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AUTOMOTIVE MECHATRONICS

TRAINER GUIDE

National Vocational Certificate Level 3

Version 1 - October, 2019

NAVTTC

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AUTOMOTIVE MECHATRONICS

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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 modeling 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

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-4 in Automotive Mechatronics. You shall be able to progress further to National Vocational Certificate Level-5 in Automotive Mechatronics; and take admission in 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 management level 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 a pipe fitter. You may need additional skills on entrepreneurship to support your initiative.

Overview of the program

Course: Automotive Mechatronics Lev 3	**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 this 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: Apply Work Health and Safety Practices (WHS) **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to apply work health and safety practices (WHS)	**LU 1:** Implement safe work practices at work place **LU 2:** Participate in hazard assessment activities a work place **LU 3:** Follow emergency procedures at workplace **LU 4:** Participate in OHS consultative processes	30 Hrs
Module 2: Identify and Implement Workplace Policy and Procedures **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to identify and implement workplace policy and procedures	**LU 1:** Identify workplace policy & procedures **LU 2:** Implement workplace policy & procedures **LU 3:** Communicate workplace policy & procedures **LU 4:** Review the implementation of workplace policy & procedures	20 Hrs

Module	Learning Unit	Duration
Module 3: Communicate at Workplace **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to communicate at workplace	**LU 1:** Communicate within the organization **LU 2:** Communicate outside the organization **LU 3:** Communicate effectively in workgroup **LU 4:** Communicate in writing	30 Hrs
Module 4: Perform Computer Application Skills **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perform computer application skills	**LU 1:** Prepare In-page documents as per required information **LU 2:** Prepare Spreadsheets as per required information **LU 3:** Use MS Office as per required information **LU 4:** Perform computer graphics in basic applications **LU 5:** Create Email account for communications	40 Hrs
Module 5: Manage Personal Finances **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to manage personal finances	**LU 1:** Develop a personal budget **LU 2:** Develop long term personal budget **LU 3:** Identify ways to maximize future finances	30 Hrs
Module 6: Perform General Inspection **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perform general inspection	**LU 1:** Inspect Mechanical Failure **LU 2:** Inspect Electrical Failure **LU 3:** Perform Road Test **LU 4:** Prepare Job Card/Report	40 Hrs

Module	Learning Unit	Duration
Module 7: Perform Engine Tuning **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perform engine tuning	**LU 1:** Clean/Replace Air filter **LU 2:** Adjust Engine Idle Speed **LU 3:** Adjust Air Fuel Ratio **LU 4:** Adjust Tappet Clearance **LU 5:** Clean/Adjust/Replace Spark Plugs **LU 6:** Clean/Adjust/Replace Contact Breaker Point	50 Hrs
Module 8: Maintain Ignition System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain ignition system	**LU 1:** Maintain Contact Breaker Ignition System **LU 2:** Maintain Electronic Ignition System **LU 3:** Maintain Coil--Plug (COP) System	50 Hrs
Module 9: Maintain Fuel Control System-I **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain fuel control system-I	**LU 1:** Maintain Electronic Fuel Injection (EFI) System **LU 2:** Maintain Common Rail Direct Injection (CRDI) System **LU 3:** Maintain Motronic Control Unit for CNG System	50 Hrs
Module 10: Service Comfort & Safety System-I **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to service comfort & safety system-I	**LU 1:** Maintain Suspension System **LU 2:** Maintain Power Window & Central Locking System **LU 3:** Verify Seat Belt **LU 4:** Service Heat Ventilating system **LU 5:** Service Air-Conditioning (AC) System	50 Hrs

Module	Learning Unit	Duration
Module 11: Maintain Controlled Brake System **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to maintain controlled brake system	**LU 1:** Maintain Anti-lock Braking System (ABS) **LU 2:** Maintain pressure Modulator **LU 3:** Maintain ABS-Electronic Control Unit (ECU)	45 Hrs
Module 12: Conserve Power Transmission-I **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to conserve power transmission-I	**LU 1:** Perform maintenance of Automatic Transmission **LU 2:** Perform maintenance of Electronic Control Transmission (ECT) System **LU 3:** Perform Diagnosis of Electronically Controlled Transmission (ECT) System with OBDII Scanner	45 Hrs
Module 13: Perpetuate Controlled Electrical & Electronic System-I **Aim:** The aim of this module is to develop advanced knowledge, skills and understanding to perpetuate controlled electrical & electronic system-I	**LU 1:** Service Windshield Wash System **LU 2:** Service Wiper System **LU 3:** Check Performance of Instrument Panel **LU 4:** Demonstrate Function of Sensors **LU 5:** Maintain Electrical Motors	60 Hrs

FORMAT FOR LESSON PLAN			
Module 7: Perform Engine Tuning			
Learning Unit 2: Adjust Engine Idle Speed			
Methods	Key Notes The tools, techniques and processes used for Adjusting engine idle speed	Media	Time
	Introduction		
	This session will introduce learners to the tools, techniques and processes used for Adjusting engine idle speed, using presentation, demonstration, question and answer, and practical skills development.		
	Main Body		
	• Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding personal health and workplace • Engine tuning and its purpose • Purpose of engine idle speed • Procedure to adjust engine idle to standard RPM. • Importance of engine idle speed for fuel economy. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping		
	Conclusion		
	To conclude the session, review the tools, techniques and processes used for Adjusting engine idle speed. 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: Apply Work Health and Safety Practices (WHS)			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Implement safe work practices at work place			
LU 2: Participate in hazard assessment activities a work place			
LU 3: Follow emergency procedures at workplace			
LU 4: Participate in OHS consultative processes			

Module 2: Identify and Implement Workplace Policy and Procedures			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Identify workplace policy & procedures			
LU 2: Implement workplace policy & procedures			
LU 3: Communicate workplace policy & procedures			
LU 4: Review the implementation of workplace policy & procedures			

Module 3: Communicate at Workplace			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Communicate within the organization			
LU 2: Communicate outside the organization			
LU 3: Communicate effectively in workgroup			
LU 4: Communicate in writing			

Module 4: Perform Computer Application Skills			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Prepare In-page documents as per required information			
LU 2: Prepare Spreadsheets as per required information			
LU 3: Use MS Office as per required information			
LU 4: Perform computer graphics in basic applications			
LU 5: Create Email account for communications			

Module 5: Manage Personal Finances			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Develop a personal budget			
LU 2: Develop long term personal budget			
LU 3: Identify ways to maximize future finances			

Module 6: 071400951 Perform General Inspection			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Inspect Mechanical Failure	Deliver an illustrated presentation on how to inspect mechanical failure. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task. • Safety precautions regarding personal health and workplace • Vehicle braking system and its components (e.g. master cylinders, brake booster, brake lines, wheel cylinder, brake pads, brake shoes etc.) • Causes of brake failure (i.e. old seals, worn brake shoes and brake pads) • Grading of brake fluid • Procedure of brake bleeding • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about how to inspect mechanical failure. 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	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush (Steel Wire) Combination Spanner Set RPM Meter Multi Meter Hydraulic Jack

