

SYLLABUS OF SEMESTER SYSTEM
FOR THE TRADE OF

MECHANIC (DIESEL)

UNDER

CRAFT INSTRUCTOR TRAINING SCHEME (CITS)
(ONE YEAR/TWO SEMESTERS)

REDESIGNED IN
2014

BY
GOVERNMENT OF INDIA
MINISTRY OF LABOUR & EMPLOYMENT (DGE&T)

GENERAL INFORMATION

1. Name of the Trade : MECHANIC DIESEL
2. Duration : One year (Two semesters)
3. Power Norms : (a) Class Room : 1 kw
(b) Workshop : 4.5 kw
4. Space Norms : (a) Class Room : 30 Sq. Mt. (@ 1.5 Sq.Mt. per Trainee)
(b) Workshop : 120 sq. meter + 80 Sq.m
5. Entry Qualification : NTC& NAC in Diesel Mech. Or Mechanic Pump Operator Trade
Or
Diploma/Degree In Mechanical / Automobile

Valid MCWG & LMV driving License Mandatory for all
7. Unit strength : 20 Trainees
8. Trainer's Qualification: Engineering Degree in Automobile or Mechanical
OR
Diploma in Automobile or Mechanical with 3 Years of Experience .
Or
NTC & NAC in Diesel Mech. Trade With 2 Years Of Experience

CITS course in Diesel Mech. trade and Valid MCWG & LMV driving License Mandatory for all.

Distribution of training on Hourly basis:

Semester	Total hours /week	Trade practical	Trade theory	POT	Engg. Drawing	Wksp/sc calculation
I	40 Hours	20 Hours	5 Hours	--	06 hours	09 hours
II	40 Hours	20 Hours	5 Hours	15 Hours	--	--

SYLLABUS FOR TRADE OF MECHANIC DIESEL
FIRST SEMESTER (Semester Code.:)
Duration : 06 Months
SYLLABUS FOR TRADE TECHNOLOGY –I

WEEK NO.	TRADE PRACTICAL	TRADE THEORY
1	<p>Practice 5s techniques in the automobile work shop.</p> <p>Practice 7QC techniques in the automobile work shop.</p> <p>Precautions to be observed while working in the automobile work shop and garage equipments.</p> <p>Familiarization with computer, Practice on data base creation with MS access and data base application.</p>	<p>Admission, introduction, facility available in the institute.</p> <p>Importance of safety, safety precautions & first aid.</p> <p>Concept of 5S & 7QC tools, time management as employed for quality circle. Importance of healthy environment.</p> <p>Application of computers & its Features. Physical & logical concept of data base.</p>
2	<p>Handling & maintenance of hand tools, special tools, equipment & machineries.</p> <p>Maintenance of garage equipment in the workshop.</p> <p>Preventive maintenance of vehicle/engines.</p>	<p>Application and safety to be observed while handling hand tools, special tools, equipment & machineries</p> <p>Importance and types of maintenance of vehicles/engines.</p> <p>.</p>
3	<p>Checking engine vacuum & compression pressure.</p> <p>Taking Cylinder leakage test with compressed air.</p> <p>Measure the cubic capacity of an given engine.</p>	<p>Explanation of Principle of All types of SI and CI Engines with respect to pressure, volume and temperature.</p> <p>Thermodynamic cycles with respect to pv & ts diagrams.</p> <p>Valve timing diagram of all types of Engine</p>
4 & 5	<p>Servicing cylinder head assembly</p> <p>Remove all accessories attached with the engine dismantling the head components and its visual inspection-</p> <p>Measuring components for wear with precision measuring instruments-suggestions for remedy and taking remedial measures.</p> <p>Reassembling cylinder head components.</p>	<p>Importance of servicing cylinder head-Precautions to be observed while servicing cylinder head.</p> <p>Reasons for frequently occurring abnormal wear in cylinder head components and its Effects on engine performance.</p> <p>Constructional details, Advantages and disadvantages of variable valve timing</p>

