from the brainstorm to explain the following key points: • Operational knowledge and understanding of tools/equipment, required to perform maintenance of hydraulic brake system • Types of hydraulic brake system (i.e. Calliper assembly, Wheel cylinder) • Procedure of maintaining hydraulic brake system including disassembly and assembly of related components • Importance and procedure of brake bleeding • Purpose of brake master cylinder, Wheel cylinder and brake booster • Purpose, characteristics and importance of brake fluid • The importance of PPEs when perform maintenance of hydraulic brake system • Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating to perform maintenance of hydraulic brake system. **Step 1 – Think** Working on their own, each learner **thinks** about the	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Brake fluid Cotton waste Brake Shoes Brake Pads Master cylinder kit Wheel cylinder seal Petrol Emery paper 0 No. Relevant PPEs

Module 9: 071400946 Maintain Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to perform maintenance of hydraulic brake system. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to perform maintenance of hydraulic brake system in an appropriate practical setting. Arrange a question and answer session to clarify trainee's understanding. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 3: Perform Maintenance of Pneumatic Brake System	Deliver an illustrated presentation on how to perform maintenance of pneumatic brake system. Ensure the presentation focuses on the following key points: • Operational knowledge and understanding of	Class room with multimedia aid and flip charts Or	Multimedia Videos Handouts Learner's guide

Module 9: 071400946 Maintain Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	tools/equipment, required to perform maintenance of pneumatic brake system • Types of pressure (i.e. Atmospheric pressure, Negative pressure) • Parts of pneumatic brake system (i.e. Compressor, Storage tanks, Brake booster, Valves, Diaphragm etc.) • Procedure of maintaining pneumatic brake system including disassembly and assembly of related components • The importance of PPEs when perform maintenance of pneumatic brake system • Importance of health and safety • Importance of housekeeping Display a flip chart showing the following key question: *'Which safety precautions are necessary when you perform maintenance of pneumatic brake system?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass	Access to an Automobile Workshop with required tools and equipment	White board Board markers Cotton waste Brake Shoes Brake Pads Petrol Emery paper 0 No. Relevant PPEs

Module 9: 071400946 Maintain Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to perform maintenance of pneumatic brake system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. After the practical sessions are completed, lead a feedback session. Ask questions to confirm their understanding.		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Check Performance of McPherson Strut	Lead a discussion about how to check performance of McPherson strut. Use examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to check performance of McPherson strut • Suspension system and its types • Sprung and un-sprung weight • Coil spring and its damages • Identification of steering linkages and their location • Procedure of disassembling and assembling of steering and linkages • McPherson pivot bearing and purpose of its placement. • Procedure of removal of McPherson strut from car, including assessment of its performance. • The importance of PPEs when check performance of McPherson strut • Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating how to check performance of McPherson strut. **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Rubber seal Hydraulic oil Cotton clothes Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to how to check performance of McPherson strut. Learners must be able to practice and develop their knowledge and skills relating to to check performance of McPherson strut in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 2: Check Tie Rod Performance	Lead a brainstorm on ways to check tie rod performance. Use ideas from the brainstorm to explain the following key points: • Operational knowledge and understanding of tools/equipment, required to check tie rod performance • Identification of ball joint, Tie rod, tie rod end, rack end inspection • Purpose of ball joint • Function of ball joint and their types. • Performance of ball joint including free play	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Rubber bushes Staring oil

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Procedure to replace ball joint • The importance of PPEs when check tie rod performance • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to check tie rod performance. They must make sure their questions cover key topics for how to check tie rod performance. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about how to check tie rod performance. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which		Oil seal Cotton cloths Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to to check tie rod performance in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 3: Check Performance of Coil Spring Sagging	Lead a discussion about how to check performance of coil spring sagging**.** Use examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to check performance of coil spring sagging • Types of coil spring • Coil spring and explaining coil spring height, diameter, wire diameter and number of turns. • Coil spring rubber cushion including replacement of cracked/damaged rubber cushion • Spring rate and calculating loading capacity of the coil spring. • Coil spring replacement as per manufacture's	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Rubber bush Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	specification. • The importance of PPEs to check performance of coil spring sagging • Importance of health and safety • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for how to check performance of coil spring sagging. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for how to check performance of coil spring sagging. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary.		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to check performance of coil spring sagging in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 4: Test Performance of Stabilizer Bar	Deliver an illustrated presentation on how to Test Performance of Stabilizer Bar**.** Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to test performance of stabilizer bar • Components of stabilizer bar including linkage. • Inspection procedure for stabilizer bar and linkage • Replacement sequence of Stabilizer bar including Stabilizer bar linkages. • Stabilizer bar adjustment • Operation of Stabilizer bar • Procedure of transverse (or side-to-side) wheel supporting. • Procedure of longitudinal (front-to-back) wheel supporting.	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Grease and oil Stabilizer bush kit Cotton cloth Relevant PPEs

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Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• The importance of PPEs when test performance of stabilizer bar • Importance of health and safety Display a flip chart showing the following key question: *'What are the Replacement sequence of stabilizer bar including stabilizer bar linkages?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss		

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Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to Test Performance of Stabilizer Bar in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 5: Test Knuckle Assembly Operations	Lead a discussion about how to Test Knuckle Assembly Operations. Ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to test Knuckle assembly operations • Inspection procedure for knuckle assembly • Reasons and rectification of excessive play in knuckle assembly. • Replacement procedure of wheel bearing. • Wheel hub replacement procedure including safety precautions taken. • Types of wheel hub bearings and oil seals. • Function of Tapper roller bearing including ball bearing. • The importance of PPEs when test Knuckle	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Grease and kerosene oil Cotton cloth Relevant PPEs

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Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	assembly operations • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on Test Knuckle Assembly Operations. They must make sure their questions cover key topics for Test Knuckle Assembly Operations. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side. They then need to devise a two-part question for each card about a key topic relating to Test Knuckle Assembly Operations. The first part of the question should ask for a fact about Test Knuckle Assembly Operations. The second part should need an explanation or an example. On the reverse of the card, they should write an appropriate two-part answer to their question. An explanation should be short and concise. If examples are requested, the learner must provide two or three alternative examples. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer **both parts of** the question. Discuss the answer with the group and ask the group to determine if the answer is		

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Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	correct. If either part of the answer is not correct, the question passes to all players in Team B to answer. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) Under the appropriate team's score column, the scorekeeper records 2 mark for each correct part of the answer given by the original player answering the question. If play passes to the whole team, only 1 mark is recorded for each part of the question. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skill to Test Knuckle Assembly Operations meeting and exceeding guest expectations in an appropriate practical setting. Ensure that learners have the opportunity to ask		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	questions to support their understanding.		
LU 6: Check Performance of Upper & Lower Suspension Arms	Deliver an illustrated presentation on how to check performance of upper & lower suspension arms**.** Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to check performance of upper & lower suspension arms • Inspection procedure of suspension, upper and lower arms ball joints. • Replacement procedure of suspension arm rubber bushes. • Suspension, upper and lower arms ball joint replacement. • Replacement procedure of upper and lower Suspension arm. • Procedure of shock absorber rubber bush replacement including their types (single acting, double acting, Oil filled/Gas filled) • The importance of PPEs when check performance of upper & lower suspension arms • Importance of health and safety	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Grease and oil Rubber bushes Relevant PPEs

