

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

Theory = 100
 Practical = 400

Grading

Theory:	Pass marks	40%
Practical:	Pass marks	60%
	Fail	0 - 59%
	Average	60 - 78%
	Good	79 - 92%
	Very Good	93 -100%

Overview of the Program

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

block.				
Module: G Re-Examine Engine Assembling Aim: Perform rechecking of proper assembling of engine.		21 Hrs	84 Hrs	105 Hrs
Module H: Repair Break Systems Aim: Learn the procedure of repairing of break system properly.		27 Hrs	108 Hrs	135 Hrs
Module I: Repair Power Train Aim: Learn the procedure of repairing the power train of the engine.		16 Hrs	64 Hrs	80 Hrs
Total		160 Hrs	640 Hrs	800 Hrs

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

Learning Unit	Learning out come	Learning Elements	Duration	Material Required	Learning Place
A.1 Follow safety rules	Learner will be able to protect self vehicles and others	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Safety Rules applied to diesel mechanic trade. – Personal protection or safety. <p>Ability to:</p> <ul style="list-style-type: none"> – Follow safety precautions. 	TH .30		Classroom / Workshop
A.2 Maintain the tools, equipments and instrument	Other to Protect tools equipment Machinery.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Enumerates symbols for safety. – Define warning. <p>Ability to:</p> <ul style="list-style-type: none"> – Carry out maintenance & repairing work of automotive engine & vehicles. – Write the abbreviations used for safety. 	TH.30 PR---		Workshop
A.3 Use of fire extinguishers	Protect self and work place for fire.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Define Caution – Define Danger. – Define Hazard. – Define First aid – Equipments used on safety Hazard (Fire Extinguisher) <p>Ability to:</p> <ul style="list-style-type: none"> – Use fire extinguisher in emergency situation. 	TH.30 PR 4 HRS		Workshop

A.4 Apply medical aid to the victims of any accident	Protect the victim and self.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Name the essential items in the first aid box - Application of first aid - Name the particular dressing for personal safety & protection <p>Ability to:</p> <ul style="list-style-type: none"> - Drill to operate fire extinguisher - Demonstrate the use of fire Extinguisher (dry powder type, liquid filled) Extinguisher). 	TH.30 PR.4 HRS	All kinds of fire extinguisher	Workshop
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B. 4 Inspect Cooling System.	To define Friction location of components, Observe Leakage Coolant, Explain related system faults.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - 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 <p>Ability to:</p> <ul style="list-style-type: none"> - Check and ascertain the defects in cooling system of the diesel engine. 	3 Hr Th. 12 Hr Pr.	General mechanic tool kit multimeter radiator cap tester temperature gauge house piper & clamps	Class room / workshop
B. 5 Check faults in Fuel system.	To Identify / rectify Diesel fuel system faults.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - 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. <p>Ability to:</p> <ul style="list-style-type: none"> - Draw fuel flow chart. - Check the fuel pump and auto miser nozzle. 	1 Hr Th. 4 Hr Pr.		
B. 6 Inspect Lubrication system	To understand to purpose and inspect the problem in lubrication system.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Purpose of Lubrication systems. - Engine oil pressure warning lamp. - Oil filter is clogged. - Oil pumps failure. 	2 Hr. Th. 8 Hr. Pr.		

B.7. Inspect exhausts systems.	To identify Exhaust gas leakage problems.	<ul style="list-style-type: none"> - Engine varnish. - Leakage (Externally). <p>Ability to:</p> <ul style="list-style-type: none"> - Check the oil grade according to manual. <p>Knowledge of:</p> <ul style="list-style-type: none"> - 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. <p>Ability to:</p> <ul style="list-style-type: none"> - Ascertain the exhaust gas leakage problem accurately. - Interpret the defect properly. 	2 Hr Th. 8 Hr Pr.		
B.8. Inspect sensors.	To understand the checking procedure of sensors and perform inspection properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - 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.	Mechnics Tool Kit. Ampere Meter Volt Meter Multi Meter. Lifting Equipmen ts Torque Ranch Banch Bice Fuel Presure Guage Oscillosco pe Computer Lead Box. Diagnosis System and	Class Room / Workshop

