Curriculum for Diesel Mechanic

(6 Month)

Code: VJ90S005
Introduction

Overall objective of the course
This Diesel Mechanic course is for learners who have some knowledge and basic skills in the auto industry - probably from a role where they work under supervision. The qualifications are for learners who want to increase their skills and take on more responsibility. Units in the qualification cover all areas of working in Diesel Mechanic job including aspects of dismantling, repairing, overhauling and fitting of different components of a diesel engine. In particular, learners will have acquired competencies to:

- Work effectively in a team
- Assemble components of a diesel engine for proper working.
- Maintain safety while working with in a workshop

After completing this course, learners will have opportunities to pursue career opportunities into job roles such as Auto Diesel Mechanic and Diesel Engine Technician.

Competencies Gained after Completion of Course
The trainee, after completion of this course, will be able to gain the following competencies:

- Observe safety precaution while working in workshop.
- Use proper tools and equipment for the work and returning them safely.
- Accurate measuring of parts and components
- Diagnose generic engine malfunctions and their repair/ maintenance.
- Dismantle different parts of the diesel engine.
- Remove defective part or component of diesel engine for proper functioning.
- Inspect vehicle/engine after completion of repair work.
- Prepare inspection report of the job.

Scope of Diesel Mechanic
Pass out will be employed in the following on industries/organizations:

- Local Workshops
- Manufacture’s service and repair centers
- Heavy Duty Workshops
- Private fleets and garages
- Government departments
- Assembly plants
- Generator workshops
- Spare parts stores
- Self Business.
- Power generating plants.
- Heat recovery units/plants.

**Entry Level**
Minimum qualification for this course is Matric or equivalent.

**Class Size**
24 week = 800
Spread over 6 month
36 hours per week
06 days a week
06 hours per day
Except Friday 05 hours

**Duration**
800 Hours Spread Over 6 Months

**Weightage**

<table>
<thead>
<tr>
<th></th>
<th>= 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td></td>
</tr>
<tr>
<td>Practical</td>
<td>= 400</td>
</tr>
</tbody>
</table>

**Grading**

<table>
<thead>
<tr>
<th></th>
<th>Pass marks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theory:</strong></td>
<td>40%</td>
</tr>
<tr>
<td><strong>Practical:</strong></td>
<td>60%</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Fail</td>
<td>0 – 59%</td>
</tr>
<tr>
<td>Average</td>
<td>60 – 78%</td>
</tr>
<tr>
<td>Good</td>
<td>79 – 92%</td>
</tr>
<tr>
<td>Very Good</td>
<td>93 – 100%</td>
</tr>
</tbody>
</table>
## Overview of the Program

<table>
<thead>
<tr>
<th>Modules</th>
<th>Learning Units</th>
<th>Theory Hours</th>
<th>Work Place Hours</th>
<th>Timeframe of Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module A:</strong></td>
<td>Follow Safety Rules</td>
<td>2 Hrs</td>
<td>8 Hrs</td>
<td>10 Hrs</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>Understand the safety precautions required in performing the job.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Module B:</strong></td>
<td>Diagnose Faults</td>
<td>22 Hrs</td>
<td>88 Hrs</td>
<td>110 Hrs</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>Able to diagnose faults in a diesel engine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module C:</strong></td>
<td>Repair Faults in Engine</td>
<td>25 Hrs</td>
<td>100 Hrs</td>
<td>125 Hrs</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>Remove faults in an engine after repairing the defective parts of engine.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Module D:</strong></td>
<td>Perform Tuning of Engine</td>
<td>16 Hrs</td>
<td>64 Hrs</td>
<td>80 Hrs</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>Learn methodology of carrying out tuning of an engine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module E:</strong></td>
<td>Repair Exhaust Manifold</td>
<td>24 Hrs</td>
<td>96 Hrs</td>
<td>120 Hrs</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>Learn procedure of repairing the exhaust manifold of an engine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Module F:</strong></td>
<td>Assemble Engine Block</td>
<td>7 Hrs</td>
<td>28 Hrs</td>
<td>35 Hrs</td>
</tr>
<tr>
<td><strong>Aim:</strong></td>
<td>Learn the procedure of assembling of engine</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Module: G
Re-Examine Engine Assembling

**Aim:** Perform rechecking of proper assembling of engine.

<table>
<thead>
<tr>
<th></th>
<th>21 Hrs</th>
<th>84 Hrs</th>
<th>105 Hrs</th>
</tr>
</thead>
</table>

### Module H:
Repair Break Systems

**Aim:** Learn the procedure of repairing of break system properly.

<table>
<thead>
<tr>
<th></th>
<th>27 Hrs</th>
<th>108 Hrs</th>
<th>135 Hrs</th>
</tr>
</thead>
</table>

### Module I:
Repair Power Train

**Aim:** Learn the procedure of repairing the power train of the engine.

<table>
<thead>
<tr>
<th></th>
<th>16 Hrs</th>
<th>64 Hrs</th>
<th>80 Hrs</th>
</tr>
</thead>
</table>

**Total**

<table>
<thead>
<tr>
<th></th>
<th>160 Hrs</th>
<th>640 Hrs</th>
<th>800 Hrs</th>
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</thead>
</table>

## Curriculum Contents (Teaching & Learning Guide)

### Module A: Follow Safety Rules

**Objective of the Module:** To enable the trainee to be able to follow safety precautions while performing the job.

**Duration of Hours:**
- **Theory:** 02 Hours
- **Practice:** 06 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning Outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| A.1 Follow safety rules | Learner will be able to protect self vehicles and others | **Knowledge of:**
- Safety Rules applied to diesel mechanic trade.
- Personal protection or safety.

**Ability to:**
- Follow safety precautions.

| | | | | | |
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| | | | | | |
| A.2 Maintain the tools, equipments and instrument | Other to Protect tools equipment Machinery | **Knowledge of:**
- Enumerates symbols for safety.
- Define warning.