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Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Importance of housekeeping prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about how to check performance of upper & lower suspension arms. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flipchart. Put up the flipchart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for how to check performance of upper & lower suspension arms. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to check performance of upper & lower suspension arms. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 7: Test Differential System	Lead a discussion about how to test differential system. Use examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to test differential system • Differential axle types and their purpose (Hypoid gear & Spiral Bevel) • Differential oil level inspecting/ checking procedures • Importance of oil grade • Differential oil level replenishment. • Differential air breather service/working procedure.		Multimedia Videos Handouts Learner's guide White board Board markers Oil and grease Rubber bushes Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Differential axle oil seals replacement procedure. • The importance of PPEs when test differential system • Importance of health and safety • Importance of housekeeping Display a flip chart showing the following key question: *'Who else do you need to do when inspecting differential oil level?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to test differential system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 8: Test Axle Assembly	Deliver an illustrated presentation on how to test axle assembly . Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to test axle assembly • Procedure of inner/outer CV Joint replacement including CV Joint excessive play and noisy determine. • Procedure of inner/outer CV Joint rubber boot replacement • Procedure of assembling Wheel hub lock & nut for proper securing wheel. • The importance of PPEs when test axle assembly	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Axle oil Grease Cotton cloth Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on providing a linen service. They must make sure their questions cover key topics for test axle assembly. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about testing of axle assembly. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won.		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to providing a linen service in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 9: Maintain Wheel Alignment	Invite an experienced Automobile expert to deliver a presentation on how to maintain wheel alignment . Ensure their presentation addresses the following important points: • Operational knowledge and understanding of tools/equipment, required to maintain wheel alignment • Types of tires and rims (Radial & Bias tyre, tubeless tyres, RFT, Alloy rims) • Explaining procedure to inspect and replace tires and rims • Wheel alignment and steering geometry • Wheel alignment procedure for proper wheel alignment.	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Wheel balancing weight Cotton cloth Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Inspection procedure for camber, caster, toe-in/ toe-out • Adjusting/measuring procedure for camber, caster, toe-in/ toe-out on wheel alignment machine. • Importance of road testing after the wheel alignment procedure. • The importance of PPEs when maintain wheel alignment • Importance of health and safety • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for maintaining wheel alignment. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for maintaining wheel alignment. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified.		

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to maintain wheel alignment in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 10: Maintain Wheel Balancing	Deliver an illustrated presentation on how to maintain wheel balancing**.** Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to maintain wheel balancing • Checking of vehicle tires conditions including specification. • Alloy wheel balancing procedure on wheel balancing machine. • Procedure of wheel assembling & disassembling on wheel balancing machine. • The importance of PPEs when maintain wheel balancing	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Wheel balancing Machine Balancing weight (different weight set) Cotton cloth Relevant PPEs

Module 10: 071400947 Maintain Suspension System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating to maintain wheel balancing . **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to maintain wheel balancing. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to maintain wheel balancing in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Check Performance of Manual Transmission	Deliver an illustrated presentation on how to check performance of manual transmission. Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to check performance of manual transmission • Gear types and their usage in different transmissions. • Transmission types (for example manual, automatic, semi-automatic, CVT) • Transmission oil replacement procedure (including oil seals). • Transmission gear shifting methods and procedure. • Identification of transmission noises during driving operation. • Inspection and replacement procedure of synchronizer ring gears • Importance of gear ratios for torque or speed in gearbox • The importance of PPEs when check performance of manual transmission • Importance of health and safety Prepare either: • A flip chart • A PowerPoint slide	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Cotton cloth for cleaning. Gear oil. Relevant PPEs

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• A handout …showing the key topics about how to check performance of manual transmission. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flip chart. Put up the flip chart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for how to check performance of manual transmission. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary.		

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to check performance of manual transmission in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 2: Check Performance of Mechanical Clutch System	Lead a discussion about how to check performance of mechanical clutch system. Use examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to check performance of mechanical clutch system • Identification of components of mechanical clutch system (clutch cable, release bearing). • Disassembling/assembling process of clutch components • Procedure of clutch cable adjustment • Gearbox assembly removal /installation procedure. • The importance of PPEs when check performance of mechanical clutch system • Importance of health and safety • Importance of housekeeping	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Oil can for lubricating joints. Gear oil as recommended by OEM. Cotton cloth for cleaning Relevant PPEs

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Display a flip chart showing the following key question related to check performance of mechanical clutch system: • *'Why is it important to follow proper sequence for disassembling/assembling process of clutch components?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After activity, demonstrate the above stated competence for better understanding of the trainees.		

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Learners must be able to practice and develop their knowledge and skills relating to check performance of mechanical clutch system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 3: Check Performance of Hydraulic Clutch System	Invite an experienced Automobile expert to deliver a presentation on how to check performance of hydraulic clutch system**.** Ensure their presentation addresses the following important points: • Operational knowledge and understanding of tools/equipment, required to check performance of hydraulic clutch system • Hydraulic clutch components • Hydraulic clutch operating method/procedure. • Clutch master cylinder oil seal replacement. • Clutch slave cylinder oil seal replacement • Hydraulic clutch bleeding procedure. • The importance of PPEs when check performance of hydraulic clutch system • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on checking performance of hydraulic clutch system. They must make sure their questions cover key topics for checking performance of hydraulic clutch system.	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers DOT-4 Hydraulic/Brake Oil Oil Seal Size: As recommended by the OEM. Cotton cloth for cleaning Relevant PPEs

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about to check performance of hydraulic clutch system. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees.		

Module 11: 071400948 Check Vehicle Transmission System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Learners must be able to practice and develop their knowledge and skills relating to maintaining the health, safety and security of the working environment in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Check Performance of Ignition System	Invite an experienced Automobile expert to deliver a presentation on how to check performance of ignition system. Ensure their presentation addresses the following important points: • Operational knowledge and understanding of tools/equipment, required to check performance of ignition system • Reading and interpretation of manufacturer's repair manual • Identification and explanation of different types of ignition system (i.e. direct ignition system, IDS ignition system, distributor system, distributor less system, mechanical ignition system, electronic ignition system) • Operation procedure of ignition switch • The spark plug types (i.e. cold type plug, hot type plug) • Function of plugs (i.e. troubleshooting and rectify faulty parts) • Distributor and distributor caps with its operation, function and location of components (i.e. rooter, point, condenser and mechanical weight) • Function of contact breaker (CB) point and its location • Identification of sensors of ignition system • Types of sensors • The importance of PPEs when check performance of ignition system • Importance of health and safety	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Service Creeper Digital Multimeter Flat / Philips Screwdriver Set Combination Spanner Set Repair Manual Combination Plier Needle Nose Plier Test Lamp Bearing puller OBD – II scanner Relevant PPEs

