

MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI - 51

1	Name of Course	C.C. in Servicing & Overhauling Of Automobiles (Petrol) (306110)																																									
2	Max.Nos. of Student	25 Students																																									
3	Duration	6 Months																																									
4	Type	Full Time																																									
5	Nos Of Days / Week	6 Days																																									
6	Nos Of Hours /Days	7 Hrs																																									
7	Space Required	Laboratory = 1000 Sq feet <u>Class Room = 200 Sq feet</u> TOTAL = 1200 Sq feet																																									
8	Entry Qualification	S.S.C.																																									
9	Objective Of Syllabus/ introduction	Awareness of Safety precautions. Awareness of Various Types of Engines. Awareness of various Controls in Engines. Awareness of Petrol & Diesel Engines. Awareness of Servicing & Overhauling of Petrol Engines. Awareness of Repair & Maintenance Petrol Engines.																																									
10	Employment Opportunity	The trainee will either to be able to take up jobs with agencies which Develop, maintain and repair such Petrol Engines or with working experience will be in a position to start his own independent Business.																																									
11	Teacher’s Qualification	Diploma in Mechanical/Automobile Engineering.																																									
12	Training System	Training System Per Week <table border="1"><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>							Theory	Practical	Total	12 Hours	30 Hours	42 Hours																													
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SYLLABUS

Servicing & Overhauling of Automobiles (Petrol)

Practical	Theory
<ul style="list-style-type: none"> > Identification of vehicle components. > Compression pressure test & its importance > Removing & refitting of petrol engine from vehicle. > Dismantling of petrol engine. > Removing broken studs. > Servicing of inlet, exhaust manifold. > Overhauling of piston and connecting rod assembly. 	<p>General classification of petrol engine vehicle</p> <ul style="list-style-type: none"> • Main parts of vehicle (body & chassis) • Classification of chassis & frame <p>Power generation system(engine):</p> <p>Description, construction and functions of petrol engine parts. Important working parts in the engine - the two stroke & four stroke cycle, single & multi-cylinder, horizontal, vertical & inclined engine. Moving parts such as piston rings, piston, connecting rod, piston pin, cam shaft, crank shaft valve lifter, valve operating mechanism and valve timing.</p> <p>Description and functions of valves, valve spring, valve seat, valve guide, tappet clearance & stationary parts - cylinder head, cylinder liner (wet & dry) & cylinder block.</p> <p>Main bearings, crank case and oil sump.</p>
<ul style="list-style-type: none"> > Complete overhauling of petrol engine. > Assembling engine parts, piston connecting rod, cylinder head. Rocker arm assembly, manifold and other accessories of the petrol engine. > Setting of valve timing & adjusting tappet clearance on different engines. > Turning of engine and testing the performance 	<p>Power generation system(engine):Introduction of carburetor & its circuit, distributor & its parts, vacuum advance, spark plug, ignition coil. Types of Air cleaners, filters, superchargers, firing order. Inspection & measurement of engine head, engine block, cam shaft, crank shaft & other moveable parts, valve timing diagram, purpose of oil galleries & water jackets, combustion chambers of petrol engine. Description & operation of multipoint fuel injection system. Study and adjustments of engines fitted with CNG/LPG kit. Study of euro III norms and its effect on the performance of an engine.</p> <p>Cooling System: Purpose of cooling system. Types of cooling system. water cooling system</p>
<p>of the petrol engine.</p> <ul style="list-style-type: none"> > Adjustments, troubleshooting and remedies of CNG/LPG system fitted on engines. > Servicing of water pump and testing thermostat valve. > Servicing of radiator and adjusting fan belt. > Servicing of oil pump. 	<p>and its parts. Radiator, water pump.</p> <p>Thermostat valve. Anti fuzzers, coolants, radiator pressure cap.</p> <p>Lubricating system: Types of Lubricating system and use of its parts, oil classification, types of oil pumps its drive, oil filter, drive system its parts, oil cooling in petrol engine.</p> <p>Application of synthetic oil.</p>