<p>6 &7</p>	<p>Servicing cylinder block assembly Removing and dismantling piston and connecting rod assembly, crank shaft and flywheel, vibration damper from the engine.</p> <p>Visual inspection of cylinder block for various parameters such as bore, main journal etc. for wear and suggest remedial measures.</p> <p>Visual inspection of the cylinder blocks components (piston and connecting rod assembly, crank shaft, flywheel etc.)</p>	<p>Importance of servicing cylinder block- Precautions to be observed while servicing cylinder block.</p> <p>Reason for measuring cylinder block for various parameters to find out its serviceability and suggestions for remedial measures.</p> <p>Reasons for frequently occurring abnormal wear in cylinder block components and its Effects on engine performance.</p>
<p>8&9</p>	<p>Measuring cylinder block & components for wear with precision measuring instruments- suggestions for remedy and taking remedial measures.</p> <p>Reassembling the engine block and its components.</p> <p>Refit cylinder head assembly.</p> <p>Setting valve timing.</p> <p>Checking and setting valve clearance</p> <p>Practice on checking and setting variable valve timing</p>	<p>Importance of measuring cylinder block components for actual wear to decide serviceability.</p> <p>Engine assembly procedure as recommended by manufacturers.</p> <p>Importance and correct procedure of setting valve timing</p> <p>Importance of correct valve clearance</p> <p>Precautions to be observed while assembling engine components.</p>
<p>10&11</p>	<p>Maintenance, diagnosis and Servicing intake systems Servicing of different types of air cleaner, turbocharger, intercooler, throttle body, intake manifold</p> <p>Maintenance, diagnosis and Servicing exhaust systems Servicing of exhaust manifold, catalytic converter, resonator, muffler</p>	<p>Study about intake system components such as air cleaner, different types of turbo charger, super charger, throttle body, intake manifold etc.</p> <p>Importance of maintenance, diagnosis and Servicing intake systems.</p> <p>Causes of failure of the components of intake system.</p> <p>Trouble shooting in an intake system.</p> <p>Study about exhaust system components such as exhaust manifold, muffler, types of catalytic converter etc.</p> <p>Importance of maintenance, diagnosis and Servicing exhaust systems.</p> <p>Causes of failure of the components of exhaust system.</p> <p>Trouble shooting in an intake system.</p>
<p>12</p>	<p>Maintenance, diagnosis and servicing of basic petrol fuel system components Overhauling of fuel tank, mechanical fuel Pump, electrical pump, fuel filters, carburetors Testing of fuel pumps for proper functioning.</p>	<p>FUEL SUPPLY SYSTEM IN PETROL ENGINE Gasoline Fuel: properties of Gasoline fuel – combustion processes</p> <p>Study about carburetor fuel system and its components such as fuel tank, mechanical fuel Pump, electrical pump, fuel filters, carburetors and its circuits etc.</p> <p>Importance of maintenance, diagnosis and Servicing carburetor fuel system and its</p>