		<p>injection system).</p> <ul style="list-style-type: none"> – 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. <p>Ability to:</p> <ul style="list-style-type: none"> – Identify location of each sensor. – Check sensors. – Preparing inspection report. 		Interface box. Technometer.	
B.9. Check electrical system	To understand the functions of electrical components and inspect defects.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Function of all electrical components of diesel engine. – Connection sequence of all electrical components. – Faults, causes and their remedies of all electrical components. <p>Ability to:</p> <ul style="list-style-type: none"> – Read the electrical circuit diagram of diesel engine. – Identify faults in electrical components. 	5 Hr Th. 20 Hr Pr.	Auto Wire, Pliers, Ampere Meter, Volt Meter, Multi Meter, Bulbs and Holder, Soldering Iron, Paste and Wire,	Class Room / Workshop
B.10. Inspect differential	To understand the working of differential and identify defects.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Function of differential. – Technical specification of the differential. – Techniques of inspecting defects in differential. <p>Ability to:</p> <ul style="list-style-type: none"> – Read the technical specification of the differential. – Identify faults in differential. 	1 Hr. Th. 4 Hr Pr.	Mechanics Tool Kit. Lifting Equipment, Differential Oil.	Workshop / Class Room

B.11. Check power train	To understand the function of power and discover defects in power train.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Components of power train. – Purpose and function of power train. – Relation of power train with gear. – Techniques for identification of defects in power train. <p>Ability to:</p> <ul style="list-style-type: none"> – Check the bearing and gear of power train. – Use proper tools to check the accuracy of power train – Observe safety precautions during work. 	1 Hr Th. 4 Hr Pr.	Work Shop Class Room
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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

Learning Unit	Learning outcome	Learning Elements	Duration	Material Required	Learning Place
C.1 Drain water from radiator	To drain water from radiator with the understanding of hose removing techniques.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Locating the mounting of rubber hoses from radiator to engine. – Removing the hoses to drain the water from radiator. <p>Ability to:</p> <ul style="list-style-type: none"> – Drain water from radiator safely. 	2 Hr Th. 8 Hr. Pr.		Work Shop / Class Room
C.2. Drain oil from engine	To understand the techniques of draining oil from diesel engine.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of leveling the vehicle. – Procedure to drain the waste oil and filling of specific grade oil. <p>Ability to:</p> <ul style="list-style-type: none"> – Level the vehicle. – Drain out waste oil. – Fill specific grade oil. – Adhere to safety precautions. 	2 Hr. Th. 8 Hr Pr.	Mechanic Tool Kit, oil filter. Wrench. Sealant lifting equipments, Scraper, oil Funnel Recommended Oil, Waste Oil Drum.	Class room/ workshop
C.3. Remove engine parts	To remove the diesel engine parts with an understanding of safety precautions.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of removing engine parts. – Procedure of removing external components and accessories of engine. – Select proper tools, and equipment. <p>Ability to:</p> <ul style="list-style-type: none"> – Remove engine parts as 	Th.6 Hr Pr. 23 Hr	General Mechanics tool kit. Lifting equipment. Torque wrench. Bench vice. Pullers of different size. Straight edge.	Class room/ workshop

		<p>per order.</p> <ul style="list-style-type: none"> – Follow safely precaution during work. 			
C.4. Remove engine blocks	To understand the techniques of removing engine block safely.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Selecting the proper tools for removing engine block. – Removing radiator and other assemblies. – Removing tappet cover and other accessories. – Removing engine block. – Safety precautions. <p>Ability to:</p> <ul style="list-style-type: none"> – Lift the engine from chases and place on stand or work bench. – Remove tappet cover and other accessories. – Remove engine head by loosening bolts. – Remove gas kit. – Follow safety rules. 	Th 6 Hr Pr.23 Hr	General Mechanics tool kit. Lifting equipment. Oil drain spanner. Waste Oil Drum.	Class Room/ Work Shop
C.5. Removes camshaft.	To understand the techniques of removing camshaft.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Selecting the proper tools from engine. – Removing rocker arm assembly. – Removing cylinder head. – Removing camshaft timing gear. <p>Ability to:</p> <ul style="list-style-type: none"> – Remove camshaft and other assembly components. – Follow safety precautions. 	Th 2 Hr Pr.18 Hr	Mechanics tool kit. Pullers. Hammer Box Socket wrench.	Class Room/ Work Shop
C.6. Remove sump	To understand the techniques of removing sump from diesel engine.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Using proper tools and equipment. – Procedure of removing sump from engine, – Removing gas kit. 	Th 3 Hr Pr. 04 Hr	Mechanics tool kit. Workbench	Class Room/ Work Shop