<ul style="list-style-type: none"> > Overhauling of clutch assembly of vehicle. > Overhauling of gear box of vehicle. > Overhauling of differential, servicing of propeller shaft. > Testing of transmission alignment. 	<p>Transmission Unit:</p> <p>CLUTCH ASSEMBLY: Requirement of a clutch, types of clutch, main parts of clutch, clutch plate, clutch lining, pressure plate, pressure spring, clutch pedal, clutch release bearing, fork, single plate, cone clutch, centrifugal clutch, diaphragm clutch, fluid fly wheel.</p> <p>GEAR BOX ASSEMBLY: Purpose of gearbox, types of gear box, synchromesh gear box, constant mesh gearbox, epicyclic gear box, parts of gearbox, types of gears, counter shaft, transmission shaft, gear lever, gear shifter fork. Introduction on Torque Convertors.</p> <p>PROPELLER SHAFT & DIFFERENTIAL ASSEMBLY: Description & purpose of different types of- propeller shaft, universal joint, slip joint or sliding joint. Differential & rear axles, front wheel drive and rear wheel drive. Differential lock. Different types of bearings - roller type, ball bearing, taper roller bearings.</p>
<ul style="list-style-type: none"> > Overhauling of brake in vehicle. 	<p>Suspension System: Functions of suspension system, independent front suspension, torsion bar, leaf spring, stabilizer, types of suspension springs, different types of shock absorbers - their description.</p>
<ul style="list-style-type: none"> > Bleeding of hydraulic brake. > Repair & Maintenance of tyre and tubes. > Adjusting wheel alignment & wheel balancing. > Repair & Maintenance of body of vehicle. > Servicing of steering system 	<p>ntrol unit:</p> <p>STEERING SYSTEM: Description of different types of steering boxes - manual, hydraulic and electrics. Special features of each, adjustments. Power Assisted steering and advantages. Description of ackermans angle, caster, camber, King pin Inclination, Toe-in, & toe-out, toe-out on turn and purpose and effect of these angles. Steering linkage system, four wheel steering (4 WS). Need of front wheel alignment.</p> <p>BRAKE SYSTEM: Types of brakes, functions, description and advantages of vacuum assisted hydraulic brakes, common troubles in vacuum assisted hydraulic brake. Classification of brake-mechanical brakes & parking brake. Power assisted brake, working of wheel cylinder and master cylinder. Function and working of antilock braking system.</p>

<ul style="list-style-type: none"> > Servicing of fuel supply system & servicing of air cleaners. > Servicing of carburetor 	<p>Fuel Supply System: Purpose of fuel supply system, Types & function of carburators. Types of fuel pump- AC Mechanical fuel pump and electrical fuel pump. Force feed system, fuel filter. Function and working of fuel injection system. Performance of engine to save fuel and energy.</p> <p>Ignition System: Description of spark ignition system. Distributor, vacuum advance, condenser, C.B. Point, air fuel ratio. Electronic Distributerless Ignition System.</p>
<ul style="list-style-type: none"> > Starting and stopping of petrol engine. > Trouble shooting of petrol engine. > Trouble in electrical circuits. > Testing of electronic devices used in petrol engine. 	<ul style="list-style-type: none"> > Starting and stopping of petrol engine. > Trouble shooting of petrol engine. > Trouble in electrical circuits. > Testing of electronic devices used in petrol engine.