		<p>components.</p> <p>Causes of failure of the carburetor fuel system and its components.</p> <p>Trouble shooting in carburetor fuel system and its components.</p> <p>Importance of testing of fuel pumps.</p>
13&14	<p>Maintenance, diagnosis and servicing of conventional diesel fuel system and its components.</p> <p>Overhauling of fuel tank, fuel feed Pump, electrical pump, fuel filters, types of fuel injection pumps, governors, injector</p> <p>Testing of fuel feed pumps for proper functioning.</p> <p>Servicing of fuel tanks, Checking leaks in the fuel lines, draining of water separators.</p> <p>Replacing of primary& secondary filters.</p> <p>Phasing and calibration of fuel injection pump.</p> <p>Testing of injectors for its proper functioning.</p> <p>Setting fuel injection timing</p> <p>Bleeding diesel fuel system.</p>	<p>FUEL SUPPLY SYSTEM IN DIESEL ENGINES</p> <p>Diesel fuel & its properties – combustion processes</p> <p>Study about conventional diesel fuel system and its components such as fuel tank, fuel feed Pump, electrical pump, fuel filters, water separators, fuel injection pumps, governors, injectors etc.</p> <p>Importance of maintenance, diagnosis and Servicing diesel fuel system and its components.</p> <p>Causes of failure of the diesel fuel system and its components.</p> <p>Importance of testing of fuel feed pumps, FIP and injectors.</p> <p>Importance of setting correct FIP timing.</p> <p>Importance of bleeding the fuel system.</p> <p>Trouble shooting in diesel fuel system and its components.</p>
15&16	<p>Maintenance, diagnosis and servicing of lubrication system.</p> <p>Changing engine oil and filter.</p> <p>Tracing oil leak from the engine.</p> <p>Overhauling of oil pump,</p> <p>Checking oil pressure relief valves for proper functioning.</p> <p>Servicing oil coolers.</p> <p>Checking oil galleries</p> <p>Oil pressure testing.</p> <p>Removing of sludge by using flushing oil.</p>	<p>ENGINE LUBRICATION SYSTEM</p> <p>Lubricant, types, application and its properties.</p> <p>Study about lubrication systems and its components such as oil sump, oil strainer, oil pump, relief valve, filter, bypass valve, oil cooler etc.</p> <p>Study about oil filtering systems.</p> <p>Importance of maintenance, diagnosis and Servicing lubricating system and its components.</p> <p>Causes of failure of the lubricating system and its components.</p> <p>Importance of testing of oil pumps.</p> <p>Importance of servicing oil filter.</p> <p>Importance of checking and setting correct oil pressure.</p> <p>Reasons for sludge formation and its prevention</p> <p>Trouble shooting in lubricating system and its components.</p>
17&18	<p>Maintenance, diagnosis and servicing of cooling system</p> <p>Flushing cooling system</p> <p>Replacing coolant.</p> <p>Tracing coolant leakage from the engine.</p> <p>Checking cooling system for proper functioning.</p>	<p>ENGINE COOLING SYSTEM</p> <p>Coolant, types, and its properties.</p> <p>Importance of maintaining correct coolant-water ratio.</p> <p>Study about cooling systems and its components such as radiator, pressure cap, types of hoses,</p>

	<p>Replacing/Overhauling of water pump. Checking thermostat valve. Adjusting fan belt tension. Checking radiator pressure cap for proper functioning. Replacing/Serviceing radiator. Diagnosis of improper operating temperature.</p>	<p>types of water pump, electric fan, thermostat, fan belts, temperature gauge, temperature sensor etc. Study about oil filtering systems. Importance of maintenance, diagnosis and Servicing cooling system and its components. Causes of failure of the cooling system and its components. Importance of testing of pressure cap. Importance of servicing radiator. Trouble shooting in cooling system and its components.</p>
19	Industrial visit/ in plant training / project work	
20	<p>Maintenance, diagnosis and servicing battery Checking of battery condition using hydrometer and battery tester. Charging batteries in series and parallel. Maintenance of battery. Jump starting a battery. Preparation of electrolyte. Reconditioning of terminal post.</p>	<p>Battery/accumulator :- types, construction, working .Battery capacity &rating, Booster starting. IBS, Disposal of waste battery. Advantages of slow charging. Advantages of solidification of electrolyte by adding salicylic acid or introducing absorbed glass mat (AGM) – VRLA batteries Electrolyte-definition, percentage of sulphuric acid and water. effects of improper ratio of acid and water on battery life. specific gravity of water, acid and electrolyte. Temperature effect on specific gravity. Battery troubles and their remedies</p>
21	<p>Maintenance, diagnosis and servicing of starting system Checking starter circuit for proper functioning. Checking solenoid switches for proper functioning Overhauling all types of starter. Checking of starter for proper functioning.</p>	<p>Study about starting system and its components. Importance of checking starter circuit for proper functioning. Role of solenoid switch and relay, importance of its checking. Importance of testing starter components. Troubles and remedies in starting system.</p>
22	<p>Maintenance, diagnosis and servicing of charging system Checking charging circuit voltage drop test for proper functioning. On vehicle inspection of alternator for proper functioning. Overhauling of alternator Testing voltage regulator.</p>	<p>Study about Charging system and its components Importance of checking charging circuit for proper functioning. Importance of voltage regulation Importance of testing charging system components. Troubles and remedies in charging system.</p>
23	<p>Maintenance, diagnosis and servicing of conventional ignition system Checking ignition circuit for proper functioning. Checking magneto coil for proper functioning. Checking magneto for proper strength. checking and Setting of magneto ignition timing using Ignition Timing light.</p>	<p>Study about types of conventional Ignition system and its components. Importance of checking ignition circuit. Importance of checking and setting correct ignition timing</p>