		<ul style="list-style-type: none"> - Cleaning the sump. <p>Ability to:</p> <ul style="list-style-type: none"> - Use proper tools and equipment for the work. - Remove sump from diesel engine. - Observe safety precautions. 			
C.7. Repair fault	To understand the techniques of repairing different faults of diesel engine.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Selecting proper tools for the job. - Diagnosing faults. - Procedure to remove the diagnosed fault. - Reassembling of engine parts. <p>Ability to:</p> <ul style="list-style-type: none"> - 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

Learning Unit	Learning out come	Learning Elements	Duration	Material Required	Learnin g Place
D.1. Perform engine test	To perform different engine tests before tuning.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Defining engine tune up. - Types of diesel engine tests. - Describe the test equipment and instrument. - Procedure of tune up tests. - Procedure of engine tune up. - Observing safety rules. <p>Ability to:</p> <ul style="list-style-type: none"> - Perform different engine tests before tuning. - Follow safety precautions. 	Th. 2 Hr Pr. 08 Hr	Mechanics tool kits. Engine analyzer. Special tools as per manufact urers. Cylinder leakage tester. Timing lights. Pressure vacuum gauge	Class Room/ Work Shop
D.2. Check injectors	To check injectors with an understanding of functioning of the injectors.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Functions of injector. - Faults of injector and their remedies. - Selecting the proper tools. - Procedure of dismantling the injector and its servicing. <p>Ability to:</p> <ul style="list-style-type: none"> - Use proper tools. - Identify faults in injectors. - Conduct repair/maintenance of injectors. - Observe safety precautions. 		Mechanics tool kits. Injector tester hand operated. Injector cleaning kit. Cotton rage. Diesel	Class Room/ Work Shop

D.3. Change air filter	To change air filter properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Importance of air filters in the diesel engine. - Selecting proper tools and equipment for job. - Procedure to replace air filter. <p>Ability to:</p> <ul style="list-style-type: none"> - 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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Important of diesel fuel filter. - Selecting proper tools and equipment. - Procedure of replacing fuel filter. <p>Ability to:</p> <ul style="list-style-type: none"> - 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

D.5. Change oil filter	To change the oil filter properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Importance of oil filter and its function in diesel engine. - Contamination of engine oil. - Selecting proper tools and equipment. - Procedure of oil changing. - Procedure of replacing oil filter. <p>Ability to:</p> <ul style="list-style-type: none"> - Use tools and equipment for changing oil filter properly. - Change oil. - Replace oil filter. - Observe safety precautions for the job. 	Th. 1 Hr Pr. 04 Hr	Oil filter ranch. Oil filter. Recommended engine oil. Waste oil drum.	Class Room/ Work Shop
D.6. Test engine compression	To perform testing of engine compression properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Pressure ratings of diesel engine. - Procedure of testing compression. <p>Ability to:</p> <ul style="list-style-type: none"> - Test compression of diesel engine. - Follow safety precautions. 	Th. 1 Hr Pr. 04 Hr	Mechanics tool kits. Cylinder leakage tester. Pressure vacuum gage.	Class Room/ Work Shop
D.7. Adjust valve trouble	To learn the procedure of adjusting the valve trouble.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Removing the tappet cover from diesel engine. - Inspecting the tappet clearance or rocker adjustment. - Procedure of valve tappet assembly. - Adjustment with the help of feeler gauge. <p>Ability to:</p> <ul style="list-style-type: none"> - Use proper tools and equipment for adjusting 	Th. 1 Hr Pr. 04 Hr	Mechanics tool kits. Feeler gauge	Class Room/ Work Shop