Basic Diesel & Petrol Engine

Practical - I
<p>Familiarization with the hand tools, machinery and type of work done in the trade. Safety precautions in the use of hand tools and equipment on shop floor. Safety equipment and its use. Use of jacks, hoist and horses in the shop. Selection of materials for gaskets, packing and locking devices and their uses in the trade.</p> <p>Familiarization with working of four stroke petrol and Diesel engines. Identification of differences between Petrol & diesel Engine. Identification of difference between two stroke and four stroke engine.</p>
<p>Identifying various petrol & Diesel engines auxiliaries. Practice on starting and stopping of the engine. Adjusting speeds in idling and running conditions. Running the engine and checking temperature, fuel, oil pressure and speed. Testing engine compression and vacuum with gauges. Torquing & detorquing of cylinder head bolts.</p>
<p>Dismantle 2-stroke petrol engine. Examine its parts their materials and other working details. Measurement of cylinder bore. Assemble and start the engine.</p>
<p>Dismantle 4-stroke petrol engine. Examine inner details of moving parts, their materials and other working details. Assemble and start the engine.</p>
<p>Familiarization with ignition system of Petrol engine. Clean spark plugs, adjust gaps and refit. Servicing air cleaner. Carry out minor adjustments on carburetor.</p>
<p>Practice on starting and stopping of diesel engine. Running engine on stand and checking speed, temperature, and oil pressure. Compression testing of cylinders.</p> <p>Dismantle 4-stroke diesel engine. Examine inner details of moving parts, their materials and other working details. Measure cylinder wears and piston clearance. Decarbonise the cylinder head. Assemble and start the engine</p>
<p>Identifying main parts of fuel injection and mounting of fuel Injection pump to the engine. Injector overhauling & testing. Replacing fuel filter elements and air cleaners.</p>
<p>Flushing of cooling system in engine. Dismantling and assembling oil pump, servicing oil filters, changing oil in engine.</p>

List of Equipments / Instruments / Machines

Sl No	Item	Qty
a) TRAINEES TOOL KIT		
1	Steel rule 15 cm. English and metric	10 Nos.
2	Screw driver 20cm.X 9mm. Blade	10 Nos.
3	Screw driver 30 cm. X 9 mm. Blade	10 Nos.
4	Spanner D.E. set of 12 pieces (6mm to 32mm)	10 Nos.
5	Pliers combination 20 cm.	10 Nos.
6	Pliers side cutting 15 cm	10 Nos.
7	Plier round nose 15 cm	10 Nos.
8	Plier flat nose 15 cm	10 Nos.
b) SHOP OUTFIT & MEASURING INSTRUMENTS		
9	Hollow punch set of seven pieces 6mm to 15mm	1 Set.
10	Drift punch copper 15 cm	2 Nos.
11	Prick punch 15 cm.	2 Nos.
12	Chisels cross cut 200 mm X 6mm	2 Nos.
13	Allen Key set of 12 pieces (2mm to 14mm)	04Sets
14	Philips Screw Driver set of 5 pieces (100 mm to 300 mm)	04Sets
15	Rule steel 30 cm. English and metric	2 Nos.
16	Engineer's square 15 cm. Blade	2 Nos.
17	Dividers spring 15 cm.	2 Nos.
18	Ball peen Hammer 0.5kg.	16 Nos.
19	Scriber with scribing black universal	4 No.
20	Marking out table 90X60X90 cm.	1 Nos.
21	Hacksaw frame adjustable	4 No.
22	Engineers stethoscope	1 Nos.
23	Hand vice - 37 mm	2 Nos.
24	Drill Twist (assorted)	10 Nos
25	Taps and Dies complete sets (5 types)	1 set
26	Hand file 20 cm. Second cut flat	10 Nos.
27	Hand file 20 cm. Second cut half-round	10 Nos.
28	Hand file 20 cm. smooth triangular	10 Nos.
29	Hand file 30 cm. bastard	10 Nos.
30	Hand file 30 cm. round bastard	10 Nos.
31	Centre punch 10 cm.	10 Nos.
32	Chisel cold flat 20 mm.	10 Nos.
33	Feeler gauge 20 blades (metric)	10 Nos.
34	Steel tools box with lock and key (folding type) size 400X200X150mm	10 Nos.
35	Spanner, adjustable 15cm.	1 No.
36	Spanner for spark plugs 14mm.	2 Nos.
37	Spanners socket with speed handle, T-bar, ratchet and universal upto 32 mm set of 28 pieces with box	2 sets
38	Adjustable spanner (pipe wrench 350 mm)	2 Nos.
39	Chain and pulley block 3000 kg. Capacity electric type	1 No.