24	<p>Overhauling distributor. Checking vacuum & centrifugal advance mechanism for proper functioning. Testing ignition coil, spark plug, condenser for proper functioning using testing equipment. Setting ignition timing. Checking of Ignition timing using Ignition Timing light</p>	<p>Study about distributor and its components. Importance of checking distributor for proper functioning. Importance of testing ignition coil, spark plug, condenser for proper functioning. Common troubles in Ignition system.</p>
25	<p>Checking of exhaust gas in petrol engine using exhaust gas analyser. Checking of exhaust gas in diesel engine using Smoke meter. Maintenance of crank case ventilation system. Maintenance of EGR system.</p>	<p>EMISSION CONTROL SYSTEM. Definition, Sources of emission (such as Exhaust system, crank case, fuel tank and carburetor) . Methods to control emission,(1. exhaust system with EGR OR Air injection system in to exhaust manifold with catalytic converter 2. Positive crank case ventilation. 3. Evaporative control system ie charcoal canister.). Vehicle emission standards- Euro and Bharat standards. Emission control</p>
26	REIVISION & TEST	

SYLLABUS FOR TRADE OF MECHANIC MOTOR VEHICLE
SECOND SEMESTER (Semester Code.:)
Duration : 06 Months
SYLLABUS FOR TRADE TECHNOLOGY –I I

WEEK NO	TRADE PRACTICAL	TRADE THEORY
1	Trouble tracing in engines through dashboard gauges such as Mal function Indicator Lamp , cooling system indicator, oil level indicator, battery charging indicator, glow plug indicator etc.	Digital panel board gauges and their circuit. details about MIL indicator, cooling system indicator, oil level indicator, battery charging indicator, glow plug indicator etc.
2&3	Engine tune up procedure, diagnosing abnormal noises coming from engine and its causes. Troubleshooting of engine-mechanical and electrical problems	Tune up the engine with the help of multi scan tool, adjusting of valve tappet clearance checking and setting at injection timing & valve timing.
4&5	Determining the mechanical efficiency of the engine by Morse test using dynamometer and tachometer.	ENGINE PERFORMANCE TESTS Purpose of testing an I.C engine. Classification of test, fault finding tests, routine tests. Measurement of IHP, indicative mean effective pressure, BHP, Mechanical efficiency, fuel consumption, thermal efficiency, volumetric efficiency, relative efficiency, air consumption, lubricating oil consumption. Dynamometers and its types. Preparation of heat balance sheet.
6	Find out the location of CNG kit components in vehicle. Overhauling of CNG kit components. (conventional type) Overhauling of CNG kit components. (Gas injection type) Find out the location of L P G kit components in vehicle. Overhauling of L P G kit components. Maintenance, diagnosis and servicing of electric and hybrid car	ALTERNATIVE FUELS, TYPES, PROPERTIES, Advantages & disadvantages of each type of fuel. CNG engine and its advantages. CNG conversion kit, function, constructional details.(conventional type) CNG conversion kit, function, constructional details. (Gas injection type) L P G engine and its advantages. LPG Conversion kit, function, constructional details. Comparison between petrol, diesel, LPG and CNG. Electric car and Hybrid car.
7	Maintaining fuel injection test bench Further practice on overhauling & testing of different types inline fuel injection pump	Importance of testing the pumps. Procedure for testing before dismantling. Procedure as per the manufacturer for dismantling , inspecting and assembling inline pump.