Module 6: 071400951 Perform General Inspection			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 inspect mechanical failure. 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. Learners must be able to practice and develop their knowledge and skills relating to how to inspect mechanical failure. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 2: Inspect Electrical Failure	Invite an experienced Automobile expert to deliver a presentation on how to inspect electrical failure. Ensure the presentation addresses the following important points: • Understanding of appropriate tools and	Class room with multimedia aid and flip charts	Multimedia Videos Handouts Learner's guide

Module 6: 071400951 Perform General Inspection			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	equipment for performing this task. • Safety precautions regarding personal health and workplace • Common electrical failure in a vehicle (for example; Bad Spark Plugs or Wires, Blown Fuse, Dead Battery and Bad Alternator) • Function of Battery and its inspection procedures • Working of Alternator • Working of Self Stator Motor • Knowledge of electric safety (for example electrical systems, protective devices, switchboard cabinets and connection technologies) • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Learners need to devise 5 quiz questions with answers based on how to inspect electrical failure. They must make sure their questions cover key topics for how to inspect electrical failure. Issue each learner with 5 blank cards. Each learner should number the cards and write their name on one side with a question about how to inspect electrical failure. 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	Or Access to an Automobile Workshop with required tools and equipment	White board Board markers Philips/Flat Screw Driver Set Hammer Drill Cotton Rags Emery Paper Wire Brush (Steel Wire) Combination Spanner Set Multi Meter Electric Tester Hydrometer Battery Load Tester WD-40 Combination Plier Nose Plier Hydraulic Jack Relevant PPEs

Module 6: 071400951 Perform General Inspection			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 how to inspect electrical failure. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 3: Perform Road Test	Deliver an illustrated presentation on how to perform road test. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task. • Safety precautions regarding personal health	Class room with multimedia aid and flip charts Or	Multimedia Videos Handouts Learner's guide White board

Module 6: 071400951 Perform General Inspection			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	and workplace • Organizational rules, regulations and policies regarding road test • Checking the performance of vehicle • Identification of different types of noises and vibrations • Checking wheel alignment • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Display a flip chart showing the following key question: *'What are the challenges when performing road test?'* 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	Access to an Automobile Workshop with required tools and equipment	Board markers Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multi Meter Hydraulic Jack

Module 6: 071400951 Perform General Inspection			
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 perform road test. Ensure that learners have the opportunity to ask questions to support their understanding.		
LU 4: Prepare Job Card/Report	Deliver an illustrated presentation on how to Prepare Job Card/Report. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task. • Safety precautions regarding personal health and workplace • Introduction of Job card/report • Purpose of Job card/report • Procedure to enlist vehicle faults in job card/report • Periodic maintenance schedule and its importance • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set Multi Meter Hydraulic Jack

Module 6: 071400951 Perform General Inspection			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	…showing key topics for preparing job card/report. 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 preparing job card/report. 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 prepare job card/report. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Clean/Replace Air filter	Deliver an illustrated presentation on how to clean/replace air filter. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task. • Safety precautions regarding personal health and workplace • Function of air filters. (i.e. how filters protect engine from dust particles) • Importance of air filter and air cleaner box, how to dissemble the air cleaner box and reassembling procedure • Importance of timely cleaning and replacing process of air filter. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about cleaning/replacing air filter. 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	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Combination Spanner Set Air Compressor

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 cleaning/replacing air filter. 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. Learners must be able to practice and develop their knowledge and skills relating to cleaning/replacing air filter. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding. Provide opportunities for trainees to ask their own questions.		

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 2: Adjust Engine Idle Speed	Invite an experienced Automobile expert to deliver a presentation on how to adjust engine idle speed. Ensure the presentation addresses the following important points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding personal health and workplace • Engine tuning and its purpose • Purpose of engine idle speed • Procedure to adjust engine idle to standard RPM. • Importance of engine idle speed for fuel economy. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to adjusting engine idle speed. They must make sure their questions cover key topics for how to adjusting engine idle speed. 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 adjusting engine idle speed. 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	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multi Meter Allen key set

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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. 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 how to adjust engine idle speed. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 3: Adjust Air Fuel Ratio	Lead a brainstorm on ways to adjust air fuel ratio. Use ideas from the brainstorm to explain the following key points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Purpose of adjusting air fuel ratio • Procedure to adjust standard air fuel ratio. • Importance of air fuel ratio for fuel economy. • Effect of too much rich or too much lean air fuel ratio on engine. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Display a flip chart showing the following key question: *'What are the challenges when adjusting air fuel ratio?'* 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	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multi Meter Allen keys set

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 adjust air fuel ratio. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 4: Adjust Tappet Clearance	Deliver an illustrated presentation on how to adjust tappet clearance. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Importance of engine tappet adjustment to improve engine efficiency. • Importance of tappet cover seal and how it prevents engine oil leakages. • Standard procedure of tappet adjustment using appropriate tools. • The types of tappets used in different vehicles and their replacement procedures	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for how to adjust tappet clearance. 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 adjust tappet clearance. 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 how to adjust tappet		Combination Spanner Set Allen keys set Feeler gauges Socket Spanners

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	clearance. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 5: Clean/Adjust/Replace Spark Plugs	Lead a brainstorm on ways to clean/adjust/replace spark plugs. Use ideas from the brainstorm to explain the following key points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Function of spark plug in engine, describe its types and heat ranges and method to clean using appropriate tools. • How to adjust spark plug electrode gap using spark plug gauges according to ignition coil output high voltages • How to inspect the spark plug high voltage cables and to protect it from heated exhaust manifold • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing the key topics about how to clean/adjust/replace spark plugs. Go through all 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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set Allen keys set Spark plug gauges Socket Spanners Multimeter

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 clean/adjust/replace spark plugs. 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. Learners must be able to practice and develop their knowledge and skills relating to clean/adjust/replace		

Module 7: 071400952 Perform Engine Tuning			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	spark plugs in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 6: Clean/Adjust/Replace Contact Breaker Point	Lead a discussion about how to clean/adjust/replace contact breaker point. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Purpose and importance of Contact Breaker point in ignition system. • Dwell angle of C.B point • Procedure to replace and adjust C.B point gap range (0.4 ~ 0.5mm) • Cleaning of C.B point by using appropriate tools. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Display a slide or flip chart with a key question relating to how to clean/adjust/replace contact breaker point. **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 Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set Allen keys set Socket Spanners Multimeter

Module 7: 071400952 Perform Engine Tuning			
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 how to clean/adjust/replace contact breaker point. 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 how to clean/adjust/replace contact breaker point. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Module 8: 071400953 Maintain Ignition System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Maintain Contact Breaker Ignition System	Lead a brainstorm on ways to maintain contact breaker ignition system. Use ideas from the brainstorm to explain the following key points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Main components of ignition distributor (Distributor cap, rotor arm, cam, contact breaker point, base plate, vacuum and centrifugal advance mechanism) • Procedure to check battery performance (Voltages, Electrolyte Specific gravity) • Working of ignition switch and coil. • Testing of ignition switch and coil using Multimeter • Procedure to replace and adjust C.B point gap range (0.4 ~ 0.5 mm) and method to clean using appropriate tools • Purpose of firing order and procedure to adjust firing order. • How to adjust spark plug electrode gap using spark plug gauges according to ignition coil output high voltages • Function of capacitor and how to check it by using Multimeter. • Procedure for cleaning and storing of tools and equipment at workplace. • 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 Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set WD-40 Grease Oil Gun Electric Tester Socket Spanner

Module 8: 071400953 Maintain Ignition System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	Learners need to devise 10 quiz questions with answers based on how to maintain contact breaker ignition system. They must make sure their questions cover key topics for how to maintain contact breaker ignition system. 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 maintain contact breaker ignition 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.		