**Ability to:**
- Carry out maintenance & repairing work of automotive engine & vehicles.
- Write the abbreviations used for safety.

| | | | | | |
| | | | | | |
| | | | | | |
| A.3 Use of fire extinguishers | Protect self and work place for fire | **Knowledge of:**
- Define Caution
- Define Danger.
- Define Hazard.
- Define First aid
- Equipments used on safety Hazard (Fire Extinguisher)

**Ability to:**
- Use fire extinguisher in emergency situation.
<table>
<thead>
<tr>
<th>A.4 Apply medical aid to the victims of any accident</th>
<th>Protect the victim and self.</th>
<th><strong>Knowledge of:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>– Name the essential items in the first aid box</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Application of first aid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Name the particular dressing for personal safety &amp; protection</td>
</tr>
<tr>
<td><strong>Ability to:</strong></td>
<td></td>
<td><strong>TH.30</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PR.4</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>HRS</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All kinds of fire extinguisher</td>
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<tr>
<td></td>
<td></td>
<td>Workshop</td>
</tr>
</tbody>
</table>
**Module B: Diagnosis Faults**

**Objective of the Module:** To enable the trainee to be able to diagnose generic malfunctions in the diesel engine.

**Duration of Hours:**
- Theory 22 Hours
- Practice 90 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
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<th>Learning place</th>
</tr>
</thead>
</table>
| B.1. Receive complaint from client | To understand the value of time & try to complete the job within specified time limit. | **Knowledge of:**
  - Procedure of receiving complaints from client. | 1 Hrs Th 4 Hrs Pr |  |  |
| B.2. Check contamination in oil and fuel. | To replace fuel injector seals, work rings liner and sticking piston rings. | **Knowledge of:**
  - Fuel injection seal leakage.
  - Quantity of fuel.
  - Worn ring liners.
  - Sticking piston rings. | 2 Hrs Th 8 Hrs Pr | See annexure |  |
| B.3. Knocking of power assembly. | To define Knocking and understand reason of knocking in different areas. | **Knowledge of:**
  - Definition of Knocking.
  - Noisy Connecting rods or bearings.
  - Noisy piston, Piston pins or piston rings.
  - Noisy main bearing
  - Detonation.
  - Pre-Injection.
  - Faulty Injection
  - Due to substandard fuel. | 2 Hrs Th 8 Hrs Pr | See annexure |  |
| B. 4 Inspect Cooling System. | To define Friction location of components, Observe Leakage Coolant, Explain related system faults. | **Knowledge of:**  
- Function of cooling system.  
- Location of system component.  
- Observe leakage of coolant.  
- Over heating.  
- Low operating temperature.  
- No coolant Flow through Heater core.  
- Inoperative coolant recovery system  
- Noise  
- Blockage of radiator  

**Ability to:**  
- Check and ascertain the defects in cooling system of the diesel engine.  |
| --- | --- | --- |
| **Knowledge of:**  
- Purpose of fuel system.  
- Empty Diesel fuel tanks.  
- Diesel fuel lines clogged.  
- Diesel fuel lines taking air.  
- Diesel fuel Filter is clogged.  
- High pressure lines are loose.  
- Water contamination in fuel lines.  |
| **Ability to:**  
- Draw fuel flow chart.  
- Check the fuel pump and auto miser nozzle.  |
| B. 5 Check faults in Fuel system. | To Identify / rectify Diesel fuel system faults. | **Knowledge of:**  
- Purpose of fuel system.  
- Empty Diesel fuel tanks.  
- Diesel fuel lines clogged.  
- Diesel fuel lines taking air.  
- Diesel fuel Filter is clogged.  
- High pressure lines are loose.  
- Water contamination in fuel lines.  |
| **Ability to:**  
- Draw fuel flow chart.  
- Check the fuel pump and auto miser nozzle.  |
| B. 6 Inspect Lubrication system | To understand to purpose and inspect the problem in lubrication system. | **Knowledge of:**  
- Purpose of Lubrication systems.  
- Engine oil pressure warning lamp.  
- Oil filter is clogged.  
- Oil pumps failure.  |
| **Knowledge of:**  
- Purpose of fuel system.  
- Empty Diesel fuel tanks.  
- Diesel fuel lines clogged.  
- Diesel fuel lines taking air.  
- Diesel fuel Filter is clogged.  
- High pressure lines are loose.  
- Water contamination in fuel lines.  |
| **Ability to:**  
- Draw fuel flow chart.  
- Check the fuel pump and auto miser nozzle.  | **General mechanism tool kit multimeter radiator cap tester temperature gauge house piper & clamps**  
**Class room / workshop**  |
| **Knowledge of:**  
- Purpose of lubrication systems.  
- Engine oil pressure warning lamp.  
- Oil filter is clogged.  
- Oil pumps failure.  | **Knowledge of:**  
- Purpose of fuel system.  
- Empty Diesel fuel tanks.  
- Diesel fuel lines clogged.  
- Diesel fuel lines taking air.  
- Diesel fuel Filter is clogged.  
- High pressure lines are loose.  
- Water contamination in fuel lines.  |
| **Ability to:**  
- Draw fuel flow chart.  
- Check the fuel pump and auto miser nozzle.  | **Knowledge of:**  
- Purpose of lubrication systems.  
- Engine oil pressure warning lamp.  
- Oil filter is clogged.  
- Oil pumps failure.  | **Knowledge of:**  
- Purpose of fuel system.  
- Empty Diesel fuel tanks.  
- Diesel fuel lines clogged.  
- Diesel fuel lines taking air.  
- Diesel fuel Filter is clogged.  
- High pressure lines are loose.  
- Water contamination in fuel lines.  |
| **Ability to:**  
- Draw fuel flow chart.  
- Check the fuel pump and auto miser nozzle.  | **Knowledge of:**  
- Purpose of lubrication systems.  
- Engine oil pressure warning lamp.  
- Oil filter is clogged.  
- Oil pumps failure.  | **Knowledge of:**  
- Purpose of fuel system.  
- Empty Diesel fuel tanks.  
- Diesel fuel lines clogged.  
- Diesel fuel lines taking air.  
- Diesel fuel Filter is clogged.  
- High pressure lines are loose.  
- Water contamination in fuel lines.  |
| B.7. Inspect exhausts systems. | To identify Exhaust gas leakage problems. |  |  |
|--------------------------------|------------------------------------------| 2 Hr Th. 8 Hr Pr. |
| **Ability to:**               |                                          |  |
| – Engine varnish.             |                                          |  |
| – Leakage (Externally).       |                                          |  |
| **Knowledge of:**             |                                          |  |
| – Function of Exhaust system. |                                          |  |
| – Component of system.        |                                          |  |
| – Weak gas kit.               |                                          |  |
| – Broken gas kit.             |                                          |  |
| – Improper installation of gas kit. |                                        |  |
| – Wrap age cylinder Head.     |                                          |  |
| – Broken cylinder liner.      |                                          |  |
| – Rusted cylinder liner.      |                                          |  |
| **Ability to:**               |                                          |  |
| – Ascertain the exhaust gas leakage problem accurately. | |  |
| – Interpret the defect properly. |                                        |  |
|  |                                          |  |
| B.8. Inspect sensors.         | To understand the checking procedure of sensors and perform inspection properly. |  |  |
| **Knowledge of:**             |                                          |  |
| – Sensors used in diesel engine. |                                        |  |
| – Function of sensors.        |                                          |  |
| – List the names of sensors.  |                                          |  |
| – Replace the sensors.        |                                          |  |
| – Techniques of testing speed sensor. |                                |  |
| – Techniques of testing knock sensor. |                               |  |
| – Techniques of testing hot film mass air flow sensor. |                      |  |
| – Techniques of testing fuel tank pressure sensor. |                      |  |
| – Techniques of testing intake camshaft hall sensor. |                      |  |
| – Techniques of testing coolant temperature sensor. |                      |  |
| – All Sensors C.R.D.I. (Common rail diesel  |                      |  |
|  |                                          |  |
|  |                                          |  |
| 2 Hr Th. 8 Hr Pr.              | Mechanics Tool Kit.  Ampere Meter Volt Meter Multi Meter. Lifting Equipments Torque Ranch Banch Bice Fuel Pressure Guage Oscilloscope Computer Lead Box. Diagnosis System and Class Room / Workshop |  |  |
| B.9. Check electrical system | To understand the functions of electrical components and inspect defects. | Injection system).  
- Techniques of testing accelerator pedal sensor.  
- Function of each sensor.  
- Identify the symbols of sensors Physical location of each sensor.  
- Identify the sensor in the electrical circuit diagram.  
- Techniques of checking sensor.  