<p>D.8. Service cooling and exhaust system</p>	<p>To perform servicing of cooling and exhaust system properly.</p>	<p>the valve.</p> <ul style="list-style-type: none"> - Adjust valve trouble properly. - Observe the safety precautions. <p>Knowledge of:</p> <ul style="list-style-type: none"> - Importance of servicing diesel engine. - Cleaning method of cooling system and exhaust system. - External cleaning processes of water body, radiator, engine block, cooling system. - Internal cleaning process of exhaust system. - Operation of air compressor. - Operation of water pressure gun. <p>Ability to:</p> <ul style="list-style-type: none"> - Use tools and equipment properly. - Service cooling and exhaust system of diesel engine properly. - Observe safety precaution during job. 	<p>Th. 2 Hr Pr. 08 Hr</p>	<p>General Mechanic tool kits. Steel wire brush. Embry paper.</p>	<p>Class Room/ Work Shop</p>
<p>D.9. Check the fan belt</p>	<p>To perform checking of fan belt safely.</p>	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Inspecting fan belt physically for any fault (cracked, oil , glazed, frayed and separate) - Checking the deflection of the fan belt. - Checking the alignment of fan belt. <p>Ability to:</p> <ul style="list-style-type: none"> - Use proper tool and instrument for job. - Check the malfunctioning of fan belt. - Observe safety rules. 	<p>Th. 1 Hr PR. 04 Hr</p>	<p>General Mechanics tool kits. Fan belt tension guage. Large size steel roler. Fane Belt.</p>	<p>Class Room/ Work Shop</p>

D.10. Check electrical components	To perform checking of electrical components of diesel engine safely.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Functions and locations of different electrical components of a diesel engine. – Procedure of checking battery, fuses, lamps, solenoids, cranking motor, alternator and relay etc. and identifying malfunctioning. <p>Ability to:</p> <ul style="list-style-type: none"> – 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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of adjusting injection pumps timing. – Selecting proper tools. <p>Ability to:</p> <ul style="list-style-type: none"> – 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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of external lubrication on the following: <ul style="list-style-type: none"> • Throttle accelerator cable • Chock cable • Clutch cable • Battery terminals <p>Able to:</p> <ul style="list-style-type: none"> – Apply lubrication on 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.			
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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

Learning Unit	Learning outcome	Learning Elements	Duration	Material Required	Learning Place
E.1 Perform test	To perform test on exhaust system with an understanding of its proper functioning.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Parts of exhaust system. – Function of exhaust analyzer. – Checking the performance of exhaust system. – Using Smoke Analyzer. <p>Ability to:</p> <ul style="list-style-type: none"> – 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 with properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Different parts of exhaust manifold. – Function of each parts of exhaust manifold – Procedure of dismantling of exhaust manifold. <p>Ability to:</p> <ul style="list-style-type: none"> – 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

E.3. Examine exhaust manifold and joints	Understand the techniques of examining exhaust manifold.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Functions of exhaust manifold and joints. - Types of faults in exhaust manifold and joints. - Examining techniques related to exhaust manifold. - Selecting proper tools for dismantling and assembling exhaust manifold. <p>Ability to:</p> <ul style="list-style-type: none"> - Locate faults in exhaust manifold and joints. - Use proper tools and instruments to remove faults. - Remove faults in exhaust manifold and joints. - Follow safety precautions. 	Th. 4 Hr Pr. 16 Hr		Class Room/ Work Shop
E.4 Replace worn-out part	To replace worn-out parts as per specification.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Parts of exhaust manifold. - Specification and function of each part. - Selecting the proper tools used to replace worn out parts. - Replacing worn out gas kit. - Replacing sipped (worn out) fasteners. <p>Ability to:</p> <ul style="list-style-type: none"> - Use tools and instruments properly. - Replace worn-out parts properly. - Observe safety rules. 	Th. 4 Hr Pr. 16 Hr	Machines tool kit. Required new parts	Class Room/ Work Shop
E.5 Assemble exhaust system	Understand the techniques of assembling all part of exhaust system.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Part and function of exhaust system. - Procedure of assembling the exhaust system. - Selecting proper tools and equipments required for assembling of the exhaust system. 	Th. 4 Hr PR. 16 Hr	Machine s tool kit. Cleaning material s.	Class Room/ Work Shop