Module 8: 071400953 Maintain Ignition 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 maintaining contact breaker ignition system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 2: Maintain Electronic Ignition System	Lead a discussion about how to maintain electronic ignition system. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Working of electronic ignition system and how ECU controls the electronic ignition system • Main components of electronic ignition system (Distributor cap, rotor arm, reluctor, pick-up assembly, base plate, vacuum and centrifugal advance mechanism) • Working of ignition switch and coil. How to check it using Multimeter • Procedure of servicing of ignition distributor • How to adjust spark plug electrode gap using spark plug gauges according to ignition coil output high voltages • Procedure for cleaning and storing of tools and	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set WD-40 Grease

Module 8: 071400953 Maintain Ignition System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	equipment at workplace. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for maintaining electronic ignition 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 maintaining electronic ignition 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 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.		Oil Gun Electric Tester Socket Spanner OBD-II Scanner

Module 8: 071400953 Maintain Ignition 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 electronic ignition system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 3: Maintain Coil--Plug (COP) System	Deliver an illustrated presentation on how to maintain Coil--Plug (COP) system. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Advantages of coil on plug system and distributor less ignition system. • Procedure to check resistance of ignition coil using Multimeter. • Usage of OBD-II Scanner for faults diagnosis and rectification of these faults on Coil-On-Plug (COP) ignition system and distributor less ignition system. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Display a flip chart showing the following key question: *'How confident are you when Using OBD-II Scanner for faults diagnosis and rectification of these faults on Coil-On-Plug?'* Give each learner a sheet of paper and asked them to	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set WD-40 Grease Oil Gun Electric Tester Socket Spanner

Module 8: 071400953 Maintain Ignition System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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. Learners must be able to practice and develop their knowledge and skills relating to how to maintain Coil--Plug (COP) system. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		OBD-II Scanner

Module 9: 071400954 Maintain Fuel Control System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Maintain Electronic Fuel Injection (EFI) System	Lead a brainstorm on ways to maintain electronic fuel injection (EFI) system. Use ideas from the brainstorm to explain the following key points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Functions of electronic fuel injection system (EFI). • How EFI system plays important role in fuel economy and enhancing engine efficiency • Importance of Electronics Control Unit (ECU) in EFI system. How it can reads the sensors and controls the actuators of vehicle • Function of all sensors (Mass Air Flow Sensor, Oxygen Sensor, Throttle Position Sensor and Intake Air Temperature Sensor) of fuel metering system • Function of all actuators (Idle air control valve and injectors) of fuel metering system • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to maintain electronic fuel injection (EFI) system. They must make sure their questions cover key topics for how to maintain electronic fuel injection (EFI) system. 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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set Electric Tester Socket Spanner OBD-II Scanner

Module 9: 071400954 Maintain Fuel Control System-I			
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 maintain electronic fuel injection (EFI) 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. Learners must be able to practice and develop their knowledge and skills relating to maintain electronic fuel injection (EFI) system in an appropriate practical		

Module 9: 071400954 Maintain Fuel Control System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 2: Maintain Common Rail Direct Injection (CRDI) System	Lead a discussion about how to maintain common rail direct injection (CRDI) system. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Function of diesel injectors in diesel fuel system. • Purpose of servicing diesel injectors. • Function of fuel rails in diesel fuel system. • Procedure to check fuel pressure at inlet and outlet ports. • Function of fuel pressure sensors and how to check them using Multimeter. • Procedure to connect OBD-II Scanner to perform fault diagnoses and rectification of faults. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Prepare either:	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set Electric Tester Socket Spanner OBD-II Scanner

Module 9: 071400954 Maintain Fuel Control System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• A flip chart • A PowerPoint slide • A handout …showing key topics for how to maintain common rail direct injection (CRDI) 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 how to maintain common rail direct injection (CRDI) 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 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 how to maintain common rail direct injection (CRDI) system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Module 9: 071400954 Maintain Fuel Control System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 3: Maintain Motronic Control Unit for CNG System	Deliver an illustrated presentation on how to maintain Motronic control unit for CNG system. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Working of CNG system. Describing the function and importance of Motronic Control Unit. • Function of solenoid valves and how to check it using Multimeter. • Procedure to adjust the CNG regulating screw to desired value. • Working of CNG reducer kit. • Function of all sensors (Oxygen Sensor, Throttle Position Sensor, Camshaft and Crankshaft Position Sensors) and how to check them using OBD-II Scanner. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Display a flip chart showing the following key question: *'How confident are you when dealing with working of CNG system?'* Give each learner a sheet of paper and asked them to write their name at the top. Explain to learners that	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set Electric Tester Socket Spanner OBD-II Scanner

Module 9: 071400954 Maintain Fuel Control System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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. Learners must be able to practice and develop their knowledge and skills relating to how to maintain Motronic control unit for CNG system. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Maintain Suspension System	Lead a discussion about how to maintain suspension system. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Main components of suspension system (leaf springs/coil springs, shock absorbers, suspension arms & trailing arms, tie rods, torsion bars, lateral rods etc.). • Types of tie rods, and their inspection procedure, • Types of ball Joint, and their inspection procedure, proper removal and refitting procedures • Types of coil springs according to load capacity and shapes, their inspection procedure, proper removal and refitting procedure • Stabilizer bars and their links, their inspection procedure, proper removal and refitting • Types of rubber bushing used in lower and upper arms, their inspection procedure, proper removal and refitting procedure • Different types of hub/wheel bearings (Ball Bearings with or without spacers, Roller Bearing and Taper roller bearings). Explaining wheel studs repairing and replacing.	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set WD-40 Grease Oil Gun Electric Tester Socket Spanner

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Different types of CV Joints,(Tripod CV joint, Rzeppa CV joint and Cross Groove CV Joint) and their internal parts(Inner and outer race, tripod, cage, balls, boots and their clamps) and inspection procedure, proper removal and refitting • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Display a flip chart showing the following key question: *'Which tools do you need to work with when maintaining suspension 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 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: 071400955 Service Comfort & Safety System-I			
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 how to maintain suspension system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 2: Maintain Power Window & Central Locking System	Deliver an illustrated presentation on how to maintain power window & central locking system. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Different components and their working of power window system (Switches, wiring harness, motors, etc.) • Different components and their working of central locking system (Remote Switches, wiring harness actuators, etc.) • Procedures of servicing/replacing the components of power window system (Switches, motors, etc.) • Procedures of servicing/replacing the components of central locking system (Remote Switches, actuators, etc.)	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Checking/replacing procedure of fuses, relays, wiring harness, connectors of power window and central locking system. • Checking/replacing procedure of actuator assembly of central locking system. • Procedure for checking motors of power window system • Procedure for cleaning and storing of tools and equipment at workplace. • 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 how to maintain power window & central locking system. Issue each learner with 10 blank cards. Each learner should number the cards and write their name on one side with a question about providing a linen service. 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		Allen Keys set WD-40 Grease Oil Gun Electric Tester Socket Spanner OBD-II Scanner