**Ability to:**  
- Identify location of each sensor.  
- Check sensors.  
- Preparing inspection report.  

**Knowledge of:**  
- Function of all electrical components of diesel engine.  
- Connection sequence of all electrical components.  
- Faults, causes and their remedies of all electrical components.  

**Ability to:**  
- Read the electrical circuit diagram of diesel engine.  
- Identify faults in electrical components.  

| B.10. Inspect differential | To understand the working of differential and identify defects. | Differential.  
- Technical specification of the differential.  
- Techniques of inspecting defects in differential.  

**Ability to:**  
- Read the technical specification of the differential.  
- Identify faults in differential.  

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Interface box.  
Technometer.  

| 5 Hr Th. 20 Hr Pr. | Auto Wire,  
Pliers,  
Ampere Meter,  
Volt Meter,  
Multi Meter,  
Bulbs and Holder,  
Solding Iron,  
Paste and Wire,  

Mechanics Tool Kit,  
Lifting Equipments,  
Differenti al Oil.  

Class Room / Workshop.
| B.11. Check power train | To understand the function of power and discover defects in power train. | **Knowledge of:**  
- Components of power train.  
- Purpose and function of power train.  
- Relation of power train with gear.  
- Techniques for identification of defects in power train. | 1 Hr Th.  
4 Hr Pr. | Work Shop Class Room |
| --- | --- | --- | --- | --- |
| **Ability to:**  
- Check the bearing and gear of power train.  
- Use proper tools to check the accuracy of power train.  
- Observe safety precautions during work. |
**Module C:** Repair fault in engine

**Objective of the Module:** To enable the trainee to be able to repair faults in a diesel engine properly.

**Duration of Hours:** Theory 30 Hours Practice 112 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| C.1 Drain water from radiator | To drain water from radiator with the understanding of hose removing techniques. | Knowledge of:  
- Locating the mounting of rubber hoses from radiator to engine.  
- Removing the hoses to drain the water from radiator.  

Ability to:  
- Drain water from radiator safely. | 2 Hr Th. 8 Hr Pr. | Mechanic Tool Kit, oil filter, Wrench, Sealant lifting equipments, Scraper, oil Funnel, Recommended Oil, Waste Oil Drum. | Work Shop / Class Room |
| C.2. Drain oil from engine | To understand the techniques of draining oil from diesel engine. | Knowledge of:  
- Procedure of leveling the vehicle.  
- Procedure to drain the waste oil and filling of specific grade oil.  

Ability to:  
- Level the vehicle.  
- Drain out waste oil.  
- Fill specific grade oil.  
- Adhere to safety precautions. | 2 Hr. Th. 8 Hr Pr. | General Mechanics Tool Kit, Lifting equipment, Torque wrench, Bench vice, Pullers of different size, Straight edge. | Class room/ workshop |
| C.3. Remove engine parts | To remove the diesel engine parts with an understanding of safety precautions. | Knowledge of:  
- Procedure of removing engine parts.  
- Procedure of removing external components and accessories of engine.  
- Select proper tools, and equipment.  