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Importance of housekeeping Display a slide or flip chart with a key question relating to how to check performance of ignition system **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to how to check performance of ignition system After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to check performance of ignition system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 2: Test Performance of Fuses & Relays	Lead a discussion about how to test performance of fuses & relays. Use real examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to test performance of fuses & relays • Identifying fuses and relays and their purpose • Checking fuses and relays (i.e. under dash fuse box, under hood fuse box) • Wiring harness and wiring circuit diagram • Checking all wiring harness and connectors of an electrical system of cars • Use of Scanners • Diagnosing fault with the help of OBD – II scanner (i.e. troubleshooting, repair and maintenance) • The importance of PPEs when test performance of fuses & relays • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on testing performance of fuses & relays. They must make sure their questions cover key topics for testing performance of fuses & relays. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side. They then need to devise a two-part question for each card about a key topic relating to test performance of fuses & relays. The first part of the question should ask for a fact about test performance of fuses & relays. The second part should	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Service Creeper Digital Multimeter Flat / Philips Screwdriver Set Combination Spanner Set Repair Manual Combination Plier Needle Nose Plier Test Lamp Bearing puller OBD – II scanner Relevant PPEs

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	need an explanation or an example. On the reverse of the card, they should write an appropriate two-part answer to their question. An explanation should be short and concise. If examples are requested, the learner must provide two or three alternative examples. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer **both parts of** the question. Discuss the answer with the group and ask the group to determine if the answer is correct. If either part of the answer is not correct, the question passes to all players in Team B to answer. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) Under the appropriate team's score column, the scorekeeper records 2 mark for each correct part of the answer given by the original player answering the question. If play passes to the whole team, only 1 mark is recorded for each part of the question. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their		

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to test performance of fuses & relays in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 3: Service Lighting System	Deliver an illustrated presentation on how to service lighting system. Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required for service lighting system • Checking method of the condition of head lights, tail lights/bulbs and replacing • Checking and replacing method of the reverse light and the reverse gear switch • Checking and replacing method of fog lights and their bulbs • Checking and replacing method of roof light, reading lights and their bulbs • Checking and replacing method of break switch and its function • Checking signals with their bulbs and replace their faulty parts • Checking and replacing method of parking lights with their bulbs • Instrument panel light with their bulbs	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Service Creeper Digital Multimeter Flat / Philips Screwdriver Set Combination Spanner Set Repair Manual Combination Plier Needle Nose Plier Test Lamp Bearing puller OBD – II scanner

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Combination switch with its function and its parts • Wiring harness of lighting system • The importance of PPEs when service lighting system • Importance of health and safety • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about service lighting system. Go through all the key topics briefly and then allocate **one key topic** to each group. Learners need to work in their small groups discussing the key topic that has been allocated to their group. Each group should use a sheet of flip chart paper to record **three main points** from their discussions that relate to **their key topic**. After the discussion, begin the feedback session. Ask one group to come to the front of the class with their flip chart. Put up the flip chart where it can be easily seen by other learners. Ask the group to share the main points they have recorded for their key topic for service lighting system. Discuss these main points briefly with the whole group. Learners should make additional notes **on the flip chart** to record additional points their group had not identified. Then ask the next group to share their flipchart showing the main points they have recorded for the next key topic.		Relevant PPEs

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. Photograph or scan all the flipcharts and use these to create a handout to distribute to all learners. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to service lighting system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 4: Test Performance of Alternator	Lead a brainstorm on ways to test performance of alternator. Use ideas from the brainstorm to explain the following key points: • Operational knowledge and understanding of tools/equipment, required for test performance of alternator • Method to check charging of warning light on odometer • Uses of DMM (digital multi-meter) • Method to check the alternator output voltage and ampere with the help of DMM • Function of alternator with voltage regulator • Wiring harness and electrical connectors • Tension belt of alternator • Method to replace the faulty components of the alternator according to standard procedure	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Service Creeper Digital Multimeter Flat / Philips Screwdriver Set Combination Spanner Set Repair Manual Combination Plier Needle Nose Plier

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Checking of wiring harness of alternators with the help of DMM • The importance of PPEs when test performance of alternator • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to test performance of alternator**.**They must make sure their questions cover key topics for testing performance of alternator Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about how to test performance of alternator**.** On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team		Test Lamp Bearing puller OBD – II scanner Relevant PPEs

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to test performance of alternator in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 5: Service Self-Starting System	Lead a discussion about how to service self-starting system. Use real examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required for service self- starting system • Checking of self-starting components (i.e. self-starter, self-solenoid, wiring harness, self-relay and fuse) • Function of solenoid in self-starter • Knowledge of different types of batteries (including Hybrid Batteries) • Operational knowledge and understanding of the function of relay in self-starter and starter motor • Function of starter motor • Wiring harness of self-starting system	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Service Creeper Digital Multimeter Flat / Philips Screwdriver Set Combination Spanner Set Repair Manual Combination Plier Needle Nose Plier

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Procedure of troubleshooting the fault of self-starter system with OBD – II scanner • The importance of PPEs when service self- starting system • Importance of health and safety • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout • …showing key topics for servicing self- starting system. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask one group to share the main points they have recorded for the first key topic for servicing self- starting system. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion		Test Lamp Bearing puller OBD – II scanner Relevant PPEs

Module 12: 071400949 Service Electrical System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	process. Continue until you have covered all the key topics. End the group discussion activity with a summary. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to service self- starting system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Perform Scanning & Diagnoses	Lead a brainstorm on ways to perform scanning & diagnoses. Use ideas from the brainstorm to explain the following key points: • Operational knowledge and understanding of tools/equipment, required to perform scanning & diagnoses • Knowledge of OBD-II scanner • Function of OBD-II scanner • Identification of main parts of OBD-II scanner • Procedure of connecting OBD-II scanner • Complete procedure of scanning by OBD-II • Identification of different types of sensor and their location (i.e. engine coolant temperature sensor, O2 sensor, TP sensor, crank shaft position sensor, cam shaft position sensor, MAF sensor, MAP sensor, Knock sensor, vehicle speed sensor etc.) • Knowledge of ECT (Electronically Controlled Transmission) • The importance of PPEs when perform scanning & diagnoses • Importance of health and safety • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to perform scanning & diagnoses. They must make sure their questions cover key topics for how to perform scanning & diagnoses. Issue each learner with 10 blank cards. Each learner	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Relevant PPEs OBD-II scanner Tool kit Screw drivers (flat/Philips)

