

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI-51**

1	Name of Syllabus	C. C. IN DIESEL ENGINE MECHANICS (306105)																																								
2	Max. Nos of Student	25 Students																																								
3	Duration	6 Month																																								
4	Type	Part Time																																								
5	Nos Of Days / Week	6 Days																																								
6	Nos Of Hours /Days	4 hrs																																								
7	Space Required	1) Workshop = 600 sq feet 2) Class Room = 200 sq feet TOTAL = 800 sq feet																																								
8	Entry Qualification	8 <sup>th</sup> Pass																																								
9	Objective Of Syllabus/ introduction	1) Trainee should be well conversant with the tool generally used for repair and maintenance of diesel engines (light & medium duty) 2) Trainee should know the working of diesel engine. 3) Trainee should be able to detect the faults. 4) He should be able to rectify the fault by way of repairing defective part of carry out minor repair and put the engine in working condition. 5) He should know the maintenance of the engine.																																								
10	Employment Opportunity	<b>Self Employment:-</b> To undertake faulty and minor repair work, especially in rural areas where garage facilities are not available. <b>Wage-Employment:</b> - Will is able to work in vehicle related establishment.																																								
11	Teacher’s Qualification	H.S.C. Vocational Passed <b>OR</b> D.M.E. (Mechanical )/Automobile																																								
12	Training System	<table><tr><th colspan="7">Training System Per Week</th></tr><tr><td>Theory</td><td></td><td>Practical</td><td></td><td>Total</td><td></td><td></td></tr><tr><td>6hrs</td><td></td><td>18hrs</td><td></td><td>24hrs</td><td></td><td></td></tr></table>						Training System Per Week							Theory		Practical		Total			6hrs		18hrs		24hrs																
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## **Curriculum :- DIESEL ENGINE MECHANICS**

### **THEORY PAPER – I, DIESEL ENGINE**

General Introduction to the course:-

- 1) Importance of safety and general precaution to be observed in the shop. Fire extinguishers used for different types of fire storing and Handling of inflammable materials elementary first aid.
- 2) Syllabus of measurement conversion of English into metric measurement and vice-versa. Marking media chalk steel rules, try square, calipers and dividers, scriber prick & centre punch etc.
- 3) Fitter's hand tools such as file, vice, Hammer chisel, Hacksaw, drills, hollow punch, uses, description and function of the hand tools.
- 4) Main trade hand tools, uses and description, function in details such as D.E. Spanner, S.E. Spanner, Ring Spanner, Box Spanner, tube spanner, torque-wrench, screw driver, pliers types etc.
- 5) Special tools to be used in this trade, Specification, description, function of the special tools such as :-
  - 1) Piston ring compressor
  - 2) Piston ring expander & remover
  - 3) Ridge remove
  - 4) Piston ring groove cleaner.
  - 5) Piston ring filling gig.
  - 6) Pullers, Jacks, types uses. Valve tapping tools etc.
- 6) Introduction to History of the diesel classification of I.C. engines.
- 7) Principles of Auto four stroke cycles, diesel four strokes cycle, two stroke cycles, differentiate at the two and four stroke cycles and Auto diesel cycles.
- 8) Introduction of engine detachable & non-detachable parts description, function, materials location etc.
- 9) Such as piston, piston assembly, crank shaft, cam shaft, gear and chain drives, valve and valve operating mechanism, engine head, cylinder block, head Radiator etc.
- 10) Introduction of the cooling system use, function, principle etc.
- 11) Introduction of the lubrication system, use, function, principle etc.
- 12) Introduction of fuel system of the diesel fuel injection system.
- 13) Introduction of fuel system of petrol carburetion system.
- 14) Introduction of Ignition system.
- 15) Introduction of Governing system.
- 16) Maintenance schedule and its importance, maintain a logbook, chalk out maintenance schedule etc.
- 17) Basic electrical equipments uses on vehicles such as starter's dynamo cut out circuit diagrams of starting system charging system & alternator etc.
- 18) Engine timing principle, settings, importance diagrams etc.
- 19) Introduction of engine faults and common troubles.

## **20. Entrepreneurship:-**

- 1) Taking to the clients so as to get the history of the vehicle.
- 2) Preparation of preliminary estimates, final costs, billing, maintenance of accounts registers etc.
- 3) Information on banking procedure and services.
- 4) Information on Government laws – with reference to registration, sales income, tax, excise duty.
- 5) Maintaining inventory books for spare parts and vehicle under repairs etc.
- 6) Information of various financing institution –  
M.S.F.C.M.S.S.I.D.C., N.S.I.D.C., R.D.C. S.I.S.I. etc.
- 7) Sources of information for spare parts and methods of keeping track of prices, rates and commercial practices.
- 8) Budgeting financial planning and saving.
- 9) Systems of wage payment.

## **PRACTICAL – I, ENGINE AND ELECTRIC SYSTEM**

### **A. ENGINE SYSTEM**

Demonstrate the hand tools & equipments to be used in this trade such as vice, file, centre punch, stool rule, Hack-saw, drill tap & dies screw driver, spanner, special tools etc.

Removing & refitting pf the nut bolts, studs, broken studs, and oversize fitting of stud.