Ability to:  
- Remove engine parts as | Th.6 Hr Pr. 23 Hr | | Class room/ workshop |
<table>
<thead>
<tr>
<th>C.4. Remove engine blocks</th>
<th>To understand the techniques of removing engine block safely.</th>
<th><strong>Knowledge of:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- Selecting the proper tools for removing engine block.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing radiator and other assemblies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing tappet cover and other accessories.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing engine block.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Safety precautions.</td>
</tr>
<tr>
<td><strong>Ability to:</strong></td>
<td></td>
<td>- Lift the engine from chases and place on stand or work bench.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Remove tappet cover and other accessories.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Remove engine head by loosening bolts.</td>
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<tr>
<td></td>
<td></td>
<td>- Remove gas kit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Follow safety rules.</td>
</tr>
<tr>
<td>Th 6 Hr Pr.23 Hr</td>
<td>General Mechanics tool kit. Lifting equipment. Oil drain spanner. Waste Oil Drum.</td>
<td>Class Room/Work Shop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C.5. Removes camshaft.</th>
<th>To understand the techniques of removing camshaft.</th>
<th><strong>Knowledge of:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- Selecting the proper tools from engine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing rocker arm assembly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing cylinder head.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing camshaft timing gear.</td>
</tr>
<tr>
<td><strong>Ability to:</strong></td>
<td></td>
<td>- Remove camshaft and other assembly components.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Follow safety precautions.</td>
</tr>
<tr>
<td>Th 2 Hr Pr.18 Hr</td>
<td>Mechanics tool kit. Pullers. Hammer Box Socket wrench.</td>
<td>Class Room/Work Shop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C.6. Remove sump</th>
<th>To understand the techniques of removing sump from diesel engine.</th>
<th><strong>Knowledge of:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- Using proper tools and equipment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Procedure of removing sump from engine,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Removing gas kit.</td>
</tr>
<tr>
<td>Th 3 Hr Pr.04 Hr</td>
<td>Mechanics tool kit. Workbench</td>
<td>Class Room/Work Shop</td>
</tr>
</tbody>
</table>
| C.7. Repair fault | To understand the techniques of repairing different faults of diesel engine. | – Cleaning the sump.  
**Ability to:**  
– Use proper tools and equipment for the work.  
– Remove sump from diesel engine.  
– Observe safety precautions.  
**Knowledge of:**  
– Selecting proper tools for the job.  
– Diagnosing faults.  
– Procedure to remove the diagnosed fault.  
– Reassembling of engine parts.  
**Ability to:**  
– Select proper tools.  
– Diagnose faults.  
– Remove faults.  
– Reassemble engine parts.  
– Observe safety precautions. | Th 4 Hr  
Pr. 16 Hr | Mechanics tool kit.  
Engine analyzer.  
Cotton west | Class Room/Work Shop |
Module D: Performs Tuning of engine

Objective of the Module: To enable the trainee to be able to perform tuning of a diesel engine properly.

Duration of Hours: Theory 16 Hours Practice 65 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.1. Perform engine test</td>
<td>To perform different engine tests before tuning.</td>
<td><strong>Knowledge of:</strong>&lt;br&gt;– Defining engine tune up.&lt;br&gt;– Types of diesel engine tests.&lt;br&gt;– Describe the test equipment and instrument.&lt;br&gt;– Procedure of tune up tests.&lt;br&gt;– Procedure of engine tune up.&lt;br&gt;– Observing safety rules.&lt;br&gt;<strong>Ability to:</strong>&lt;br&gt;– Perform different engine tests before tuning.&lt;br&gt;– Follow safety precautions.</td>
<td>Th. 2 Hr Pr. 08 Hr</td>
<td>Mechanics tool kits. Engine analyzer. Special tools as per manufacturers. Cylinder leakage tester. Timing lights. Pressure vacuum gauge</td>
<td>Class Room/Work Shop</td>
</tr>
<tr>
<td>D.2. Check injectors</td>
<td>To check injectors with an understanding of functioning of the injectors.</td>
<td><strong>Knowledge of:</strong>&lt;br&gt;– Functions of injector.&lt;br&gt;– Faults of injector and their remedies.&lt;br&gt;– Selecting the proper tools.&lt;br&gt;– Procedure of dismantling the injector and its servicing.&lt;br&gt;<strong>Ability to:</strong>&lt;br&gt;– Use proper tools.&lt;br&gt;– Identify faults in injectors.&lt;br&gt;– Conduct repair/maintenance of injectors.&lt;br&gt;– Observe safety precautions.</td>
<td></td>
<td>Mechanics tool kits. Injector tester hand operated. Injector cleaning kit. Cotton rag. Diesel</td>
<td>Class Room/Work Shop</td>
</tr>
</tbody>
</table>
| D.3. Change air filter | To change air filter properly. | **Knowledge of:**  
- Importance of air filters in the diesel engine.  
- Selecting proper tools and equipment for job.  
- Procedure to replace air filter. | **Ability to:**  
- Use proper tools and equipment for changing the air filter.  
- Replace air filter properly.  
- Observe safety precaution. | Th. 1 Hr PR. 04 Hr | Mechanics tool kits. Air filter. Screw drivers. Cotton west | Class Room/Work Shop |
| D.4. Change fuel filter | To change fuel filter properly. | **Knowledge of:**  
- Important of diesel fuel filter.  
- Selecting proper tools and equipment.  
- Procedure of replacing fuel filter. | **Ability to:**  
- Use proper tools and equipment for changing the fuel filter.  
- Replace the diesel fuel filter.  
- Follow safety precautions. | Th. 1 Hr Pr. 04 Hr | Class Room/Work Shop |
<table>
<thead>
<tr>
<th>D.5. Change oil filter</th>
<th>To change the oil filter properly.</th>
<th><strong>Knowledge of:</strong></th>
<th>Th. 1 Hr</th>
<th>Oil filter ranch. Oil filter. Recomended engine oil. Waste oil drum.</th>
<th>Class Room/Work Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Ability to:</strong></td>
<td>Pr. 04 Hr</td>
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</table>

<table>
<thead>
<tr>
<th>D.6. Test engine compression</th>
<th>To perform testing of engine compression properly.</th>
<th><strong>Knowledge of:</strong></th>
<th>Th. 1 Hr</th>
<th>Mechanics tool kits. Cylinder leakage tester. Pressure vacuum gage.</th>
<th>Class Room/Work Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Ability to:</strong></td>
<td>Pr. 04 Hr</td>
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</table>