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	should number the cards and write their name on one side with a question about how to perform scanning & diagnoses. On the reverse of the card, they should write an appropriate answer to their question. For the quiz, arrange learners in two equal teams. Ask one learner to keep score using a suitable score-card. Player 1 for Team A asks one of their questions to Player 1 of Team B, who needs to answer the question. Discuss the answer with the group and ask the group to determine if the answer is correct. Player 1 of Team A then confirms the answer they had devised. (You need to correct answers if the learner's answer was not wholly correct.) The scorekeeper records 1 mark for a correct answer under the appropriate team's score column. Play then passes to Player 1 of Team B, who asks their question to Player 1 of Team A, and so on. Total the scores at the end of the quiz to see which team won. After the quiz, collect learners' question/answer cards and check that answers provided were correct. Return any incorrect answers to learners and ask them to change their answer to the correct one. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to perform scanning & diagnoses in a hospitality setting in an appropriate		

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 2: Investigate OBD-II for Fault Analysis	Lead a discussion about how to investigate OBD-II for fault analysis. Use real examples to support the discussion and ensure the discussion considers: • Operational knowledge and understanding of tools/equipment, required to investigate OBD-II for fault analysis. • Knowledge of DTC (Diagnostic trouble code) • Different DTC codes (for example P 1120 and P 1125 for air fuel control) • Procedure to remove faults and ensure with OBD-II scanner • The importance of PPEs to investigate OBD-II for fault analysis. • Importance of health and safety • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for investigating OBD-II for fault analysis. Learners need to work in small groups discussing the key topics. Each group should make notes from their discussions that identify **three main points** that related to **each key topic**. After the discussion, begin the feedback session. Ask	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Relevant PPEs OBD-II scanner Tool kit Screw drivers (flat/Philips)

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	one group to share the main points they have recorded for the first key topic for investigating OBD-II for fault analysis. Discuss these main points briefly with the whole group. Learners should make additional notes to record additional points their group had not identified. Then ask the next group to share the main points they have recorded for the second key topic. Repeat the discussion process. Continue until you have covered all the key topics. End the group discussion activity with a summary. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to investigating OBD-II for fault analysis in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 3: Check Vehicle's Mechanical Parameters of OBD-II Operations	Deliver an illustrated presentation on how to check vehicle's mechanical parameters of OBD-II operations. Ensure you address the importance of the following points: • Operational knowledge and understanding of tools/equipment, required to check vehicle's mechanical parameters of OBD-II operations. • Complete procedure for scanning faults with OBD-II • Defining Actuators	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Relevant PPEs OBD-II scanner

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Different type of Actuator (IAC Valve, solenoid, stepper motors etc.) • The importance of PPEs to check vehicle's mechanical parameters of OBD-II operations. • Importance of health and safety • Importance of housekeeping Display a flip chart showing the following key question: *'How confident are you when scanning faults with OBD-II?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that they will be sharing their work with other learners. Ask learners to write silently for 3-5 minutes answering the question displayed on the flip chart. When learners have completed writing, instruct them to pass their paper to the learner on their left. Each learner will read what their partner has passed to them and write a response. This will also be done silently. After another 2-3 minutes, instruct the learners to pass the paper to their left a second time. Repeat the same procedure, also done in silence. At the end of the activity, ask the learners to return the paper to the original writer. Allow learners a few moments to read over the responses to their writing. Ask learners to work in pairs to reflect on and discuss the responses to the question on the flip chart. When this activity is concluded, collect the papers and make copies for each learner. After activity, demonstrate the above stated		Tool kit Screw drivers (flat/Philips)

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to check vehicle's mechanical parameters of OBD-II operations in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 4: Maintain OBD-II Scanner	Invite an experienced hospitality expert to deliver a presentation on how to maintain OBD-II Scanner. Ensure their presentation addresses the following important points: • Operational knowledge and understanding of tools/equipment, required to maintain OBD-II Scanner • Handling and cleaning techniques of OBD-II scanner • Ensuring the good working condition of OBD-II • Storing OBD-II scanner safely at allocated place • The importance of PPEs when maintain OBD-II Scanner • Importance of health and safety • Importance of housekeeping Display a slide or flip chart with a key question relating to how to maintain OBD-II Scanner **Step 1 – Think** Working on their own, each learner **thinks** about the	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools and equipment	Multimedia Videos Handouts Learner's guide White board Board markers Relevant PPEs OBD-II scanner Tool kit Screw drivers (flat/Philips)

Module 13: 071400950 Perform On-Board Diagnostic (OBD-II) Scanner Operations			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	question and makes notes of their responses or key points which they believe to be important. **Step 2 – Pair** For the next step, each learner **pairs** up with a partner. The two learners exchange their ideas and make further notes to add clarity to their own ideas. **Step 3 – Share** The final step is for you to invite different pairs to share the ideas they have discussed in response to the key question relating to how to deliver effective and efficient service for guests. After activity, demonstrate the above stated competence for better understanding of the trainees. Learners must be able to practice and develop their knowledge and skills relating to maintain OBD-II Scanner in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding.		

Short Questions/Answers

1. What is index mark?	It is a fix mark located near crank shaft and cam shaft.
2. Where the timing mark is located?	It is located on the crank shaft and cam shaft.
3. Give name of main parts of an engine	Main parts of an engine are head cylinder, cylinder block and oil pan.
4. Define function of carburettor system	It provides accurate mixture of air and gasoline to engine combustion chamber.
5. What's a throttle body? https://mechanicbase.com/engine/fuel-induction-service/	It is responsible for taking in the air and fuel to mix it according to the right proportion and as per the computer's input. The throttle body consists of a body and a plate which determines how much air inlet in, similar to how the butterfly valve works in carburetors.
6. Why do I need to clean my fuel injectors? https://www.precisiontune.com/services/fuel-system-service/	Cleaning the fuel injectors on a regular scheduled maintenance program removes carbon deposits which forms on piston valves and fuel injector nozzles due to burning of the fuel. It interferes with the spray pattern and flow of fuel.
7. Is the following statement True or False? Pressure valve and vacuum valve are parts of radiator pressure cap	True
8. When should the thermostat valve replace?	It should be replaced if not completely closed at normal atmosphere temperature.
9. Are pressure valve and vacuum valve parts of radiator pressure cap?	Yes they are.
10. What are the Purposes of engine lubrication? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-engine-lubrication-system/	Minimizes wear in moving parts Helps in keeping the parts cool Washes away and carries away dirt
11. What parts of the engine of a car can oil leak from? https://axleaddict.com/auto-repair/5-Reasons-Your-Car-is-Leaking-	Valve Cover Gaskets, Head Gasket, Rear Main Seal, Front Main Seal, Timing Cover, Oil Pan Gasket, Oil Drain Plug, Oil Filter, Dip Stick Inlet,

Oil	Crack in the Block, Oil Cap, and anywhere that water can leak from if the block or head gasket has ruptured and allowed oil and water to mix.
12. What is Viscosity index (VI)? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-engine-lubrication-system/	Viscosity index (VI) is a measure for the change of viscosity with change in Temperature
13. How many types of of Oil pumps are used in Engine Lubrication system? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-engine-lubrication-system/	There are 3 types of oil pumps are used in Engine Lubrication System; Gear type Rotor type Plunger type
14. Which parts are lubricated by splash system? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-engine-lubrication-system/l	Piston and piston rings Tappets Cams on camshaft
15. To stop a vehicle, the force required is dependent on? https://scholarexpress.com/multiple-choice-questions-mcq-on-braking-system/	the weight of vehicle the deceleration rate
16. An automobile brake is only used to reduce the speed or bring the vehicle to hault https://www.sanfoundry.com/machine-design-questions-answers-brakes/	No. It can also be used to hold the car stationary.
17. Are pneumatic brake same as electrical brakes? https://www.sanfoundry.com/machine-design-questions-answers-brakes/	No, one deals with pressure and other with electricity.