8&9	<p>Further practice on servicing and testing different types of inline FIP, governors and injectors.</p> <p>Servicing and testing different types of distributor type fuel injection pumps</p>	<p>Detailed description of procedure of servicing mechanically controlled distributor type, electronically controlled distributor type and solenoid valve controlled distributor type pumps-details of start assist systems</p> <p>Procedure as per the manufacturer for dismantling , inspecting and assembling distributor pumps.</p>
10&11	<p>Trouble tracing in engine using multi scan tool such as Engine management system, electronic fuel injection, Air flow measurement, Variable intake manifold system, types of EFI wiring system, Electronic control unit, malfunction indicating lamp, Data link connector, Onboard diagnostic system</p> <p>Checking of sensors.</p> <p>Checking of actuators.</p> <p>Checking of pumps.</p>	<p>ENGINE MANAGEMENT SYSTEM. Definition, Function, Types of system available,</p> <p>Parts of Engine Management System.(All sensors, actuators, pumps.) & their function.</p> <p>closed and open loop system, cold start system, Air flow measurement, Variable intake manifold system, EFI wiring system, Electronic control unit, pre heaters for inlet manifold, Data link connector, Onboard diagnostic system.</p>
12	<p>Diesel Engine diagnostic information and procedures-Engine and emission control system-analyzing the complaint-handling of scan tool-checking freeze frame data-recording freeze frame data and clearance-visual inspection-confirmation of trouble system- rechecking freeze frame data</p>	<p>Precautions to be observed while working with engine emission control systems- details of OBD-description of data link connector-study about schematic and routing diagram of emission control system-flow diagram of control systems-terminal arrangement of ECM</p>
13&14	<p>Trouble shooting for DTC-checking DTC circuits-identifying the trouble by scan tool-tracing the faults by trouble code-checking intermittent problems-final confirmation test</p>	<p>Details of trouble codes-functions of sensors and actuators-details of scan tool-precautions while working with sensors and actuators</p>
15	<p>Servicing CRDI fuel system: checking low pressure fuel supply circuit-preliminary check-checking fuel pump operation-checking fuel pressure-checking high pressure fuel supply circuit-checking fuel injector leak-checking fuel regulator</p>	<p>Description of CRDI systems and its components. Precautions to be observed before removing the CRDI fuel system-study about the low and high pressure fuel supply circuits and</p>

16	<p>Removing a high pressure CRDI pump from an engine-refit the pump to the engine, start and adjusting for proper functioning.</p> <p>Servicing and testing of various types of electronic injectors.</p> <p>Checking and replacing the components of CRDI system.</p>	<p>Electronic Diesel control- Electronic Diesel control systems, Common Rail Diesel Injection (CRDI) system, Hydraulically actuated electronically controlled unit injector (HEUI) diesel injection system. Sensors, actuators and ECU (Electronic Control Unit) used in Diesel Engines.</p>
17&18	<p>Servicing CRDI diesel engines Dismantling, inspecting, measuring the engine components for wear, suggestions for remedy, and replacement of worn out/unserviceable parts and reassembling. Starting engine and tune up for better performance</p>	<p>Importance of measuring/ inspecting the engine components for wear to decide serviceability.</p>
19&20	<p>Servicing stationary diesel engine-PT injection system. Dismantling, inspecting, measuring the engine components for wear, suggestions for remedy, replacement of worn out/unserviceable parts and reassembling. Starting and adjusting for better performance Servicing PT fuel system. overhauling components of PT fuel system</p>	<p>Study about PT fuel system. definition, function, components, function and working of each component and advantages and disadvantages of PT system Importance of measuring/ inspecting the engine components for wear to decide serviceability.</p>
21&22	<p>Identify terminals of 3 phase generator set-determine dc excitation/field winding terminals-testing gen set for continuity-connect start, run the gen set & measure build up voltage -determine the load performance</p>	<p>Read and interpret the name plate details-selecting ohmmeter for proper range-advantages of using megger-residual magnetism-residual voltage and current</p>
23	<p>Dismantling of reciprocating pumps-valves, pistons, cranks, seals etc. for inspection, repair & replacement. Cleaning of parts & assembling. Installing of reciprocating pumps.</p>	<p>Importance of pumps in agricultural & industrial applications. Classification of pumps, parts, constructional details and its working. Classification of reciprocating pump, construction and operation. Installation technique of reciprocating pump. Tools and equipment required & procedure.</p>
24	<p>Dismantling of rotary pumps- impeller, shaft, bearing etc, for inspection, Repair & replacement. Cleaning of parts and assembling. Checking for alignment, clearance, etc., Priming technique and its application. Installing, operating & testing of rotary pumps.</p>	<p>Classification of rotary pumps- Construction and operation- repairing procedure. Brief description of turbine & stage pumps, positive displacements and their advantages. Meaning of priming and its effect. Installation techniques of rotary pump-procedure, tools and equipments required</p>
25	Industrial visit and project work	
26	Revision and test	