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<thead>
<tr>
<th>D.7. Adjust valve trouble</th>
<th>To learn the procedure of adjusting the valve trouble.</th>
<th><strong>Knowledge of:</strong></th>
<th>Th. 1 Hr</th>
<th>Mechanics tool kits. Feeler gauge</th>
<th>Class Room/Work Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Ability to:</strong></td>
<td>Pr. 04 Hr</td>
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<tr>
<td>D.8. Service cooling and exhaust system</td>
<td>To perform servicing of cooling and exhaust system properly.</td>
<td>Th. 2 Hr</td>
<td>General Mechanic tool kits. Steel wire brush. Embry paper.</td>
<td>Class Room/Work Shop</td>
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<tr>
<td>Knowledge of:</td>
<td>the valve.</td>
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<tr>
<td></td>
<td>− Adjust valve trouble properly.</td>
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<td></td>
<td>− Observe the safety precautions.</td>
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<tr>
<td></td>
<td>− Importance of servicing diesel engine.</td>
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<td></td>
<td>− Cleaning method of cooling system and exhaust system.</td>
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<tr>
<td></td>
<td>− External cleaning processes of water body, radiator, engine block, cooling system.</td>
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<td></td>
<td>− Internal cleaning process of exhaust system.</td>
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<td></td>
<td>− Operation of air compressor.</td>
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<td></td>
<td>− Operation of water pressure gun.</td>
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<tr>
<td>Ability to:</td>
<td>− Use tools and equipment properly.</td>
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<tr>
<td></td>
<td>− Service cooling and exhaust system of diesel engine properly.</td>
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<tr>
<td></td>
<td>− Observe safety precaution during job.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>D.9. Check the fan belt</th>
<th>To perform checking of fan belt safely.</th>
<th>Th. 1 Hr</th>
<th>General Mechanics tool kits. Fan belt tension gauge. Large size steel roller. Fan belt.</th>
<th>Class Room/Work Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of:</td>
<td>− Inspecting fan belt physically for any fault (cracked, oil, glazed, frayed and separate)</td>
<td>Th. 1 Hr</td>
<td>General Mechanics tool kits. Fan belt tension gauge. Large size steel roller. Fan belt.</td>
<td>Class Room/Work Shop</td>
</tr>
<tr>
<td></td>
<td>− Checking the deflection of the fan belt.</td>
<td>PR. 04 Hr</td>
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<tr>
<td></td>
<td>− Checking the alignment of fan belt.</td>
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<tr>
<td>Ability to:</td>
<td>− Use proper tool and instrument for job.</td>
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<td></td>
<td>− Check the malfunction of fan belt.</td>
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<td></td>
<td>− Observe safety rules.</td>
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</tbody>
</table>
| D.10. Check electrical components | To perform checking of electrical components of diesel engine safely. | **Knowledge of:**  
- Functions and locations of different electrical components of a diesel engine.  
- Procedure of checking battery, fuses, lamps, solenoids, cranking motor, alternator and rely etc. and identifying malfunctioning.  
- **Ability to:**  
  - Use tools and instruments properly.  
  - Identify malfunctioning of different electrical components of a diesel engine.  
  - Observe safety precautions. | Th. 2 Hr  
Pr. 08 Hr  
Test lamp.  
Bench vice.  
Auto wire thimble.  
Thimble pliers.  
Ampere meter.  
Volt meter.  
Multi meter. | Class Room/Work Shop |
| --- | --- | --- | --- | --- |
| D.11. Adjust timing | To perform adjusting of timing with an understanding of safety precautions. | **Knowledge of:**  
- Procedure of adjusting injection pumps timing.  
- Selecting proper tools.  
- **Ability to:**  
  - Adjust injection pump timing properly.  
  - Use proper tools for the job.  
  - Follow safety rules. | Th. 1 Hr  
Pr. 04 Hr  
Mechanic tool kits.  
Timing lights. | Class Room/Work Shop |
| D.12. Apply external lubrication | To perform lubrication externally effectively. | **Knowledge of:**  
- Procedure of external lubrication on the following:  
  - Throttle accelerator cable  
  - Chock cable  
  - Clutch cable  
  - Battery terminals  
- **Able to:**  
  - Apply lubrication on throttle accelerator cable,  
  - Chock cable  
  - Clutch cable  
  - Battery terminals  
  - Throttle accelerator cable | Th. 1 Hr  
Pr. 04 Hr  
Grees gun.  
Grees. Oil.  
Cotton Rage. | Class Room/Work Shop |
chock cable, clutch cable and battery terminals.
- Observe safety precautions.
Module E: Repair exhaust manifold

Objective of the Module: To enable the trainee to be able to repair exhaust manifold of a diesel engine properly.

Duration of Hours: Theory 23 Hours Practice 94 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| E.1 Perform test | To perform test on exhaust system with an understanding of its proper functioning. | Knowledge of:  
- Parts of exhaust system.  
- Function of exhaust analyzer.  
- Checking the performance of exhaust system.  
- Using Smoke Analyzer.  

Ability to:  
- Use proper instruments to check performance of exhaust system.  
- Performing different tests to check the working of exhaust system.  
- Follow safety precautions during work. | Th. 4 Hr Pr. 16 Hr | Test lamp. Bench vice. Scan Tools. Exhaust gas analyzer. Gas kit. | Class Room/Work Shop |
| E.2. Dismantle exhaust manifold | To dismantle exhaust manifold properly. | Knowledge of:  
- Different parts of exhaust manifold.  
- Function of each parts of exhaust manifold  
- Procedure of dismantling of exhaust manifold.  

Ability to:  
- Using proper tools for dismantling exhaust manifold.  
- Dismantle the exhaust manifold properly.  
- Follow safety precautions. | Th. 4 Hr Pr. 16 Hr | Mechanic tool kit. Scraper. Empery paper. Steel wire brush. | Class Room/Work Shop |
<p>| E.3 Examine exhaust manifold and joints | Understand the techniques of examining exhaust manifold. | <strong>Knowledge of:</strong>&lt;br&gt;– Functions of exhaust manifold and joints.&lt;br&gt;– Types of faults in exhaust manifold and joints.&lt;br&gt;– Examining techniques related to exhaust manifold.&lt;br&gt;– Selecting proper tools for dismantling and assembling exhaust manifold. | Th. 4 Hr&lt;br&gt;Pr. 16 Hr | Class Room/Work Shop |
| E.4 Replace worn-out part | To replace worn-out parts as per specification. | <strong>Knowledge of:</strong>&lt;br&gt;– Parts of exhaust manifold.&lt;br&gt;– Specification and function of each part.&lt;br&gt;– Selecting the proper tools used to replace worn out parts.&lt;br&gt;– Replacing worn out gas kit.&lt;br&gt;– Replacing sipped (worn out) fasteners. | Th. 4 Hr&lt;br&gt;Pr. 16 Hr | Machines tool kit. Required new parts |
| E.5 Assemble exhaust system | Understand the techniques of assembling all part of exhaust system. | <strong>Knowledge of:</strong>&lt;br&gt;– Part and function of exhaust system.&lt;br&gt;– Procedure of assembling the exhaust system.&lt;br&gt;– Selecting proper tools and equipments required for assembling of the exhaust system. | Th. 4 Hr&lt;br&gt;PR. 16 Hr | Machine s tool kit. Cleaning material s. |
|  |  | <strong>Ability to:</strong>&lt;br&gt;– Locate faults in exhaust manifold and joints.&lt;br&gt;– Use proper tools and instruments to remove faults.&lt;br&gt;– Remove faults in exhaust manifold and joints.&lt;br&gt;– Follow safety precautions. |  | Class Room/Work Shop |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>E.6 Examine turbo-charger</strong></td>
<td><strong>To examine turbo charger for malfunctioning</strong></td>
<td><strong>Knowledge of:</strong></td>
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<td></td>
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<td>– Value of torque applied on fasteners.</td>
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<td>Ability to:</td>
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<td>– Check physically assembled exhaust system.</td>
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<td>– Observe safety rules.</td>
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<td><strong>Ability to:</strong></td>
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<tr>
<td></td>
<td></td>
<td>– Use proper tools and instrument.</td>
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<tr>
<td></td>
<td></td>
<td>– Check performance of turbo charger.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Identify faults in turbo charger.</td>
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<td>– Observe safety rules.</td>
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<tr>
<td></td>
<td>Th. 4 Hr Pr. 16 Hr</td>
<td>Machines tool kit. Hammer Screw drivers. Specific pullar. Dial guage with magnetic stand. Filler guage etc.</td>
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<td></td>
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<td>Class Room/Work Shop</td>
</tr>
</tbody>
</table>
# Module F: Assemble engine block