18. How mechanical brakes are operated? https://scholarexpress.com/multiple-choice-questions-mcq-on-braking-system/	mechanical brakes are operated by means of a) levers b) bell cranks c) cams
19. Internal shoe brakes are radial while external shoe brakes are axial brakes. https://www.sanfoundry.com/machine-design-questions-answers-brakes/	False. Both internal and external shoe brakes are radial brakes.

20. What is the function of master cylinder in hydraulic brakes? https://scholarexpress.com/multiple-choice-questions-mcq-on-braking-system/	The function of master cylinder in hydraulic brakes is to (A) builds up hydraulic pressure to operate the brakes (B) maintains constant volume of fluid in the system (C) serves as a pump to force air out of the hydraulic system
21. What is the main purpose of a car suspension? https://play.howstuffworks.com/quiz/car-suspension-quiz	The job of a car suspension is to maximize the friction between the tires and the road surface, to provide steering stability with good handling and to ensure the comfort of the passengers.
22. Why the stabilizers (sway bars) are used? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-suspension-system/2/	The stabilizers (sway bars) are used to connect shock absorber operating arm
23. What is called a combination of roll and pitch? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-suspension-system/2/	Diagonal pitch.
24. What term describes the ability of a vehicle to travel a curved path? https://play.howstuffworks.com/quiz/car-suspension-quiz	Cornering is the ability of a vehicle to travel a curved path.
25. What are the two different cycles of shock absorbers? https://play.howstuffworks.com/quiz/car-suspension-quiz	Shock absorbers work in two cycles -- the compression cycle and the extension cycle.
26. What are the types of leaf springs? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-suspension-system/	three Quarter elliptic semi elliptic quarter elliptic
27. What are the dead axles? https://scholarexpress.com/multiple-choice-questions-mcq-with-	These are simply beams which supports the vehicle weight

28. What is loosely defined as the mass between the road and the suspension springs? https://play.howstuffworks.com/quiz/car-suspension-quiz	The sprung mass is the mass of the vehicle supported on the springs, while the unsprang mass is loosely defined as the mass between the road and the suspension springs.
29. What is CVT stands for?	Continuous variable transmission
30. What are the classes of Mechanical transmission? https://scholarexpress.com/multiple-choice-questions-mcq-on-transmission-system/	Mechanical transmission can be of following classes (A) Clutch, gearbox and live axle transmission (B) Clutch, gearbox and dead axle transmission (C) Clutch, gearbox and axle less transmission
31. How Increase of torque in a vehicle is obtained? https://www.sanfoundry.com/automobile-engineering-questions-answers-transmission-system-gearbox/	Increase of torque in a vehicle is obtained by decreasing speed.
32. What is the purpose of bleeding in hydraulic system?	To remove air from wheel cylinder/ hydraulic system
33. How manual transmission is connected to the engine? https://play.howstuffworks.com/quiz/transmission-quiz	The clutch connects the transmission to the engine.
34. What connects the gears to the drive shaft in a manual transmission? https://play.howstuffworks.com/quiz/transmission-quiz	The collar can slide left or right along the shaft to engage one of the gears.
35. What two things do automatic transmissions lack that manual transmissions have? https://play.howstuffworks.com/quiz/transmission-quiz	An automatic transmission lacks a clutch pedal and gear shift.
36. What provides a smooth means of disengagement and engagement between the engine and the remainder of transmission system? https://scholarexpress.com/multiple-choice-questions-mcq-on-transmission-system/	Clutch
37. What type of modern transmission is generally best for fuel economy? https://play.howstuffworks.com/quiz/transmission-quiz	CVT type

38. Which type of transmission uses chain and sprocket to transmit power? https://scholarexpress.com/multiple-choice-questions-mcq-on-transmission-system/	Clutch, gearbox and dead axle transmission
39. How the cover is separated, in coil spring type of clutch? http://iitportal.com/Paper/Multiple-Choice-Questions-Exam-Paper-For-Engineering-Automobile-4	By removing three screws or nuts
40. What type of a continuously variable transmission is? https://play.howstuffworks.com/quiz/transmission-quiz	The continuously variable transmission is based on the automatic transmission.
41. What is the torque tube? https://scholarexpress.com/multiple-choice-questions-mcq-on-transmission-system/	The torque tube is a tubular member which encloses the propeller shaft
42. What does a tachometer do? https://play.howstuffworks.com/quiz/transmission-quiz	The tachometer tells the driver how fast the engine is moving, measured in rpms.
43. The function of a torque converter or fluid converter is similar to? http://iitportal.com/Paper/Multiple-Choice-Questions-Exam-Paper-For-Engineering-Automobile-4	Gear box
44. Why synchronizing devices are designed? http://iitportal.com/Paper/Multiple-Choice-Questions-Exam-Paper-For-Engineering-Automobile-4	To prevent gear clash when shifting into Second and high
45. Why is the CVT so common in hybrid cars? https://play.howstuffworks.com/quiz/transmission-quiz	For better fuel economy
46. What are the purposes of the distributor in the ignition system? https://scholarexpress.com/multiple-choice-questions-mcq-on-ignition-system-of-automobile/	It operates break and make mechanism It distributes high tension current to spark plug at correct time
47. What are the two types of distributor system?	The two types of distributor system are CB point distributor and CB

	point less distributor
48. What is it called when the spark timing is moved closer to the top of the compression stroke? https://play.howstuffworks.com/quiz/ignition-system-quiz	Retarding the spark
49. What is the difference between a "hot" spark plug and a "cold" spark plug? https://play.howstuffworks.com/quiz/ignition-system-quiz	The shape of the ceramic tip
50. In a distributor less ignition system, what component has total control over spark timing? https://play.howstuffworks.com/quiz/ignition-system-quiz	The engine control unit (ECU)
51. What DTC code from P000 to P0299 represent?	Air fuel mixture control
52. Is the following statement True or False? Map sensor located on intake manifold	True
53. Is the following statement True or False? Oxygen (O2) located on transmission unit	False
54. Is the following statement True or False? OBD-II scanner connector is located behind rear seats	False

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19. Internal shoe brakes are radial while external shoe brakes are axial brakes. https://www.sanfoundry.com/machine-design-questions-answers-brakes/	False. Both internal and external shoe brakes are radial brakes.