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 how to maintain power window & central locking system. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 3: Verify Seat Belt	Deliver a presentation on how to verify seat belt. Ensure your presentation addresses the following important points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Procedure to check seat belt indication lamp (for example; the indication lamp must be OFF	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with	Multimedia Videos Handouts Learner's guide White board Board markers

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	when seat belt is fastened and it must go ON when seat belt is not fastened properly). • Procedure to check fuse, relays, electrical wire harness and connector by using Multimeter and test lamp. • Importance of seat belt while driving. • Procedures to check the locking of seat belt on jerk or emergency braking. • Working of power seat switches and their location on seats. Explaining the function of ECU which controls adjusting motors of seats according to requirements • Diagnosing the power seat motors for proper functioning (tilt, recline, and seat elevation) and replace faulty motors. • Procedure for cleaning and storing of tools and equipment at workplace. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for verify seat belt. 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	required tools and equipment	Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set RPM Meter Multimeter Allen Keys set WD-40 Grease Oil Gun Electric Tester Socket Spanner OBD-II Scanner

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 verifying seat belt. 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 verify seat belt. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 4: Service Heat Ventilating system	Deliver an illustrated presentation on how to service heat ventilating system. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Various parts of radiator (Radiator neck, tubes	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with	Multimedia Videos Handouts Learner's guide White board Board markers

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	and fins, upper & lower tanks). • How to test leakage and condition of radiator. • Procedure to perform leakage test of hoses and cooling/heating systems using leakage tester. • Importance and working of blower fan, procedure to test blower fan motor by using Multimeter and replacing the faulty parts. • Working of electrical system of heat ventilation using Multimeter and voltage tester and replacing the faulty parts. • Procedure for testing thermostat operation.(thermostat starts to open at about 83 degree Celsius and completely opens at 90 degree Celsius) • Procedure to perform leakage test of heater core using leakage tester and repair/replace the heater core. • Procedure check heater control valve from dashboard knob/switch and repair/replace the faulty knob/switch • Procedure for cleaning and storing of tools and equipment at workplace • Importance of housekeeping Display a slide or flip chart with a key question relating to how to service heat ventilating system **Step 1 – Think** Working on their own, each learner **thinks** about the question and makes notes of their responses or key	required tools and equipment	Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set Socket Spanner Multimeter Allen Keys set WD-40 Grease Oil Gun Voltage Tester

Module 10: 071400955 Service Comfort & Safety System-I			
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 service heat ventilating 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 how to service heat ventilating system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 5: Service Air-Conditioning (AC) System	Lead a discussion about how to service air-conditioning (AC) system. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task	Class room with multimedia aid and flip charts Or Access to an Automobile	Multimedia Videos Handouts Learner's guide White board Board markers

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Different types of A/C Compressors and their internal parts(Reciprocating AC Compressor, Scroll AC Compressor, Screw AC Compressor, Rotary AC Compressor, Centrifugal AC Compressor) • Procedure of pressure testing of AC condenser and its repairing/replacing. • Procedure of checking radiator fan and its motor using Multimeter and replacing faulty motor. • Procedure to check receiver/dryer or accumulator through sight glass • Importance and working of blower fan. Explaining the procedure to test blower fan motor using Multimeter and replacing the faulty parts. • Importance and working of expansion valve. Explaining the procedure to test expansion valve and replacing the faulty expansion valve. • Procedure to check evaporator leak, refrigerant will collect in the evaporator case, and pass into the passenger compartment through the a/c vents on the dash. Test the vent nearest the evaporator with an electronic leak detector. • Dye-based air conditioning leak-down test which uses a colored dye to find Freon leaks in A/C system. In this test, a colored dye is injected into the A/C system which will be visible under ultra-violet light at the point of	Workshop with required tools and equipment	Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Wire Brush Combination Spanner Set Socket Spanner Multimeter Allen Keys set WD-40 Grease Oil Gun Voltage Tester Manifold Gauge Set with Hose and Manual Couplers A/C Recovery & Recycling Machines A/C Flushing Equipment A/C Vacuum Pumps A/C Manifold Gauge Sets A/C Charging Scales

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	a leak anywhere in the system. • Procedure for repairing leakages and re-charging A/C refrigerant into the system (30 to 40 psi on Low pressure side.) While the high pressure reading 225 to 250 psi for 134 a, when the system is fully charged. • Electrical system checks of car A/C system and their rectification procedure. (Electrical Checks include A/C Compressor clutch testing, Blower fan Testing, Condenser fan, Pressure switch testing using Multimeter). • Procedure of pressure testing of evaporator for leakage finding and repairing/replacing the evaporator. • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to service air-conditioning (AC) system. They must make sure their questions cover key topics for how to service air-conditioning (AC) system. 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 service air-conditioning (AC) 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		A/C Retrofit Adapters & Gaskets A/C Orifice Tube Tools Clutch A/C Holding Tool Line Disconnect Tools Refrigerant Identifiers Diagnostic Leak Detection Valve Core Remover/Installer

Module 10: 071400955 Service Comfort & Safety System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 how to service air-conditioning (AC) system in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Module 11: 071400956 Maintain Controlled Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Maintain Anti-lock Braking System (ABS)	Deliver an illustrated presentation on how to maintain anti-lock braking system (ABS). Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Usage of different tools and equipment for fault diagnoses e.g. screw drivers, combination spanner, Clip opener, socket set and DC tester etc. • Knowledge of electric standards and relevant safety (for example electrical systems, protective devices and connection technologies • Purpose of ABS system and its main components e.g. wheel speed sensors, gear pulsar, ECU and hydraulic pressure modulator • Importance of ABS system in a vehicle • Diagnosis of ABS system with the help of OBD II scanner. • Finding Fault with the help of scanner and its rectification • Procedure for cleaning and storing of tools & equipment at work place • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout	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 Brake Fluid Brake pads Brake shoe Philips/Flat Screw Driver Set Cotton Rags Needle Nose plier Car Lift Emery Paper Combination Spanner Set Multi Meter

Module 11: 071400956 Maintain Controlled Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	…showing the key topics about how to maintain anti-lock braking system (ABS). 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 maintain anti-lock braking system (ABS). 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.		