		<ul style="list-style-type: none"> - Value of torque applied on fasteners. <p>Ability to:</p> <ul style="list-style-type: none"> - Check physically assembled exhaust system. - Observe safety rules. 			
E.6 Examine turbo-charger	To examine turbo charger for malfunctioning.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Function of all parts of turbo charger. - Types of troubles in turbo charger. - Procedure of checking the vibration of turbo engine. - Checking the condition for clean waste gate. - Checking the turbo housing for effect of excessive lean air. - Checking the flexibility of carbon real. - Checking the presence of oil in the waste gate. - Checking the performance of turbo charger bearing. <p>Ability to:</p> <ul style="list-style-type: none"> - Use proper tools and instrument. - Check performance of turbo charger. - Identify faults in turbo charger. - Observe safety rules. 	Th. 4 Hr Pr. 16 Hr	Machines tool kit. Hammer Screw drivers. Specific pullar. Dial guage with magnetic stand. Filler guage etc.	Class Room/ Work Shop

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

Learning Unit	Learning outcome	Learning Elements	Duration	Material Required	Learning Place
F.1. Refit power and Refits fly wheel	To refit fly wheel and tighten properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Parts clearing, inspecting measurements, machine work. - Refitting / installation procedure of fly wheel. <p>Able to:</p> <ul style="list-style-type: none"> - 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 waste.	Class Room/ Work Shop
F.2. Refit engine auxiliary accessories	To re-fit engine auxiliary accessories as per specification.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Re-fitting procedure of auxiliary accessories as per specification. <p>Able to:</p> <ul style="list-style-type: none"> - 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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - 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 waste	Class Room/ Work Shop

F.4. Fill water in Radiator	To fill water in radiator with an understanding of the function of a radiator in a diesel engine.	<p>Able to:</p> <ul style="list-style-type: none"> – Remove tappet cover filling cap – Fill fresh specified engine oil <p>Knowledge of:</p> <ul style="list-style-type: none"> – Functioning of radiator. – Filling water in the radiator and its purpose. <p>Able to:</p> <ul style="list-style-type: none"> – Fill coolant in radiator. 	Th. 1/2 Hr Pr. 02 Hr	Funnel water jar	Class Room/ Work Shop
F.5. Refit injector	To perform refitting of injector properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Refitting procedure of injector <p>Able to:</p> <ul style="list-style-type: none"> – Install injectors with new seal and tighten bolts pre openly. 	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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Types of batteries. – Procedure of connecting battery in the vehicle. <p>Able to:</p> <ul style="list-style-type: none"> – Install battery in the vehicle, properly. 	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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Connecting procedure of all fuel supply and return line with free of leakage and air bleeding. <p>Able to:</p> <ul style="list-style-type: none"> – Install all fuel lines properly and air purge out from system. 	Th. 1/2 Hr Pr. 02 Hr	Mechanic tool kits.	Class Room/ Work Shop

F.8. Refit engine accessories	To perform refitting of engine accessories as per specification.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of re-fitting of clutch, cable, throttle accelerator link, chock cable adjustment. <p>Ability to:</p> <ul style="list-style-type: none"> – Re-fit clutch, cable, throttle accelerator link, chock cable adjustment properly. 	Th. 01 Hr Pr. 04 Hr	Mechanic tool kits. Oil can. Greases. Cotton rags.	Class Room/ Work Shop
F.9. Check connection.	To perform checking of connections of different connectors of a diesel engine.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Functions and location of different electrical components. – Checking of different connections of electrical system attached to engine. <p>Ability to:</p> <ul style="list-style-type: none"> – Use proper tools and instrument – Check connection of electrical system properly. – Observe safety precautions. 	Th. 02 Hr Pr. 08 Hr	Cleaning equipment test lamp. Scan tools. Special tools as per manufacturer recommendation.	Class Room/ Work Shop

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

Learning Unit	Learning outcome	Learning Elements	Duration	Material Required	Learning Place
G.1 Conduct cold examination	To conduct cold examination of the diesel engine.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Cold testing procedure and its purpose. <p>Ability to:</p> <ul style="list-style-type: none"> – 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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of hot Examination test and its purpose. <p>Able to:</p> <ul style="list-style-type: none"> – 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.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of speed throttling Examination and its purpose. <p>Able to:</p> <ul style="list-style-type: none"> – 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