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24. What term describes the ability of a vehicle to travel a curved path? https://play.howstuffworks.com/quiz/car-suspension-quiz	Cornering is the ability of a vehicle to travel a curved path.
25. What are the two different cycles of shock absorbers? https://play.howstuffworks.com/quiz/car-suspension-quiz	Shock absorbers work in two cycles -- the compression cycle and the extension cycle.
26. What are the types of leaf springs? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-suspension-system/	three Quarter elliptic semi elliptic quarter elliptic
27. What are the dead axles? https://scholarexpress.com/multiple-choice-questions-mcq-with-answers-on-suspension-system/	These are simply beams which supports the vehicle weight

28. What is loosely defined as the mass between the road and the suspension springs? https://play.howstuffworks.com/quiz/car-suspension-quiz	The sprung mass is the mass of the vehicle supported on the springs, while the unsprang mass is loosely defined as the mass between the road and the suspension springs.
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30. What are the classes of Mechanical transmission? https://scholarexpress.com/multiple-choice-questions-mcq-on-transmission-system/	Mechanical transmission can be of following classes (A) Clutch, gearbox and live axle transmission (B) Clutch, gearbox and dead axle transmission (C) Clutch, gearbox and axle less transmission
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33. How manual transmission is connected to the engine? https://play.howstuffworks.com/quiz/transmission-quiz	The clutch connects the transmission to the engine.
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35. What two things do automatic transmissions lack that manual transmissions have? https://play.howstuffworks.com/quiz/transmission-quiz	An automatic transmission lacks a clutch pedal and gear shift.
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39. How the cover is separated, in coil spring type of clutch? http://iitportal.com/Paper/Multiple-Choice-Questions-Exam-Paper-For-Engineering-Automobile-4	By removing three screws or nuts
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44. Why synchronizing devices are designed? http://iitportal.com/Paper/Multiple-Choice-Questions-Exam-Paper-For-Engineering-Automobile-4	To prevent gear clash when shifting into Second and high
45. Why is the CVT so common in hybrid cars? https://play.howstuffworks.com/quiz/transmission-quiz	For better fuel economy
46. What are the purposes of the distributor in the ignition system? https://scholarexpress.com/multiple-choice-questions-mcq-on-ignition-system-of-automobile/	It operates break and make mechanism It distributes high tension current to spark plug at correct time
47. What are the two types of distributor system?	The two types of distributor system are CB point distributor and CB

	point less distributor
48. What is it called when the spark timing is moved closer to the top of the compression stroke? https://play.howstuffworks.com/quiz/ignition-system-quiz	Retarding the spark
49. What is the difference between a "hot" spark plug and a "cold" spark plug? https://play.howstuffworks.com/quiz/ignition-system-quiz	The shape of the ceramic tip
50. In a distributor less ignition system, what component has total control over spark timing? https://play.howstuffworks.com/quiz/ignition-system-quiz	The engine control unit (ECU)
51. What DTC code from P000 to P0299 represent?	Air fuel mixture control
52. Is the following statement True or False? Map sensor located on intake manifold	True
53. Is the following statement True or False? Oxygen (O2) located on transmission unit	False
54. Is the following statement True or False? OBD-II scanner connector is located behind rear seats	False

Test Yourself (Multiple Choice Questions)

MODULE	5				
Question	**1**	Which type of engine is used in most of the cars?		A	Rotatory engine
				B	Opposed engine
				C	V type engine
			Xx	D	In-line engine
Question	**2**	From which of the following system, a thermostat belongs?	Xx	A	Liquid cooling system
				B	Lubrication system
				C	Transmission system
				D	Cabin system

Question	**3**	Into which energy, an engine converts the chemical energy?		A	Heat
				B	Kinetic
			Xx	C	Mechanical
				D	Light
Question	**4**	Into which of the following, Crank shaft converts reciprocating motion?		A	Harmonic motion
			Xx	B	Rotatory motion
				C	Liner motion
				D	Up & down motion
Question	**5**	Is the following statement True or False? Intake and exhaust valves are same in design and material	Xx	A	False
				B	True

MODULE 6

Question	**6**	Where the fuel pump of a vehicle is located?		A	In Engine room
				B	Under Driving seat
				C	With transmission system
			Xx	D	In Fuel tank
Question	**7**	What is the full form of EFI?	Xx	A	Electronic fuel injection.
				B	Elementary fuel injection
				C	Periodically fuel injection
				D	Electric fuel ignition
Question	**8**	Due to which of the following reason, Pre ignition can occur?		A	Missing
			Xx	B	Detonation
				C	Over lapping

				D	Dieseling
Question	**9**	What FIP Stands for?	Xx	A	Fuel injection pump.
				B	Fuel ignition plug
				C	Fuel integrator pump
				D	Fuel inhale pump
MODULE	**7**				
Question	**10**	At which pressure, the radiator cap opens?		A	10 bar
			Xx	B	0.9 bar
				C	0.8 bar
				D	0.83 bar
Question	**11**	In which part of the vehicle, ATF (automatic transmission fluid) is filled?		A	Radiator

			B	Oil cooler
			C	Water cooler
		Xx	D	Reservoir
Question	**12**	In which part, the water jacket is built-in?	A	Oil sump
			B	Oil pump
		Xx	C	Cylinder head & cylinder block
			D	Radiator assembly
Question	**13**	Where the thermostat is mostly placed?	A	In oil sump
			B	In oil pump

			C	In oil cooler
			Xx D	Inside or outside of cylinder block
Question	**14**	From which part, the viscous coupling belongs?	A	Radiator
			B	Reservoir
			Xx C	Cooling fan
			D	Blower
Question	**15**	Is the following statement True or False? Pressure radiator gap have 3 valves	A	True
			Xx B	False

Module	**8**				
Question	**16**	Is the following statement True or False? In full pressure system, oil from oil sump is pumped under pressure to the various parts requiring lubrication.	Xx	A	True
				B	False
Question	**17**	The following part is not lubricated by Pressure feed system		A	Timing gears
			Xx	B	Valve rods and Push rods
				C	Rocker arms
				D	Main bearings of crankshaft
Question	**18**	What is the purpose of crankcase ventilation?	Xx	A	To remove harmful particles from the engine
				B	To provide proper lubrication to the engine
				C	To provide air for combustion to the engine
				D	all of the above

Question	**19**	In which of the following system, lubricating oil is carried in separate tanks from where it is fed to the engine?		A	Mist lubrication system
				B	Wet sump system
			Xx	C	Dry sump system
				D	Splash system
Question	**20**	For which rating of engine oil, the viscosity numbering system is used?	Xx	A	Oil thickness
				B	Oil weight
				C	Oil temperature
				D	Oil gravity
MODULE	**9**				
Question	**21**	Which of the following energy is absorbed by brake?		A	Kinetic energy
				B	Potential energy

	C	Strain energy
Xx	D	Kinetic or potential

Question 22 In which of the following kinetic energy is converted, when brakes are applied on a moving vehicle?

	A	Mechanical energy
Xx	B	Heat energy
	C	Electrical energy
	D	Potential energy

Question 23 Which is not a drum brake?

	A	External contracting brake
	B	Internal expanding brake
Xx	C	Disc brake
	D	All of the above

Question 24 What is usually the hand brake of the automobile?