Module 11: 071400956 Maintain Controlled Brake 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 how to maintain anti-lock braking system (ABS) in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 2: Maintain pressure Modulator	Lead a discussion about how to maintain pressure modulator. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Usage of different tools and equipment for fault diagnoses e.g. screw drivers, combination spanner, Clip opener, socket set and DC tester etc. • The inlet and outlet brake lines and figure out the leakages in these brake lines • The working principle of hydraulic pressure modulator • The the functions of solenoid valves and return motor of Pressure Modulator during braking. • Importance of housekeeping Display a flip chart showing the following key question	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 Brake Fluid Brake pads Brake shoe Philips/Flat Screw Driver Set Cotton Rags Needle Nose plier Car Lift Emery Paper Combination Spanner Set

Module 11: 071400956 Maintain Controlled Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	related to how to maintain pressure modulator: *'Why is it important to follow safety guidelines when maintaining pressure modulator?'* 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. Learners must be able to practice and develop their knowledge and skills relating to how to maintain pressure modulator. Ensure that learners have the opportunity to ask		Multi Meter

Module 11: 071400956 Maintain Controlled Brake System			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	questions to support their understanding. Ask questions to confirm their understanding.		
LU 3: Maintain ABS-Electronic Control Unit (ECU)	Lead a brainstorm on ways to maintain ABS-Electronic Control Unit (ECU). Use ideas from the brainstorm to explain the following key points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task. • Usage of different tools and equipment for maintaining ABS-Electronic Control Unit (ECU) e.g. screw drivers, combination spanner, Clip opener, socket set and DC tester etc. • Knowledge of electric standards and relevant safety (for example electrical systems, protective devices and connection technologies) • Working of ECU in ABS system. • The method how to remove, clean and refit the connector of ECU • How ECU may be replaced if found malfunctioned after scanning by OBD II scanner. • Importance of housekeeping Display a slide or flip chart with a key question relating to maintain ABS-Electronic Control Unit (ECU). **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 Class or demonstration room or Workshop Or Professional field work in domestic building and industrial complex	Multimedia Videos Handouts Learner's guide White board Board markers Relevant PPEs Brake Fluid Brake pads Brake shoe Philips/Flat Screw Driver Set Cotton Rags Needle Nose plier Car Lift Emery Paper Combination Spanner Set Multi Meter

Module 11: 071400956 Maintain Controlled 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 maintain ABS-Electronic Control Unit (ECU). 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 ABS-Electronic Control Unit (ECU). Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding..		

Module 12: 071400957 Conserve Power Transmission-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Perform maintenance of Automatic Transmission	Deliver an illustrated presentation on how to perform maintenance of automatic transmission. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • The working principle of Automatic Transmission • Usage of different tools and pressure gauge to check oil pressure of automatic transmission • The procedure to replace vehicle speed sensor • Working of planetary gear set in reverse gear operation • Working of reverse clutch drum, its friction band and servo unit. • Elaborating the components of Automatic Transmission and their functions e.g. Drive shaft, driven shaft, multi plate clutches, valve body, governor, oil cooler etc. • Purpose of transmission fluid strainer and procedure of its replacement • Main parts and their functions of torque converter (namely pump, turbine and stator). • Procedure for cleaning and storing of tools & equipment at work place • Importance of housekeeping 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 Transmission Oil Philips/Flat Screw Driver Set Cotton Rags Grip plier Car Lift Emery Paper Combination Spanner Set Multi Meter Allen Key Set Bearing Puller Housing Puller Tyre Lever Hammer

Module 12: 071400957 Conserve Power Transmission-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• A PowerPoint slide • A handout …showing the key topics about how to perform maintenance of automatic 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 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 perform maintenance of automatic 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.		

Module 12: 071400957 Conserve Power Transmission-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 how to perform maintenance of automatic transmission in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 2: Perform maintenance of Electronic Control Transmission (ECT) System	Lead a discussion about how to perform maintenance of Electronic Control Transmission (ECT) system. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Usage of multi meter and DC tester for testing sensors and solenoid valves. • The function of sensor used in automatic transmission • Diagnosing the fault with the help of OBD II sensor • Procedure to replace the faulty sensor • Importance of housekeeping Display a flip chart showing the following key question	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 Transmission Oil Philips/Flat Screw Driver Set Cotton Rags Grip plier Car Lift Emery Paper

Module 12: 071400957 Conserve Power Transmission-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	related to how to perform maintenance of Electronic Control Transmission (ECT) system: *'Why is it important to know functions of sensor, used in automatic?'* 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. Learners must be able to practice and develop their knowledge and skills relating to how to perform maintenance of Electronic Control Transmission		Combination Spanner Set Multi Meter Allen Key Set Bearing Puller Housing Puller Tyre Lever Hammer

Module 12: 071400957 Conserve Power Transmission-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	(ECT) system. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 3: Perform Diagnosis of Electronically Controlled Transmission (ECT) System with OBD-II Scanner	Lead a brainstorm on ways to perform diagnosis of Electronically Controlled Transmission (ECT) system with OBD-II Scanner. Use ideas from the brainstorm to explain the following key points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Usage of different tools and equipment for fault diagnoses e.g. screw drivers, combination spanner, Clip opener, socket set and DC tester etc. • Knowledge of electric standards and relevant safety (for example electrical systems, protective devices and connection technologies • Function of sensor used in automatic transmission • Diagnosing the fault with the help of OBD-II sensor • The procedure to replace the faulty sensor • Importance of housekeeping Display a slide or flip chart with a key question relating to greeting guests and taking orders.	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 Transmission Oil Philips/Flat Screw Driver Set Cotton Rags Grip plier Car Lift Emery Paper Combination Spanner Set Multi Meter Allen Key Set Bearing Puller Housing Puller Tyre Lever Hammer

Module 12: 071400957 Conserve Power Transmission-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 diagnosis of Electronically Controlled Transmission (ECT) system with OBD-II Scanner. 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 diagnosis of Electronically Controlled Transmission (ECT) system with OBD-II Scanner. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 1: Service Windshield Wash System	Lead a discussion about how to service windshield wash system. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Usage of multi meter and DC tester for testing sensors and actuators. • Working mechanism & location of rain sensor, troubleshooting of rain sensor with the help of OBD-II Scanner. • Understanding of the connection of hoses and their location, nozzle, washer reservoir, along with motor driven centrifugal pump. • Understanding of components of motor e.g. armature, magnet and carbon bushes etc. • Functioning and servicing of shower nozzles • Functioning and connections of Wiper switch and instrument panel wire harness • Servicing and re-fixing of faulty parts at their desired location. • Procedure for cleaning and storing of tools & equipment at work place. • Importance of housekeeping Display a slide or flip chart with a key question relating to service windshield wash 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 Washer Fluid WD 40 Multipurpose Grease Oil Gun Emery Paper Cotton rags Philips/Flat Screw Driver Set Combination Spanner Set Multi Meter Socket Set Relevant PPEs

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 service windshield wash 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 service windshield wash system. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 2: Service Wiper System	Deliver an illustrated presentation on how to service wiper system. Ensure you address the importance of the following points:	Class room with multimedia aid and flip	Multimedia Videos Handouts

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	• Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Main components of wiper system (wiper blade, wiper arm, pivot shaft, linkage, wiper switches etc.). • Understanding of intermittent or delay mode and working of wiper motor. • Testing wiper motor with the help of battery voltage. • Checking the fuses and relays with DMM. • Procedure for cleaning and storing of tools & equipment at work place. • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to service wiper system. They must make sure their questions cover key topics for how to service wiper system. 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 service wiper 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	charts Or Access to an Automobile Workshop with required tools and equipment	Learner's guide White board Board markers Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Multimeter Combination Spanner Set Socket Spanner Set

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 how to service wiper system. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 3: Check Performance of Instrument Panel	Invite an experienced Automobile expert to deliver a presentation on how to check performance of instrument panel. Ensure the presentation addresses the following important points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Introduction of gauges of instrument panel,	Class room with multimedia aid and flip charts Or Access to an Automobile Workshop with required tools	Multimedia Videos Handouts Learner's guide White board Board markers