Learning Unit	Learning outcome	Learning Elements	Duration	Material Required	Learning Place
H.1 Perform brake tests	To perform brake test to identify troubles in the brake assembly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – 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. <p>Ability to:</p> <ul style="list-style-type: none"> – Identify common troubles in brake assembly. – Use tools and instruments properly. 	Th. 08 Hr PR.32 Hr	Mechanics tool kits. Vehicles lifting jack and safety stand. Brake oil grees repair kits. Master cylinder and wheel cylinder kit. Brake pads or brake shoes. Brake hoses and pipes. Vinyl tube and container	Class Room/ Work Shop
H.2 Dismantle wheel	To dismantle the wheel of the vehicle as per specification.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Tools used to dismantle wheel. – Operation of power tools (pneumatic gun) used to remove units of the wheel drum. – Dismantling the wheel. <p>Ability to:</p> <ul style="list-style-type: none"> – Use tools and equipment properly. 	Th. 03 Hr PR. 12 Hr	Mechanics tool kit. Wheel spanner. Pneumatic gun. Air compressor.	Class Room/ Work Shop

<p>H.3 Service hydraulic brake system</p>	<p>To perform servicing of hydraulic brake system properly.</p>	<ul style="list-style-type: none"> - Dismantle different components of the wheel as per specification. - Observe safety precautions. <p>Knowledge of:</p> <ul style="list-style-type: none"> - Tools and material, needed for disassembly and assembling brake system. - Procedure for servicing brake system. - Techniques of reassembling brake system after servicing. - Procedure of testing brake system after servicing. <p>Ability to:</p> <ul style="list-style-type: none"> - Use tools properly. - Perform servicing of hydraulic brake system properly. - Observe safety precaution. 	<p>Th. 03 Hr PR. 12 Hr</p>	<p>Hydraulic brake oil. Vinyl tube and container.</p>	<p>Class Room/ Work Shop</p>
<p>H.4 Service pneumatic brake system</p>	<p>To perform service of pneumatic brake system properly.</p>	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Tools and material, needed for disassembly and assembling of brake system. - Procedure for servicing brake system. - Techniques of reassembling brake system after servicing. - Procedure of testing brake system after servicing. <p>Ability to:</p> <ul style="list-style-type: none"> - Use tools properly. - Perform service of pneumatic brake system as per procedure. - Observe safety 	<p>Th. 04 Hr PR. 16 Hr</p>	<p>Mechanics tool kit. Master cylinder. Wheel cylinder. Repair kit.</p>	<p>Class Room/ Work Shop</p>

H.5 Service air assisted hydraulic brake	To perform servicing of air assisted hydraulic brake properly.	<p>precaution.</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> - Tools and material, needed for disassembly and assembling brake system. - Procedure for servicing air assisted hydraulic brake system. - Techniques of reassembling brake system after servicing. - Procedure of testing brake system after servicing. <p>Ability to:</p> <ul style="list-style-type: none"> - Use tools properly. - Perform service of air assisted hydraulic brake properly. - Observe safety precaution. 		Mechanics tool kit. Air assist unit. Pipe connection etc.	Class Room/ Work Shop
H.6 Remove fault	To identify faults in brake system and remove them to ensure normal functioning.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Identifying common faults of brake system. - Procedure of removing faults in brake system. - Procedure of dismantling and assembling brake system. - Check the performance of brake system after completion of repair work. <p>Ability to:</p> <ul style="list-style-type: none"> - Identify common faults in brake system. - Use tools and equipment properly. - Remove faults of brake system properly. - Test the normal functioning of brake after removing fault. 	Th. 02 Hr PR. 08 Hr	Mechanics tool kit. Vinyl tube and container. Brake shoes and pipes. Brake padle returner spring. Dia phram etc.	Class Room/ Work Shop