Xx	A	External contracting brake
	B	Internal expanding brake
	C	Disc brake
	D	Drum brake

Question 25 By which of the following the disc is attached, in disc brake?

	A	Wheel
Xx	B	Axle
	C	Suspension system
	D	Radiator

Question 26 On which principle, Hydraulic brakes work?

	A	Law of conservation of momentum
	B	Law of conservation of energy
	C	Newton’s Law of motion

			Xx	D Pascal’s law
Question	**27**	On which of the following, Hand brake is applicable?		A only front wheels
			Xx	B only rear wheels
				C both front and rear wheels
				D None of the above
Question	**28**	What is the process of removing air from the brake system?	Xx	A bleeding
				B self-energizing
				C servo action
				D energization

MODULE	**10**				
Question	**29**	What is the most common type of spring used in modern car suspensions?		A	Leaf spring
			Xx	B	Coil spring
				C	Air spring
				D	Hung spring
Question	**30**	In which year, the MacPherson strut was developed by Earle S. MacPherson?		A	1907
				B	1927
				C	1937
			Xx	D	1947

Question 31 Which one of the following represents the correct specification of a Tyre?

Xx	A	155-80-R-13
	B	R-155-80-13
	C	155-80-13-R
	D	0155-R-80-13

Question 32 Why spring shackles are used?

	A	to join Spring and Axle
	B	to join chassis frame and axle
Xx	C	to join chassis frame and spring
	D	to join Spring and knuckle

Question 33 Which material is used for making torsion bar?

Xx	A	Steel
	B	Cast iron
	C	High carbon steel

D Copper

Question 34 How Leaf springs absorb shocks?

A by twisting

Xx B by bending

C by compression

D by tension

Question 35 How Coil springs absorb shocks?

A by bending

B by twisting

Xx C by compression

D by tension

Question 36 What is Un-sprung weight?

A Weigh of vehicle

		B	Weigh of chassis frame
		C	Weight of wheels
	Xx	D	Weight of wheels and axles
Question	**37** What is Sprung weight?	Xx	A Weigh of vehicle minus un sprung weight
			B Weigh of chassis frame
			C Weight of wheels
			D Weight of wheels and axles
Question	**38** Why Tire wear at the center?		A Due to low inflation pressure
		Xx	B Due to high inflation pressure
			C Due to positive camber
			D Due to excessive play in steering

MODULE	**11**				
Question	**39**	The following provides a smooth means of disengagement and engagement between the engine and the remainder of transmission system	Xx	A	Clutch
				B	Gearbox
				C	Propeller shaft
				D	Differential
Question	**40**	What is the following axle, which form compact unit with gearbox, clutch and engine?		A	Tandem axle
			Xx	B	power packed axle
				C	compact axle
				D	none of the above

Question 41 Which of the following are absorbed by Sideways forces?

A Coil springs

B Torsion bars

C Air springs

Xx D Leaf springs

Question 42 Which is not a part of driving axle unit?

A Differential

B Final drive

Xx C Propeller shaft

D Half shafts

Question 43 Where the overdrive is located??

A Between transmission and engine

Xx B Between transmission and propeller shaft

C Between transmission and rear axle

D Between transmission and differential

Question 44 Which of the following is not part of automatic transmission?

A Epicyclical gearbox

B Torque convertor

C Multi-plate clutch

Xx D Sliding mesh gearbox

Question 45 Where Mechanical clutches are used?

A In master cylinder

Xx B In cable or linkages

C In wheel cylinder

D In salve cylinder

Question 46 By which of the following, clutch plate lining is made?

A Steel material

B Aluminum material

C Spring material

Xx D Frictional material

Question 47 Where hydraulic clutches are used?

A In cable or linkage

B In air reservoir

Xx C In master cylinder

D In booster assembly

Question 48 Where the pilot bearing is fixed?

A In gear box

			Xx	B In flywheel
				C In clutch paddle
				D In automatic transmission
Question	**49**	Which of the following shaft is not a part of manual transmission?	Xx	A Cam shaft
				B Output / secondary shaft
				C Reverse gear shaft
				D Input / primary shaft
Question	**50**	Is the following statement True or False? Automatic vehicle has a clutch system		A True
			Xx	B False

MODULE	**12**				
Question	**51**	What is the correct sequence of flow of current, in Battery coil ignition system?	Xx	A	Battery – Ammeter – Ignition coil – Distributor – Spark plug
				B	Battery – Ignition coil – Ammeter – Distributor – Spark plug
				C	Battery – Ammeter – Distributor – Ignition coil – Spark plug
				D	Battery – Distributor – Ammeter – Ignition coil – Spark plug
Question	**52**	Which of the following provides a reservoir for the current (induced in the primary circuit), at the time of brake?		A	induction coil
				B	distributor
			Xx	C	condenser
				D	governor

Question 53 In a four stroke engine, how the drive shaft is rotated in distributor?

Xx	A	At half the engine speed
	B	equal to the engine speed
	C	one and half times the engine speed
	D	At double the engine speed

Question 54 Which of the following is known as ‘Breaker less Ignition system?

	A	Capacitive discharge Ignition system
Xx	B	Electronic Ignition system
	C	Battery coil ignition system
	D	Magneto Ignition system

Question	**55**	How to find the total voltage Vt in series circuit?		A	V total = 1/V1+1/V2+1/V3….
				B	V total = I/R1+ I/R2 + I/R3
				C	V total = I/V1+ I/V2 + I/V3
			Xx	D	V total = V1 +V2 +V3……
Question	**56**	Is the following statement true or false? The gap between two spark plug is usually 3 mm		A	TRUE
			Xx	B	FALSE
Question	**57**	What is Ohm's law?	Xx	A	V=IR
				B	V=I/R
				C	V=V/R
				D	V=I2/R

MODULE	13				
Question	**58**	Electrical circuits in the on-board diagnostics (OBD) system are being diagnosed. Tech A says that it's important to check for voltage drops on the power side of the circuit. Tech B says that it's important to check for voltage drops at the circuit ground connections. Who is correct?		A	Tech A
				B	Tech B
			Xx	C	Both Techs A & B
				D	Neither Tech A nor Tech B
Question	**59**	A fault code that begins with the letter "P" would MOST likely address a fault in the:	Xx	A	Exhaust system
				B	Power door lock wiring
				C	HVAC system
				D	Interior lighting system

Question 60 Which of the following is the best place to start gathering information and planning a diagnostic pathway based on suspected systems and components?

A The owner’s manual

Xx B Diagnostic trouble codes (DTCs) and customer information

C The service manual

D Technical service bulletins

Question 61 On-board diagnostic (OBD) systems help the service tech do all of these EXCEPT:

A Work more efficiently

B Take the guesswork out of diagnosing vehicle problems

Xx C Determine exactly where faults exist

D Access data for today’s sophisticated vehicles

Question 62 How fault codes on today's vehicles are categorized?