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	their functioning and troubleshooting with the help of OBD-II Scanner • Fixing and removing of CD player, radio and LCD, understanding of their functions and their performance level. • Panel buttons and knobs of instrument panel • Operation of all indicators and warning lights in instrument panel. • Procedure for cleaning and storing of tools & equipment at work place. • Importance of housekeeping Prepare either: • A flip chart • A PowerPoint slide • A handout …showing key topics for how to check performance of instrument panel. 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 instrument panel. 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	and equipment	Relevant PPEs Philips/Flat Screw Driver Set Cotton Rags Emery Paper Combination Spanner Set RPM Meter Multi Meter OBD II Scanner

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	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 how to check performance of instrument panel. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		
LU 4: Demonstrate Function of Sensors	Deliver an illustrated presentation on how to demonstrate function of sensors. Ensure you address the importance of the following points: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • How to check sensor or troubleshoot the sensor problem with the help of OBD-II scanner • Monitoring function of all sensors with the help of multi meter and voltage tester • The method how to replace the faulty sensor. • Procedure for cleaning and storing of tools & equipment at work place	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Combination Spanner Set RPM Meter

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
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 demonstrate function of sensors. **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 demonstrate function of sensors. 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 how to demonstrate function of sensors in an appropriate practical setting. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		Multi Meter OBD II Scanner

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
LU 5: Maintain Electrical Motors	Lead a discussion about how to maintain electrical motors. Use real examples to support the discussion and ensure the discussion considers: • Understanding of appropriate tools and equipment for performing this task • Safety precautions regarding the task • Usage of different tools and equipment for fault diagnoses e.g. screw drivers, combination spanner, Clip opener, socket set and DC tester etc. • Understanding of electric standards and relevant safety (for example electrical systems, protective devices, connection technologies and) • Understanding the connections of wire harness and their locations • Monitoring the operations of all motors • Functioning and location of all motors • Method how to replace the faulty motor. • Procedure for cleaning and storing of tools & equipment at work place • Importance of housekeeping Learners need to devise 10 quiz questions with answers based on how to maintain electrical motors. They must make sure their questions cover key topics for how to maintain electrical motors. 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 maintain electrical	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 Philips/Flat Screw Driver Set Cotton Rags Emery Paper Combination Spanner Set RPM Meter Multi Meter OBD II Scanner

Module 13: 071400958 Perpetuate Controlled Electrical & Electronic System-I			
Learning Unit	**Suggested Teaching/ Learning Activities**	**Delivery Context**	**Media**
	motors. 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 how to maintain electrical motors. Ensure that learners have the opportunity to ask questions to support their understanding. Ask questions to confirm their understanding.		

Short Questions/Answers:

1. How can low tire pressure negatively affect driving? https://www.aarp.org/auto/car-maintenance-safety/info-2016/auto-maintenance-quiz.html#quest3	By Compromised cornering, braking and stability By Decreased fuel efficiency By Uneven wear and increased chance of tire failure
How often oil and oil filter should change? https://www.aarp.org/auto/car-maintenance-safety/info-2016/auto-maintenance-quiz.html#quest3	Depends on your driving style and conditions Depends on the car year and model
Which instrument do we use to check specific gravity of electrolyte?	Hydrometer
What are the main factors relate to non-starting of engine?	1. Fuel supply 2. Voltage supply in ignition system
What mandatory checkups to be done before starting an engine?	Mandatory check-ups are 1. Coolant Level 2. Engine Oil Level 3. Brake Fluid level 4. Electrolyte Level 5. Fuel Level 6. Tire Pressure
What is DTC stands for	Diagnose Trouble Code
Name different types of filter used in a vehicle?	1. Oil filter 2. Air filter 3. Fuel filter 4. Air-conditioning filter
At which stroke do we set tappet clearance and why?	We set tappet at compression stroke/power stroke, because both valves (Intake & Exhaust) are closed on these strokes
How to adjust engine idle speed?	Engine idle speed can adjust by turning the screw clockwise or anti clock wise on throttle body and also by OBD-II sensor.
What is the main purpose of ignition system	The main purpose of ignition system is to create a high voltage spark.

Which tools do we use to set tappet clearance?	Feeler gauge Flat screw driver Combination Spanner
How often should a car engine filter be changed? https://auto.ndtv.com/news/what-does-a-car-engine-air-filter-do-1248487	There is no simple answer as to how often a car engine air filter should be changed. It depends on a number of factors, such as how many miles the vehicle has been driven and the environment it is driven in.

How often should an air filter be replaced? https://blog.firestonecompleteautocare.com/maintenance/fags-about-your-cars-cabin-fuel-and-air-filters/	Generally, it's recommended that you get your filters replaced every 12 months or 12,000 miles, but check your owner's manual for specifics about your vehicle's filter replacement schedules.
What happens to air filters as they get older? https://blog.firestonecompleteautocare.com/maintenance/fags-about-your-cars-cabin-fuel-and-air-filters/	When your air filter is dirty, your engine is forced to work harder, resulting in poor fuel economy, higher emissions and, possibly, a loss of engine power.
What is the benefit of replacing an air filter? https://blog.firestonecompleteautocare.com/maintenance/fags-about-your-cars-cabin-fuel-and-air-filters/	**Air filter: Engine protection is the name of the game.** So is engine performance. Acceleration can improve up to 11% after an old, dirty air filter is replaced.
Name different types of Spark Ignition Systems?	1. Contact Breaker Ignition System 2. Breaker-less/Electronic Ignition System 3. Distribute less Ignition System 4. Coil-On-Plug Ignition System
What are the two windings used in ignition coil?	The two windings used in ignition coil are 1. Primary winding 2. Secondary winding
Name main components of ignition system?	Main components of ignition system are 1. Battery

	2. Ignition Switch 3. Ignition Coil 4. Ignition distributor 5. Spark Plug
What are the advantages of EFI System?	Advantages of EFI System 1. Improved fuel distribution 2. Engine power increases by average of 10 percent 3. Faster acceleration resulting from direct delivery of fuel to the cylinder 4. Leaner air/fuel ratios 5. better fuel economy 6. reduced exhaust emissions
What are different types of EFI sensor?	Types of EFI sensor are 1. Mass Air Flow sensor 2. Throttle position sensor 3. Manifold absolute pressure sensor 4. Camshaft position sensor 5. Crankshaft position sensor 6. Engine Coolant temperature sensor 7. Oxygen sensor 8. Knocking sensor
Name different types of EFI actuators?	Types of EFI actuators are 1. Fuel Injectors 2. Idle Air control valve
What MAF Stands for?	Mass Air Flow Sensor
What CMP stands for?	Camshaft position sensor
For how long does fuel line pressure remain? https://axleaddict.com/auto-repair/How-to-Test-a-Fuel-Pressure-Regulator	Fuel pressure decreases slightly after shutting off the engine. Then the pressure will hold for about five minutes then decrease slightly. But some pressure will remain steady usually after about 20 minutes.