**Objective of the Module:** To enable the trainee to be able to assemble engine block properly.

**Duration of Hours:** Theory 07 Hours  Practice 28 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| F.1. Refit power and Refits fly wheel | To refit fly wheel and tighten properly. | **Knowledge of:**  
- Parts clearing, inspecting measurements, machine work.  
- Refitting / installation procedure of fly wheel.  
**Able to:**  
- Clean, inspect, measure, make list of new parts and consumable items  
- And Installation, apply SST.  
- Install fly wheel and tighten bolts firmly as specified torque. | Th. 1/2 Hr  
Pr. 02 Hr | Mechanics tool kit lifting equipment.  
Torque wrench.  
Kerosene oil.  
Micro meter.  
Vernier caliper.  
Hydraulic press.  
Engine Oil and grees.  
Cotton weste. | Class Room/Work Shop |
| F.2. Refit engine auxiliary accessories | To re-fit engine auxiliary accessories as per specification. | **Knowledge of:**  
- Re-fitting procedure of auxiliary accessories as per specification.  
**Able to:**  
- Install exhaust system components.  
- Inlet system  
- Alternators  
- Fuel injection pump  
- Fuel lines, return lines  
- Cooling system component  
- Linkages and battery  
- Connection | Th. 1/2 Hr  
Pr. 02 Hr | General mechanic tool kits. | Class Room/Work Shop |
| F.3. Fill engine oils | Understand the procedure according to workshop manual fill in the oil engine. | **Knowledge of:**  
- Procedure of engine oil filling.  
- Grade of oil, quantity of oil mileage service record etc. | Th. 1/2 Hr  
PR. 02 Hr | General mechanic s tool kits.  
Engine oil.  
Cotton weste | Class Room/Work Shop |
<table>
<thead>
<tr>
<th>Task</th>
<th>Description</th>
<th>Knowledge of</th>
<th>Time</th>
<th>Tools/Equipment</th>
<th>Location</th>
</tr>
</thead>
</table>
| F.4. Fill water in Radiator | To fill water in radiator with an understanding of the function of a radiator in a diesel engine. | - Functioning of radiator.  
- Filling water in the radiator and its purpose. | Th. 1/2 Hr  
Pr. 02 Hr | Funnel water jar | Class Room/Work Shop |
| F.5. Refit injector         | To perform refitting of injector properly.                                   | - Refitting procedure of injector                                             | Th. 1/2 Hr  
Pr. 02 Hr | General Specific tools  
Injector washers.  
Cotton rag. | Class Room/Work Shop |
| F.6. Connect battery       | To connect battery with the engine properly.                                | - Types of batteries.  
- Procedure of connecting battery in the vehicle.                           | Th. 01 Hr  
Pr. 04 Hr | Cell tester combination pliers ring spanner.  
Double End open wrench. | Class Room/Work Shop |
| F.7. Connect fuel          | To connect fuel supply with the diesel engine as per specification.          | - Connecting procedure of all fuel supply and return line with free of leakage and air bleeding. | Th. 1/2 Hr  
Pr. 02 Hr | Mechanic tool kits. | Class Room/Work Shop |
<table>
<thead>
<tr>
<th><strong>F.8. Refit engine accessories</strong></th>
<th>To perform refitting of engine accessories as per specification.</th>
<th><strong>Knowledge of:</strong></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Procedure of re-fitting of clutch, cable, throttle accelerator link, chock cable adjustment.</td>
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<td><strong>Ability to:</strong></td>
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<td></td>
<td>Re-fit clutch, cable, throttle accelerator link, chock cable adjustment properly.</td>
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<td><strong>Th. 01 Hr</strong></td>
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<td><strong>Pr. 04 Hr</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>F.9. Check connection.</strong></th>
<th>To perform checking of connections of different connectors of a diesel engine.</th>
<th><strong>Knowledge of:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Functions and location of different electrical components.</td>
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<tr>
<td></td>
<td></td>
<td>Checking of different connections of electrical system attached to engine.</td>
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<td></td>
<td><strong>Ability to:</strong></td>
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<tr>
<td></td>
<td></td>
<td>Use proper tools and instrument</td>
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<td></td>
<td>Check connection of electrical system properly.</td>
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<td></td>
<td></td>
<td>Observe safety precautions.</td>
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<tr>
<td></td>
<td></td>
<td><strong>Th. 02 Hr</strong></td>
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<td><strong>Pr. 08 Hr</strong></td>
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</tbody>
</table>
Module G: Re-examine engine assembling

Objective of the Module: To enable the trainee to be able to re-examine engine assembling properly.