A By vehicle’s model

B By vehicle’s year

C By vehicle’s make

			Xx	D By vehicle’s system
Question	**63**	For which of the following vehicles, OBD-II scanner is used?		A Model 1970 – 1980
				B Model 1981 – 1990
				C Model 1991 – 1995
			Xx	D Model 1996 onward
Question	**64**	A fault code that begins with the letter "B" would MOST likely address a fault in the:		A Ignition system
				B Exhaust system
			Xx	C Taillight circuit
				D Transmission
Question	**65**	What ECU stands for?	Xx	A Electronics control unit

B Electrical control unit

C Electronic central unit

D External computing unit

Question 66 What ECT stands for?

A Electronic control terminal

Xx B Electronic control transmission

C Electrical control transmission

D External control transmission

ANSWERS

MODULE	**5**			
Question	**1**	Which type of engine is used in most of the cars?	D	In-line engine
Question	**2**	From which of the following system, a thermostat belongs?	A	Liquid cooling system
Question	**3**	Into which energy, an engine converts the chemical energy?	C	Mechanical
Question	**4**	Into which of the following, Crank shaft converts reciprocating motion?	B	Rotatory motion
Question	**5**	Is the following statement True or False? Intake and exhaust valves are same in design and material	A	False
MODULE	**6**			
Question	**6**	Where the fuel pump of a vehicle is located?	D	In Fuel tank

Question	**7**	What is the full form of EFI?	A	Electronic fuel injection.
Question	**8**	Due to which of the following reason, Pre ignition can occur?	B	Detonation
Question	**9**	What FIP Stands for?	A	Fuel injection pump.
MODULE	**7**			
Question	**10**	At which pressure, the radiator cap opens?	B	0.9 bar
Question	**11**	In which part of the vehicle, ATF (automatic transmission fluid) is filled?	D	Reservoir
Question	**12**	In which part, the water jacket is built-in?	C	Cylinder head & cylinder block
Question	**13**	Where the thermostat is mostly placed?	D	Inside or outside of cylinder block
Question	**14**	From which part, the viscous coupling belongs?	C	Cooling fan
Question	**15**	Is the following statement True or False? Pressure radiator gap have 3 valves	B	False
Module	**8**			
Question	**16**	Is the following statement True or False? In full pressure system, oil from oil sump is pumped under pressure to the various parts requiring lubrication.	A	True

Question	**17**	The following part is not lubricated by Pressure feed system	B	Valve rods and Push rods
Question	**18**	What is the purpose of crankcase ventilation?	A	To remove harmful particles from the engine
Question	**19**	In which of the following system, lubricating oil is carried in separate tanks from where it is fed to the engine?	C	Dry sump system
Question	**20**	For which rating of engine oil, the viscosity numbering system is used?	A	Oil thickness
MODULE	**9**			
Question	**21**	Which of the following energy is absorbed by brake?	D	Kinetic or potential
Question	**22**	In which of the following kinetic energy is converted, when brakes are applied on a moving vehicle?	B	Heat energy
Question	**23**	Which is not a drum brake?	C	Disc brake
Question	**24**	What is usually the hand brake of the automobile?	A	External contracting brake
Question	**25**	By which of the following the disc is attached, in disc brake?	B	Axle
Question	**26**	On which principle, Hydraulic brakes work?	D	Pascal's law
Question	**27**	On which of the following, Hand brake is applicable?	B	only rear wheels
Question	**28**	What is the process of removing air from the brake system?	A	Bleeding

MODULE	10			
Question	**29**	What is the most common type of spring used in modern car suspensions?	B	Coil spring
Question	**30**	In which year, the MacPherson strut was developed by Earle S. MacPherson?	D	1947
Question	**31**	Which one of the following represents the correct specification of a Tyre?	A	155-80-R-13
Question	**32**	Why spring shackles are used?	C	to join chassis frame and spring
Question	**33**	Which material is used for making torsion bar?	A	Steel
Question	**34**	How Leaf springs absorb shocks?	B	by bending
Question	**35**	How Coil springs absorb shocks?	C	by compression
Question	**36**	What is Un-sprung weight?	D	Weight of wheels and axles
Question	**37**	What is Sprung weight?	A	Weigh of vehicle minus un sprung weight
Question	**38**	Why Tire wear at the center?	B	Due to high inflation pressure

MODULE	11			
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Question	**40**	What is the following axle, which form compact unit with gearbox, clutch and engine?	B	power packed axle
Question	**41**	Which of the following are absorbed by Sideways forces?	D	Leaf springs
Question	**42**	Which is not a part of driving axle unit?	C	Propeller shaft
Question	**43**	Where the overdrive is located?	B	Between transmission and propeller shaft
Question	**44**	Which of the following is not part of automatic transmission?	D	Sliding mesh gearbox
Question	**45**	Where Mechanical clutches are used?	B	In cable or linkages
Question	**46**	By which of the following, clutch plate lining is made?	D	Frictional material
Question	**47**	Where hydraulic clutches are used?	C	In master cylinder
Question	**48**	Where the pilot bearing is fixed?	B	In flywheel
Question	**49**	Which of the following shaft is not a part of manual transmission?	A	Cam shaft
Question	**50**	Is the following statement True or False? Automatic vehicle has a clutch system	B	False

MODULE	**12**			
Question	**51**	What is the correct sequence of flow of current, in Battery coil ignition system?	A	Battery – Ammeter – Ignition coil – Distributor – Spark plug
Question	**52**	Which of the following provides a reservoir for the current (induced in the primary circuit), at the time of brake?	C	Condenser
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Question	**54**	Which of the following is known as 'Breaker less Ignition system?	B	Electronic Ignition system
Question	**55**	How to find the total voltage Vt in series circuit?	D	V total = V1 +V2 +V3……
Question	**56**	Is the following statement true or false? The gap between two spark plug is usually 3 mm	B	FALSE
Question	**57**	What is Ohm's law?	A	V=IR
MODULE	**13**			
Question	**58**	Electrical circuits in the on-board diagnostics (OBD) system are being diagnosed. Tech A says that it's important to check for voltage drops on the power side of the circuit. Tech B says that it's important to check for voltage drops at the circuit ground connections. Who is correct?	C	Both Techs A & B
Question	**59**	A fault code that begins with the letter "P" would MOST likely address a fault in the:	A	Exhaust system

Question	**60**	Which of the following is the best place to start gathering information and planning a diagnostic pathway based on suspected systems and components?	B	Diagnostic trouble codes (DTCs) and customer information
Question	**61**	On-board diagnostic (OBD) systems help the service tech do all of these EXCEPT:	C	Determine exactly where faults exist
Question	**62**	How fault codes on today's vehicles are categorized?	D	By vehicle’s system
Question	**63**	For which of the following vehicles, OBD-II scanner is used?	D	Model 1996 onward
Question	**64**	A fault code that begins with the letter "B" would MOST likely address a fault in the:	C	Taillight circuit
Question	**65**	What ECU stands for?	A	Electronics control unit
Question	**66**	What ECT stands for?	B	Electronic control transmission

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