What if the car just doesn't start and I've never had it running? How can the fuel pressure system be tested? https://axleaddict.com/auto-repair/How-to-Test-a-Fuel-Pressure-Regulator	Locate the fuel pump relay; you may be able to connect battery power to it. Have a fuel pressure gauge connected to the test port. Check the specification for initial pressure on your vehicle repair manual. The manual will help you locate the relay as well.
Name main components of Air-conditioning system?	Main components of Air-conditioning system are 1. AC compressor 2. AC condenser 3. AC Drier 4. Expansion Valve 5. Evaporator
How does AC clutch work?	AC system uses electromagnetic clutch which engages and disengage on requirement
What is the main function of thermostat in engine cooling system	Main function of thermostat is to reduce engine warm up time
What are the two pressure lines in AC system	Two pressure lines in AC system are 1. Low pressure line (30- 35 PS) 2. High Pressure Line (280 – 300 PSI)
What does expansion valve do in AC system?	It reduces high pressure AC fluid into low pressure which results in low temperature/cooling
What are the basic characteristics of a brake fluid? https://www.objectivebooks.com/2015/04/automobile-engineering_79.html	A high boiling point Low viscosity Compatibility with rubber and metal parts
ABS stands for?	Anti-Lock Brake System
What are the main components of ABS system?	The main components of ABS system are 1. Wheel speed sensor

	2. Gear Pulsar Ring 3. Electronic Control Unit 4. Hydraulic Pressure Modulator
What is the main function of ABS Pressure modulator?	The main function of ABS pressure modulator is to regulate hydraulic pressure from brake master cylinder to wheel cylinders
What is the main function of ABS Return motor?	The main function of ABS Return motor is to return brake fluid pressure to master cylinder
Why do we have four wheel sensors instead of one?	In a circular path, outer wheel need high brake fluid pressure than inner wheel.
Enlist different types of clutches used in automatic transmission	Types of clutches used in automatic transmission are : 1. Forward Clutch 2. Reverse Clutch
Enlist main components of torque convertor	Main components of torque convertor are: 1. Fluid Pump 2. Turbine 3. Stator
How do you check oil pressure in automatic transmission	1. Install oil pressure tester in oil lines between transmission and oil cooler 2. Start the engine and note oil pressure reading (pressure should be in between 40 to 70 psi)
Enlist different types of sensors in ECT (Electronically Controlled Transmission)	1. Input shaft sensor 2. Output shaft sensor 3. Vehicle Speed Sensor
Explain purpose of Oil Cooler in automatic transmission	The purpose of the engine oil cooler is to allow the engine's cooling system to remove excess heat from the oil. These types of coolers are usually of the water-to-oil type of heat exchanger. The oil then flows through the tubes of the cooler while the engine coolant flows around the tubes
Define Motors and explain its types	An electric motor is an electrical machine that converts electrical

	energy into mechanical energy. Common type of Motors are AC Motors and DC Motors
Define Sensors and their types	A Sensor converts the physical parameter (for example: temperature, pressure etc.) into a signal which can be measured electrically. Common types of Sensors are Temperature, Pressure, Humidity, Speed, Proximity, etc.
Identify different indicators and warning lights	**Indicators:** 1. Side indicators 2. High beam indicator **Warning Lights:** 1. Engine oil light 2. Charging light 3. Brake light 4. Seat belt light 5. Air Bag
Enlist different types of gauges and meter used in instrument panel	**Gauges:** 1. Fuel Gauge 2. Temperature Gauge **Meters:** 4. Speedometer 5. Odometer 6. Trip meter 7. Tachometer
Enlist main components of windshield wash & wiper system	**Windshield Wash System:** 1. Washer fluid reservoir 2. Fluid Pump with motor 3. Fluid Lines 4. Washer Nozzle 5. Electric Switch **Windshield Wiper System:**
	1. Wiper Motor 2. Wiper Links 3. Wiper Blades

Test Yourself (Multiple Choice Questions)

MODULE 6			
Question 1 To extend the life of tires, how often should rotate them?		A	Every 1,000 to 2,000 miles
	Xx	B	Every 5,000 to 8,000 miles
		C	Every 10,000 to 15,000 miles
		D	Rotating tires doesn't really extend their life
Question 2 A car's air filter should be inspected for signs of wear (e.g., oil or water soaked, leaking, torn or restricted) after every oil change, but how often should it be replaced even if it's not failing?		A	Once every 6 months
	Xx	B	Once per year
		C	Every two years
		D	Every 50,000 miles

Question	**3**	When should replace the belts that power alternator, water pump, power steering and cooling fans?	A	Every time you have your car serviced
			B	During an oil change
		Xx	C	When the belts look greasy or glazed, have excessive cracks, or contain splits and chunking
			D	When the Check Engine light illuminates
Question	**4**	Is the following statement True or False? A Battery is a series or parallel combination of electrolytic cells.	Xx	A True
			B	False

Question	**5**	In which term, the capacity of a battery is usually expressed?		A	Volts
				B	Amperes
				C	Weight
			Xx	D	Ampere hours
MODULE	**7**				
Question	**6**	What the condition called, if the air-fuel mixture ignites before the spark takes place at spark plug?		A	Detonation
				B	Ignition
			Xx	C	Pre-ignition
				D	Rumble

Question 7	Which of the following should be the first step in diagnosing an engine performance concern?	Xx	A	Discussing concern with the vehicle owner
			B	Retrieve diagnostic trouble codes
			C	Check for symptoms in the on-line service manual
			D	Road test the vehicle
Question 8	How the valve tappet clearance is measured?		A	By Screw pitch gauge
			B	By Engineering scale
		Xx	C	By Feeler gauge
			D	By Vernier caliper

MODULE 8					
Question	**9**	A NO START condition is being diagnosed on a vehicle with electronic fuel injection (EFI) and distributor less ignition. Technician A says you should only use a DMM (Digital Multimeter) to check voltage values on PCM (Powertrain Control Module). Technician B says you should use a tool to check for spark at one of the spark plugs. Who is right?		A	A only
				B	B only
			Xx	C	Both A and B
				D	Neither A nor B
Question	**10**	What the starting system includes?	Xx	A	A battery, a starter, and an ignition switch
				B	A battery, a distributor, and an ignition switch
				C	A battery, a starter, and a distributor
				D	A distributor, a starter, and an ignition switch

Question	**11**	What is the point gap in Contact Breaker Ignition System?	A	0.3 to 0.4 mm
		Xx	B	0.4 to 0.5 mm
			C	0.5 to 0.6 mm
			D	0.6 to 0.7 mm
Question	**12**	What is the range of high voltage in ignition system?	A	20 to 40 volts
			B	200 to 400 volts
			C	2000 to 4000 volts
		Xx	D	20000 to 40000 volts
Question	**13**	Why the ignition coil is used?	A	To Step up current
			B	To Step down current
		Xx	C	To Step up voltage

				D	To Step down voltage
MODULE	**9**				
Question	**14**	How engine oil effects, if the engine coolant leaks into the engine oil?	Xx	A	Appears milky
				B	Become foamy
				C	Turns black
				D	Turns sticky
Question	**15**	What is the main purpose of a fuel pump in gasoline fuel system?		A	To filter the fuel
				B	To regulate the flow of petrol
			Xx	C	To transfer petrol from tank to carburetor
				D	To compress the petrol prior to deliverer

Question	**16**	What is the advantage of the fuel injection system over the carburetor system?	A	Improved fuel efficiency
			B	Improved emission
			C	Improved power output
		Xx	D	All of these
Question	**17**	What is the maintenance cost in an electronic fuel injection?	A	Very low
			B	low
		Xx	C	high
			D	Nil
Question	**18**	Is the following statement True or False? The electronic fuel injection, eliminates majority of carburetor pressure loses and almost eliminates the requirement of manifold heating.	Xx	A True
			B	False

Question 19 What is the correct order in which fuel is injected?