H.7 Refit wheel	To refit the wheel and ensure proper fitting.	<ul style="list-style-type: none"> – Follow safety precautions. <p>Knowledge of:</p> <ul style="list-style-type: none"> – Procedure of wheels removing and its refitting. – Values of torque applied to fastener. <p>Ability to:</p> <ul style="list-style-type: none"> – Use of proper tools to re-fit the wheel. – Refit wheel properly. – Observe safety precaution. 	Th. 02 Hr PR. 08 Hr		Class Room/ Work Shop
H.8 Perform brake test	To perform brake test with an understanding of normal functioning of brake system.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Common tests of brake system. – Procedure of performing brake tests. <p>Ability to:</p> <ul style="list-style-type: none"> – Use proper tools, instrument and equipment to perform brake test. – Follow safety rules. 	Th. 03 Hr PR. 12 Hr	Mechanics tool kit. Barrat brake shop. Brake dresser power brake unit.	Class Room/ Work Shop

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

Learning Unit	Learning outcome	Learning Elements	Duration	Material Required	Learning Place
I.1 Fill gear oil	To perform filling of gear oil properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Purpose and function of gear oil in the power train. - Procedure of filing gear oil properly. <p>Ability to:</p> <ul style="list-style-type: none"> - 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
I.2 Couple power-train with main unit	To couple power-train with main unit as per specification.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Procedure of dismantling power train. - Diagnosing faults of drive train. - Repairing for squeaking, grinding clunking sounds. - Repairing the defective/worn out parts. <p>Ability to:</p> <ul style="list-style-type: none"> - 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

I.3 Repair clutch-plate	To perform repair of clutch plate properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Function and purpose of clutch assembly/unit. - Faults of clutch. - Repair of faults of clutch. <p>Ability to:</p> <ul style="list-style-type: none"> - 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
I.4 Replace worn-out parts	To replace worn-out parts of power-train as per specification.	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Components/parts of power train and their function. - Procedure of replacing worn-out parts in power train. <p>Ability to:</p> <ul style="list-style-type: none"> - 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 pin bering. Mounting ruvver. Cv joint. Cotton weste.	Class Room/ Work Shop
I.5 Assemble power-train	<ul style="list-style-type: none"> • Understand techniques of assembling power train. • Understand the inspection techniques before starting assembling process 	<p>Knowledge of:</p> <ul style="list-style-type: none"> - Components/parts of power train. - Procedure of assembling the power train as per specification. <p>Ability to:</p> <ul style="list-style-type: none"> - 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 pin bering. Mounting ruvver. Cv joint. Cotton weste.	Class Room/ Work Shop

		<ul style="list-style-type: none"> – Follow safety precaution. 			
I.6 Adjust gear shifting	To perform adjusting of gear ratio properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Gear ratio. – Procedure of adjusting the ratio between reverse gear, first gear, second gear, third gear. <p>Ability to:</p> <ul style="list-style-type: none"> – Use proper tools to complete the job. – Adjust gear ratio to ensure proper functioning. 		<p>Machines tool kits. Gear shifter bushes kit. Fork sliding returner spring.</p>	Class Room/ Work Shop
I.8 Repair differentials	To perform repair of differentials properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Differentials. – Types of faults in differential and their causes. – Procedure to repair differential faults. <p>Ability to:</p> <ul style="list-style-type: none"> – Use tools properly. – Identify faults in differentials. – Remove faults properly. – Follow safety precautions. 		<p>Machines tool kits. Shims bearing differential . Boots and boots clips. Greases silicon base. Sealant and gas kit. Cleaning liquids oil seal. Jack and stands rags.</p>	Class Room/ Work Shop
I.09. Adjust alignment of propeller shaft	To perform adjusting the alignment of propeller shaft properly.	<p>Knowledge of:</p> <ul style="list-style-type: none"> – Purpose and function of propeller shaft. – Procedure of alignment of propeller shaft. – Inspection procedure of alignment of propeller shaft. <p>Ability to:</p> <ul style="list-style-type: none"> – Use tools properly. – Inspect faults in propeller shaft. 	Th. 02 Hr PR. 08 Hr	<p>Machines tool kits. Large steel ruler. Dial guage with stand.</p>	Class Room/ Work Shop

		<ul style="list-style-type: none">- Remove faults in propeller shaft.- Follow safety rules.			
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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 work place conditions are not available, assessment is simulated and that the work place 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 back lash 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 work place 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.