Duration of Hours: Theory 21 Hours Practice 85 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| G.1 Conduct cold examination | To conduct cold examination of the diesel engine. | **Knowledge of:**  
- Cold testing procedure and its purpose.  
**Ability to:**  
- Conduct cold engine testing. | Th. 07 Hr Pr. 28 Hr | Engine dynamometer hydraulic power absorption unit. | Class Room/Work Shop |
| G.2 Conduct hot examination | To conduct hot examination of the diesel engine. | **Knowledge of:**  
- Procedure of hot Examination test and its purpose.  
**Able to:**  
- Conduct hot Examination test of Diesel engine on Dynamometer.  
- Follow the safety rules. | Th. 07 Hr Pr. 28 Hr | Engine dynamometer hydraulic power absorption unit | Class Room/Work Shop |
| G.3 Perform speed throttling examination (RPM) | To perform speed throttling examination on diesel engine. | **Knowledge of:**  
- Procedure of speed throttling Examination and its purpose.  
**Able to:**  
- Perform speed throttling examination safely. | Th. 07 Hr Pr. 28 Hr | Engine dynamometer hydraulic power absorption unit | Class Room/Work Shop |
Module H: Repair brake system

Objective of the Module: To enable the trainee to be able to repair brake system of the vehicle.

Duration of Hours: Theory 23 Hours Practice 94 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| H.1 Perform brake tests | To perform brake test to identify troubles in the brake assembly. | **Knowledge of:**  
  - Components of brake assembly and their function.  
  - Common troubles, causes and remedies of brake systems.  
  - Testing procedure of brake assembly/system.  
  - Tools, instrument and equipments used to perform test of brake.  
  **Ability to:**  
  - Identify common troubles in brake assembly.  
| H.2 Dismantle wheel | To dismantle the wheel of the vehicle as per specification. | **Knowledge of:**  
  - Tools used to dismantle wheel.  
  - Operation of power tools (pneumatic gun) used to remove units of the wheel drum.  
  - Dismantling the wheel.  
  **Ability to:**  
  - Use tools and equipment properly. | Th. 03 Hr PR. 12 Hr | Mechanics tool kit. Wheel spanner. Pneumatic gun. Air compressor. | Class Room/Work Shop |
| H.3 Service hydraulic brake system | To perform servicing of hydraulic brake system properly. | **Knowledge of:**
- Tools and material, needed for disassembly and assembling brake system.
- Procedure for servicing brake system.
- Techniques of resembling brake system after servicing.
- Procedure of testing brake system after servicing.
| **Ability to:**
- Use tools properly.
- Perform servicing of hydraulic brake system properly.
- Observe safety precaution. |
| H.4 Service pneumatic brake system | To perform service of pneumatic brake system properly. | **Knowledge of:**
- Tools and material, needed for disassembly and assembling of brake system.
- Procedure for servicing brake system.
- Techniques of resembling brake system after servicing.
- Procedure of testing brake system after servicing.
| **Ability to:**
- Use tools properly.
- Perform service of pneumatic brake system as per procedure.
- Observe safety precaution. |
<table>
<thead>
<tr>
<th>H.5 Service air assisted hydraulic brake</th>
<th>To perform servicing of air assisted hydraulic brake properly.</th>
<th><strong>Knowledge of:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tools and material, needed for disassembly and assembling brake system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedure for servicing air assisted hydraulic brake system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Techniques of resembling brake system after servicing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedure of testing brake system after servicing.</td>
</tr>
<tr>
<td><strong>Ability to:</strong></td>
<td></td>
<td>Use tools properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perform service of air assisted hydraulic brake properly.</td>
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<td>Observe safety precaution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H.6 Remove fault</th>
<th>To identify faults in brake system and remove them to ensure normal functioning.</th>
<th><strong>Knowledge of:</strong></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Identifying common faults of brake system.</td>
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<tr>
<td></td>
<td></td>
<td>Procedure of removing faults in brake system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedure of dismantling and assembling brake system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check the performance of brake system after completion of repair work.</td>
</tr>
<tr>
<td><strong>Ability to:</strong></td>
<td></td>
<td>Identify common faults in brake system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use tools and equipment properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Remove faults of brake system properly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Test the normal functioning of brake after removing fault.</td>
</tr>
</tbody>
</table>

<p>| Mechani cs tool kit. Air assist unit. Pipe connecti on etc. | Class Room/Work Shop | Th. 02 Hr PR. 08 Hr | Vinyl tube and container. Brake shoes and pipes. Brake padle returner spring. Dia phram etc. | Class Room/Work Shop |</p>
<table>
<thead>
<tr>
<th>H.7 Refit wheel</th>
<th>To refit the wheel and ensure proper fitting.</th>
<th>Knowledge of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Procedure of wheels removing and its refitting.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Values of torque applied to fastener.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ability to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of proper tools to re-fit the wheel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refit wheel properly.</td>
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<tr>
<td></td>
<td></td>
<td>Observe safety precaution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>H.8 Perform brake test</th>
<th>To perform brake test with an understanding of normal functioning of brake system.</th>
<th>Knowledge of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Common tests of brake system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedure of performing brake tests.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ability to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use proper tools, instrument and equipment to perform brake test.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Follow safety rules.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Th. 02 Hr PR. 08 Hr</th>
<th>Mechani cs tool kit. Barrat brake shop. Brake dresser power brake unit.</th>
<th>Class Room/ Work Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Th. 03 Hr PR. 12 Hr</td>
<td>Class Room/ Work Shop</td>
<td></td>
</tr>
</tbody>
</table>
Module I: Repair power-train

Objective of the Module: To enable the trainee to be able to perform repair of power-train of a vehicle properly.

Duration of Hours: Theory 16 Hours Practice 66 Hours

<table>
<thead>
<tr>
<th>Learning Unit</th>
<th>Learning outcome</th>
<th>Learning Elements</th>
<th>Duration</th>
<th>Material Required</th>
<th>Learning Place</th>
</tr>
</thead>
</table>
| 1.1 Fill gear oil | To perform filling of gear oil properly. | Knowledge of:  
- Purpose and function of gear oil in the power train.  
- Procedure of filing gear oil properly.  

Ability to:  
- Use tools properly.  
- Fill gear oil as per requirement.  
- Observe safety precautions. | Th. 02 Hr  PR. 08 Hr | Mechanics tool kits. Oil Container | Class Room/Work Shop |
| 1.2 Couple power-train with main unit | To couple power-train with main unit as per specification. | Knowledge of:  
- Procedure of dismantling power train.  
- Diagnosing faults of drive train.  
- Repairing for squeaking, grinding clunking sounds.  
- Repairing the defective/worn out parts.  