Xx

A Fuel tank – Fuel filter – Fuel feed pump – Fuel injection pump – injector

B Fuel tank – Fuel feed pump – Fuel filter – Fuel injection pump – injector

C Fuel tank – Fuel filter – Fuel injection pump – Fuel feed pump – injector

D Fuel tank – Fuel injection pump – Fuel filter – Fuel feed pump – injector

Question 20 When the fuel is injected into the cylinder?

A At the end of suction stroke.

Xx B At the end of compression stroke.

C At the end of expansion stroke.

D At the end of exhaust stroke.

Question 21 For which of the following injection system only one pump is sufficient for multi-cylinder engine?

A air

B mechanical

				C	Compression fuel
			Xx	D	Common rail

Module	**10**				
Question	**22**	Where the seat belt tensioners are built?		A	In the Front seats
				B	In the Shoulder anchors
			Xx	C	In the Seat belt retractor
				D	In the Seat belt buckles
Question	**23**	When replacing a lower control arm bushings on a short arm long arm (SLA) suspension, what should be the replacement?		A	Tightened and torqued in a vise
				B	Tightened using the torque turn method
			Xx	C	Torqued with vehicle weight on suspension

			D	Torqued with control arm resting on frame
Question	**24**	Which of the following conditions is likely to indicate a worn control arm bushing?	A	Ball joint play
			B	Front suspension sag
			C	Fails the bounce test
		Xx	D	Rubber bushing is cracked
Question	**25**	During an air conditioning performance test, the technician notices that the compressor outlet is hot. Technician A says this is a normal condition. Technician B says the air conditioning system is overcharged. Who is right?	A	A only
			B	B only
			C	Both A & B
			D	Neither A nor B

Question 26 The brake shoe is moved outward to force the lining against which of the following, during braking?

	A	Wheel piston or cylinder
	B	Anchor pin
Xx	C	Brake drum
	D	Wheel rim or axle

Question 27 What is the sequence in which the force is transmitted through a brake system when the brake pedal is depressed?

	A	Brake pedal, master cylinder, brake lines, vacuum servo mechanism, brake pads
Xx	B	Brake pedal, vacuum servo mechanism, master cylinder, brake lines, brake pads
	C	Brake pedal, master cylinder, vacuum servo mechanism, brake lines, brake pads
	D	Brake pedal, brake lines, vacuum servo mechanism, master cylinder, brake pads

Question 28 What is the function of anti-lock brake system (ABS)?

	A	Reduces the stopping distance
	B	Minimizes the brake fade

	Xx	C	Maintains directional control during braking by preventing the wheels from locking
		D	Prevents nose dives during braking and thereby postpones locking of the wheels
Question 29 The ABS (antilock brake system) amber light does not go off after the engine is started. Technician A says a parking brake not fully released could be the cause. Technician B says when this happens the brakes will operate like a normal non-ABS brake system. Who is right?		A	A only
	Xx	B	B only
		C	Both A & B
		D	Neither A nor B
Question 30 To which of the following the brake switch sends an electronic signal?		A	Brake light
		B	Electronic control module
	Xx	C	Both A & B
		D	None of the above

Question	**31**	An automobile brake is only used to reduce the speed or bring the vehicle to hault.		A	Yes
			Xx	B	No, it also be used to hold the car
				C	Brake acts only onmoving vehicles
				D	None of the mentioned
Module	**12**				
Question	**32**	What is the purpose of transmission in an automobile?		A	To vary the speed of automobile
			Xx	B	To vary the torque at the wheels
				C	To vary the power of automobile
				D	None of these
Question	**33**	Which of the following the torque converter does, when removing an engine from a vehicle equipped with an automatic transmission?	Xx	A	Stays with transmission

			B	Stays with engine
			C	Must be drained
			D	Must be flushed
Question	**34**	Which of the following will identify by an automatic transmission pressure test?	A	Defective Engine Shutoff (ESO) solenoid
			B	Defective torque converter
			C	Shift solenoid
		Xx	D	Dirty transmission filter
Question	**35**	Which of 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

Module	13				
Question	**36**	By which of the following the starter motor is driven?		A	By chain drive
			Xx	B	By gear drive
				C	By flat belt drive
				D	By v-belt drive
Question	**37**	What is the main task of a battery in automobiles?		A	To Supply electricity to the alternator
				B	To Act as a reservoir or stabilizer of electricity
				C	To Supply electricity to the vehicle's electrical system at all times while the engine is running
			Xx	D	To Supply a large amount of power to turn the starter motor when the engine is being started
Question	**38**	Which of the following information is provided by the oxygen (O_2) sensor to the feedback control system?	Xx	A	About air fuel ratio

	B	About air flow speed
	C	About air temperature
	D	Exhaust gas volume

Question 39 What is the function of a governor in automobiles?

	A	Limit the power
Xx	B	Limit the vehicle speed
	C	Maintain constant engine speed
	D	Maximise the fuel economy

Question 40 What Tachometer measures, in a vehicle?

	A	Speed
	B	Distance
Xx	C	Engine r.p.m
	D	Fuel consumption

Question 41 For which measurement, Odometer is used?

	A	Power
	B	Fuel consumption
	C	Engine r.p.m
Xx	D	Distance

Question 42 When performing a load test on a battery, a technician finds that the battery voltage drops below specifications. Which of the following is the MOST likely action to perform?

	A	Recharge the battery and return it to service
	B	Recharge the battery and retest it
Xx	C	Replace the battery
	D	Replace the voltage regulator

ANSWERS

MODULE 6				
Question	**1**	To extend the life of tires, how often should rotate them?	B	Every 5,000 to 8,000 miles
Question	**2**	A car's air filter should be inspected for signs of wear (e.g., oil or water soaked, leaking, torn or restricted) after every oil change, but how often should it be replaced even if it's not failing?	B	Once per year
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Question	**4**	Is the following statement True or False? A Battery is a series or parallel combination of electrolytic cells.	A	True
Question	**5**	In which term, the capacity of a battery is usually expressed?	D	Ampere hours

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Question	**7**	Which of the following should be the first step in diagnosing an engine performance concern?	A	Discussing concern with the vehicle owner
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Question	**10**	What the starting system includes?	A	A battery, a starter, and an ignition switch
Question	**11**	What is the point gap in Contact Breaker Ignition System?	B	0.4 to 0.5 mm
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MODULE 9				
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Question	**16**	What is the advantage of the fuel injection system over the carburetor system?	D	All of these
Question	**17**	What is the maintenance cost in an electronic fuel injection?	C	high

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