40	Horses and wheel choke	4 Sets
41	Screw jack one tone, capacity double lift	2 Nos.
42	Hydraulic jack with trolley capacity 3 Ton	1 No.
43	Oil can 0.5/0.25 liter capacity	2 No.
44	Cleaning tray 45x30 cm.	4 Nos.
45	Piston ring expander and remover 50 mm & 100 mm	1 each
46	Piston Ring compressor	2 Nos.
47	Piston Ring Groove cleaner	2 Nos.
48	Cylinder ridge remover/cutter.	1 No.
49	Torque wrench 5 to 35 Nm, 12 - 68 Nm & 50 - 225 Nm	1 No.
50	Work bench 250 x 120 x 60 cm with 2 vices 12cm Jaw	2 Nos.
51	Pullers screw powered 2 mm gap with bearing puller attachment	1 No.
52	Vice grip pliers	2 Nos.
53	Hand reamers adjustable 10.5 to 11.25 mm, 11.25 to 12.75 mm, 12.75 to 14.25 mm and 14.25 to 15.75 mm	2 Sets
54	Micrometer out side 0-25 mm, 25-50 mm, 50 - 75 mm, 75 -100 mm	1 each
55	Micrometer in side 25-50, 50-75, 75-150 mm with extension rod.	1 each
56	Mallets wooden/plastic.	2 Nos.
57	Spanner, ring set of 12 metric sizes 6 to 32 mm.	2 Nos.
58	Feeler gauge piston (metric)	1 Set
59	Cleaning tray- Aluminum 45 x 30 cm	8 Nos.
60	Spark plug spanner 14mm x 18mm x Size	2 Nos.
61	Valve spring lifter	1 No.
62	valve grinding tool-suction type	6 Nos.
63	Valve seat cutting tools complete with guides and pilot bar (all angles)	1 Set.
64	Valve key inserter	1 No.
65	Cylinder bore gauge capacity 20 to 160 mm	2 Nos.
66	Carburetor	2 Nos.
67	Fuel feed pump	2 Nos.
68	Circlip pliers 15 cm. Expanding type	1 No.
69	Circlip pliers 15 cm. Contracting type	1 No.
c) GENERAL INSTALLATION / MACHINERIES		
70	Straight edge gauge 2 ft.	1 No.
71	Distributor	2 Nos.
72	Surface Plate 60 x 60cm	1 No.
73	Circlip pliers Expanding and contracting type 15cm and 20cm each	8 Sets.
74	Inspection lamp with guard and wandering lead of 100ft. length	1 No.
75	Crow bar	1 No.
76	Fire extinguisher ABC type 5 kg capacity.	2 Nos.
77	Fire Buckets (4 Nos.) with stand	2 Nos.
78	Disk brake with caliper assembly	2 Nos.
79	Tandem master cylinder with booster	4 Nos.
80	Wheel cylinder	4 Nos.
81	Lead acid battery 12 V	4 Nos.
82	Battery charger 6 - 24 V with 10 A rate	1 No.

83	C.V. Joint units of 3 different types	4 sets
84	Drilling machine bench to drill up to 12mm die	1 No.
85	Electric pedestal grinder with two 18cm. Wheel	1 No.
86	Compression testing gauge to read 0 to 50 kg/sq.cm.	1 No.
87	Vacuum gauge to read 0 to 760 mm of Hg.	1 No.
88	Cut model of 4 stroke Petrol engine on stand	1 No.
89	Cut model of 2 stroke Petrol engine on stand	1 No.
90	Engine analyzer	1 Sets.
91	Bearing puller screw powered/hydraulic powered with attachments Max spread 80, 200 and 300mm	1 Each.
92	Speed counter / Tacho meter - pointed type to read up to 5000 RPM	1 No.
93	Petrol Engine of: latest model (CNG Engine) with workshop manuals	1