Changing water of the engine radiator

Changing lubrication oil of the engine

Cleaning fuel tank of the engine

Cleaning the air cleaning

Fitting diesel in the tank and bleeding the fuel system and start the engine

Demonstration the engine controls

Removing & Assembly of radiator

Adjust the fan belt tension

Replace the fan belt

Replace foundation brackets

Demonstrate the engine to keep it neat & clean

Connection of Battery to the engine starter

### **B. ELECTRICAL SYSTEM**

- Replacing starter motor
- Replacing dynamo & setting fan belt tension
- Give the battery connection to the starter motor and dynamo.
- Checking the Battery.
- Serving Air Cleaner
- Repairing High Pressure Pipeline
- Replacing injectors

- Replacing & Servicing fuel filters
- Check-up the engine before starting
- Starting and engine
- Check-up the engine while running
- Principle functions of governor, observation of Governor.
- Stopping an engine
- Check-up engine after stopping.
- Maintain log book
- Checking leakages of the engines while running.
- Checking and setting taper clearance
- Removing & refitting engine head
- Decarburizing the engine head, manifold & piston, cylinder head.
- Lapping the valve
- Removing & refitting piston assembly.
- Removing & refitting piston rings
- Rechecking clearance between piston & liner

## **PRACTICAL – II, ENGINE AND FUEL SYSTEM**

1. Checking clearance of piston rings
2. Checking wear and tear of cylinder bone
3. Checking compression pressure
4. Replacing connecting rod bearing
5. Check-up clearance of connecting rod bearing
6. Removing and refitting camshaft
7. Removing & refitting camshaft Bushings
8. Removing & refitting crank shaft
9. Replacing main bearing
10. Check-up clearance of main bearing
11. Setting valve timing
12. Setting fuel injection timing.
13. Over hauling water pump
14. Fault finding of engine of fuel system
15. Fault economy methods in brief.
16. Fault finding on lubrication oil system
17. Fault finding on cooling system
18. Fault finding on Governing system
19. Fault finding on loading unloading
20. Check-up and setting speed of the engine
21. Chalk out the schedule of engine maintenance according to the manufacture instructions.

## LIST OF TOOLS AND EQUIPMENT

Sr. No.	Name of Tools & Equipment
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- |     |   |
|-----|---|
| 1.  | Hammer ball pane 0.75 kg.   |
| 2.  | Chisel cold fiat 19 mm.   |
| 3.  | Steel rule 15 cm & metric   |
| 4.  | Screw driver 30 cm x 9 mm blade                                   |
| 5.  | Screw driver 20m x 9 mm   |
| 7.  | Spanner DE set of 12 metric 8-32 mm.                              |
| 8.  | Pliers combination 15 cm  |
| 9.  | Flat file 20 cm. second cut                                       |
| 10. | Feeler gauge 20 blades  |
| 11. | Ring spanner set of 12 metric 8-32 mm.                            |
| 12. | Steel tool Box with lock & key                                    |
| 13. | Steel rule 30 cm  |
| 14. | Chisel cross cut 9 x 3 mm   |
| 15. | Hammer ball pane 0.5 kg.  |
| 16. | Hack-saw frame adjustable for 20 – 30 cm blades                   |
| 17. | Punch hollow 6,7,8,9,10,5 & 12 mm.                                |
| 18. | Hand vice 3.7 mm.   |
| 19. | File flat 35 cm. bastard  |
| 22. | Set of Hammer   |
| 23. | Spanner adjustable 20 cm.   |
| 24. | Spanner ring of set 6 SAE   |
| 25. | Double Open ended spanner set of 12 pieces 8 to 32mm.             |
| 26. | Valve lapping suction type tools (Consumable)                     |
| 27. | Piston ring Groove cleaner  |
| 28. | Piston Ring expander & remover                                    |
| 29. | Circlip pliers expandable   |
| 30. | Circlip pliers compressible                                       |
| 31. | Socket spanner set of 28 pieces                                   |
| 32. | Torque 7 kg. To 35 kg/ meter                                      |
| 33. | Piston ring compressor  |
| 34. | Puller set Universal for bearing & bushes                         |
| 35. | Lifter valve spring 'C' type & side valve type                    |
| 36. | Extractor stud "Ezy out" type                                     |
| 37. | Mallet (Wooden)   |
| 38. | Cylinder gauge capacity 6.22" cur x 11" cur                       |
| 39. | Compression gauge to read 120 kg/39 cm & vacuum gauge 0 to 75 cm. |
| 40. | Workbench 250 x 120 x 75 cm with 4 vices of 12.5                  |
| 41. | Fuel feed pump  |
| 42. | Fuel injection pump [ (PE) Type ]                                 |
| 43. | Water pump & Oil Pump   |
| 44. | Filling jig for adjusting the piston ring gap.                    |

45. Tachometer (Counting type)
46. Starter Motor
47. Dynamo & Voltage regulator
48. Injectors assorted type
49. High rate discharge tester
50. Injection cleaning kit
51. Tap & die set B.S.W.

#### **GENERAL MACHINERY**

1. Diesel engine cut-out model to show working parts.
2. Diesel engine 4 stroke Multi cylinder, 4 cylinder vehicle type.
3. Diesel engine stationery type
4. Battery charge unit
5. Hydrometer
6. Air cooled vertical diesel engine
7. Trolley type portable air compressor, single cylinder with 45 liters capacity air tank all accessories and with working pressure 6.5 kg. 159 cm<sup>2</sup>.
8. Unserviceable Horizontal diesel engine
9. Unserviceable vertical water cool engine
10. Unserviceable vertical Air cool engine

#### **REFERENCE BOOKS :**

- |   |               |
|---|---------------|
| 1. Oil Engine Mechanic                        | Vaze          |
| 2. Yantric Motor Gadi Part – I & II (Marathi) | Shekhar Dalvi |
| 3. Diesel engine operation and Maintenance    | Malveer V.L.  |
| 4. Diesel engine Mechanic                     | N.K. Mangal   |

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