Ability to:  
- Use tools and equipment properly.  
- Fixing power train faults to ensure normal functioning.  
- Couple power train with main unit safely.  
- Follow safety precautions. | Th. 01 Hr  PR. 04 Hr | Mechanics tool kits. | Class Room/Work Shop |
| 1.3 Repair clutch-plate | To perform repair of clutch plate properly. | **Knowledge of:**  
- Function and purpose of clutch assembly/unit.  
- Faults of clutch.  
- Repair of faults of clutch.  
**Ability to:**  
- Dismantle the clutch unit.  
- Identify faults of clutch unit.  
- Remove faults properly.  
- Use tools properly.  
- Follow safety precautions. | Th. 02 Hr PR. 08 Hr | Mechanics tool kits.  
Clutch aligning tool.  
Emery paper.  
Grees.  
Clutch plate.  
Pressure plate.  
Thrust bearing.  
Clutch cable.  
Brake oil.  
Clutch cylinder.  
Fly wheel if required. | Class Room/Work Shop |
| 1.4 Replace worn-out parts | To replace worn-out parts of power-train as per specification. | **Knowledge of:**  
- Components/parts of power train and their function.  
- Procedure of replacing worn-out parts in power train.  
**Ability to:**  
- Use tools properly.  
- Replace worn-out parts of the power-train properly.  
- Follow safety rules. | Th. 02 Hr PR. 08 Hr | Mechanics tool kits.  
Dail guage with stand.  
Large steel ruler.  
Ruler pinbering.  
Mounting ruvver.  
Cv joint.  
Cotton weste. | Class Room/Work Shop |
| 1.5 Assemble power-train |  
- Understand techniques of assembling power train.  
- Understand the inspection techniques before starting assembling process  
**Knowledge of:**  
- Components/parts of power train.  
- Procedure of assembling the power train as per specification.  
**Ability to:**  
- Use tools properly.  
- Perform assembling of power train as per specification. | Th. 01 Hr PR. 04 Hr | Mechanics tool kits.  
Dail guage with stand.  
Large steel ruler.  
Ruler pinbering.  
Mounting ruvver.  
Cv joint.  
Cotton weste. | Class Room/Work Shop |
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
<th>Knowledge of</th>
<th>Ability to</th>
<th>Tools</th>
<th>Location</th>
</tr>
</thead>
</table>
| I.6 Adjust gear shifting | To perform adjusting of gear ratio properly. | - Gear ratio.  
- Procedure of adjusting the ratio between reverse gear, first gear, second gear, third gear. | - Use proper tools to complete the job.  
- Adjust gear ratio to ensure proper functioning. | Machines tool kits.  
Gear shifter bushes kit.  
Fork sliding returner spring. | Class Room/Work Shop |
| I.8 Repair differentials | To perform repair of differentials properly. | - Differentials.  
- Types of faults in differential and their causes.  
- Procedure to repair differential faults. | - Use tools properly.  
- Identify faults in differentials.  
- Remove faults properly.  
- Follow safety precautions. | Machines tool kits.  
Shims bearing differential.  
Boots and boots clips.  
Grees silicon base.  
Sealant and gas kit.  
Cleaning liquids oil seal.  
Jack and stands rags. | Class Room/Work Shop |
| I.09. Adjust alignment of propeller shaft | To perform adjusting the alignment of propeller shaft properly. | - Purpose and function of propeller shaft.  
- Procedure of alignment of propeller shaft.  
- Inspection procedure of alignment of propeller shaft. | - Use tools properly.  
- Inspect faults in propeller shaft. | Machines tool kits.  
Large steel ruler.  
Dial guage with stand. | Class Room/Work Shop |
- Remove faults in propeller shaft.
- Follow safety rules.
Supportive Notes

Assessment Context

- These learning units may be assessed on the job, off the job or a combination of on and off the job demonstrated by an individual working alone. In some areas continuous assessment may be required to gauge the competency.
- Assessment of the practical skills must take place only after a period of supervised practice and repetitive experience. If workplace conditions are not available, assessment is simulated and that the workplace conditions are acceptable.
- The prescribed outcome must be achieved without direct supervision.
- Competency should be assessed within the context of the qualification being sought.

Critical Aspects

Assessment must confirm that the candidate is able to:

- Apply the health and safety legislations while working.
- Use fire extinguishers.
- Read measurements with measuring tools.
- Identify and use the automotive fasteners.
- Select, handle and use hand tools, workshop tools safely and properly.
- Check the compression pressure of engine and diagnose the faults.
- Diagnose problems in different fuel systems and make the necessary adjustment.
- Set the valve and ignition timing.
- Diagnose and service the lubricating, cooling, ignition systems.
- Service the clutch and adjust the free play.
- Remove, dismantle, check, assemble and refit the transmission.
- Adjust the backlash of differential.
- Replace the axle bearing.
- Accuracy of adjustments.
- Replace the suspension systems components.
- Carry out the wheel balancing.
- Carry out the wheel alignment.
- Service of various mechanical steering gear boxes.
- Service of power steering.
- Adjust the brake system.
- Bleed the brake system.
- Connect the battery.
- Wiring up the cranking motor circuit.
- Identify and connect the charging system connections.
- Drive the car amicably in forward and reverse speeds in the ground.
- Apply the mathematical rules in routine work.
• Identify and demonstrate the drawings.

**Assessment Condition**

The candidate will have access to:

• All tools, equipment, materials and documentation required.

The candidates will be permitted to refer the following documents:

• Relevant workplace procedures.
• Relevant product and manufacturing specifications.
• Relevant drawings, manuals, codes, standards and reference material.

The Candidate will be required to:

• Orally or by other methods of communication, answer, questions put forward by the assessor.
• Identify superiors who can be approached for the collection of competency evidence where appropriate.
• Present evidence of credit for any off job training related course.

**Special Notes**

During assessment the individual will:

• Demonstrate safe working practices all the times.
• Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment.
• Take the responsibility for the quality of his/her own work.
• Plan tasks in all situations and review tasks requirements as appropriate.
• Perform all tasks in accordance with standard operating procedures.
• Perform all tasks to specifications.
• Use accepted engineering techniques, practices, processes and work place procedures. Items requiring specialize repair will be sent to appropriate specialists.

The tasks involved will be completed within reasonable time frames relating to typical workplace activities. The resources required for assessment includes tools, equipment and machines listed within these learning units. The completed product should comply with the respective industrial standards.

**Resources required**

Materials, tools, equipment and machines is attached.

Name of Industries for industrial linkage.
• Hino motors.
• Toyota motors.
• Honda motors.