TRADE: MECHANIC (DIESEL)

LIST OF TOOLS & EQUIPMENT

First & second semesters.

A. TRAINEE TOOLKIT FOR 20 TRAINEES +1 INSTRUCTOR

SL.NO	ITEM WITH SPECIFICATION	QTY
Trainees tool kit (10 Trainees +1 Instructor)		
1.	Steel rule 150 mm(graduated both English and metric) as per IS 1481	10+1 nos.
2.	Steel rule 300 mm(graduated both English and metric) as per IS 1481	10+1 nos.
3.	Steel measuring tape 10 meter in a case	10+1 nos.
4.	Engineers Try Square 150 mm with knife edge as per IS 2013	10+1 nos.
5.	Outside Caliper 15 cm spring type	10+1 nos.
6.	Inside Caliper 15 cm Spring type	10+1 nos.
7.	Dividers 15 cm Spring type	10+1 nos.
8.	Safety glasses	10+1 nos.
9.	Scriber 15 cm	10+1 nos.
10.	Knife double Blade Electrician	10+1 nos.
11.	Wire insulation Stripper for shinning conductors from 0.4mm to 4mm	10+1 nos.
12.	Electrician testing Pencil (Line / Neon tester)	10+1 nos.
13.	Electrician Screw Driver 250mm	10+1 nos.
14.	Centre punch 10 cm.	10+1 nos.
15.	Chisel cold flat 20 mm x 150 mm	10+1 nos.
16.	Hammer ball peen 0.5 kg with handle	10+1 nos.
17.	Screw driver 20cm.X 9mm. Blade	10+1 nos.
18.	Screw driver 30 cm. X 9 mm. Blade	10+1 nos.
19.	Spanner D.E. set of 12 pieces (6mm to 32mm) as per IS2028	10+1 nos.
20.	Combination Pliers 20 cm.	10+1 nos.
21.	Side cutting Pliers 15 cm	10+1 nos.
22.	Round nose Pliers 15 cm	10+1 nos.
23.	Flat nose Pliers 15 cm	10+1 nos.
24.	Hand file 20 cm. Second cut flat	10+1 nos.
25.	Hand file 20 cm. Second cut half-round	10+1 nos.
26.	Hand file 20 cm. smooth triangular	10+1 nos.
27.	Hand file 30 cm. bastard	10+1 nos.
28.	Hand file 30 cm. round bastard	10+1 nos.

29.	Ring spanner set of 12 pieces(6mm to 32mm)	10+1 nos.
30.	Feeler gauge 20 blades(metric)	10+1 nos.
31.	File card or cleaner	10+1 nos.
32.	Wire cutter and stripper	10+1 nos.
33.	Allen key set of 12 pieces(2mm to 14 mm)	10+1 nos.
34.	Steel tool box with lock and key (folding type) 400x200x150 mm	10+1 nos.
35.	Punch Letter 4mm	10 +1 nos.

Tools, Instruments and General shop outfits

1.	Outside micrometer 0 to 25 mm with least count 0.010mm as per IS 2967	2 nos.
2.	Outside micrometer 25 to 50 mm with least count 0.010mm as per IS 2967	2 nos.
3.	Outside micrometer 50 to 75 mm with least count 0.010mm as per IS 2967	2 nos.
4.	Outside micrometer 75 to 100 mm with least count 0.010mm as per IS 2967	2 nos.
5.	Inside micrometer 25 -50,50-75,75-100,100-125,125-150mm, with least count 0.01mm	2 each
6.	Depth micrometer 0-25mm with least count 0.010mm	2 nos.
7.	Thread Micrometer 0-25mm with least count 0.010mm	2 nos.
8.	Adjustable micrometer sprit level to measure flatness, indication and taper with prismatic measuring base	2 nos.
9.	Vernier caliper 200mm inside and outside (graduated in inches and millimetres)	1no.
10.	Digital Vernier calliper outside 300mm least count 0.01mm	2 nos.
11.	Vernier depth Gauge 0-150 mm	2 nos.
12.	Vernier bevel protractor, least count 5minutes as per IS 4239	2 nos.
13.	Telescope gauge	2 nos.
14.	Dial test indicator plunger type (complete with clamping devices and stand)	4 nos.
15.	Universal Surface gauge	2 nos.
16.	Cylinder bore gauge capacity 20 to 160 mm	2 nos.
17.	Compression testing gauge suitable for petrol engine.	2 nos.
18.	Vacuum gauge to read 0 to 760 mm of Hg.	2 nos.
19.	Granite surface plate ,Grade 0,630 x 630 x 100 mm with adjustable stand as per IS7327	1 no.
20.	Calipers 15 cm Hermaphrodite	2 nos.

21.	Chisels cross cut 200 mm X 6mm	2 nos.
22.	Chisel 10 cm flat	2 nos.
23.	Ball Peen Hammer 0.75 Kg	2 nos.
24.	Hammer Mallet	2 nos.
25.	Hammer Plastic	2 nos.
26.	Hammer ball peen 0.25 kg with handle	2 nos.
27.	Work bench 240 x 120 x 75 cm with 4 vices 15cm Jaw	5 nos.
28.	Magnifying glass 75mm	2 nos.
29.	'V' Block 75 x 38 mm pair with Clamps (Hardened and ground) as per IS2949	2 nos.
30.	C Clamps 100mm	2 nos.
31.	C Clamps 150mm	2 nos.
32.	C Clamps 200mm	2 nos.
33.	Spanner, adjustable upto15cm.	2 nos.
34.	Spark plug spanner 14mm x 18mm x Size	2 nos.
35.	Spanners socket with speed handle, T-bar, ratchet and universal up to 32 mm set of 28 pieces with box	2 nos.
36.	Pipe wrench 350 mm	2 nos.
37.	Spanner T. flex for screwing up and up-screwing inaccessible	2 nos.
38.	Spanner Clyburn 15 cm	1 no.
39.	Magneto spanner set with 8 spanners	1 set
40.	Piston ring filing jig	2 nos.
41.	Cylinder ridge cutter	1 no.
42.	Vice grip pliers	10 nos
43.	Circlip pliers Expanding and contracting type 15cm and 20cm each	10 nos
44.	Torque wrenches 5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
45.	pneumatic tools set	1 no.
46.	Car Jet washer	1 no.
47.	Pipe flaring tool	1 no.
48.	Pipe cutting tool	1 no.
49.	Universal puller for removing pulleys, bearings	1 no.
50.	Cleaning tray 45x30 cm.	4 nos.
51.	Cleaning tray- Aluminium 45 x 30 cm	4 nos.
52.	Stud extractor set of 3	2 sets
53.	Stud remover with socket handle	1 no.

54.	Paraffin pressure Gun	2 nos.
55.	Grease Gun	2 nos.
56.	Hacksaw frame adjustable 20-30 cm	4 nos.
57.	Files assorted sizes and types including safe edge file (20 Nos)	2 set
58.	Drill twist,metric straight shank 3 mm to 12 mm in step of 0.5 mm	1 set
59.	Drill point angle gauge	1 no.
60.	Set of stock and dies - UNC, UNF and metric	2 sets each
61.	Taps and wrenches - UNC, UNF and metric	2 sets each
62.	Taps and Dies complete sets (5 types)	1 set each
63.	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	2sets each
64.	Lapping abrasives (consumable)	As required
65.	Oil can 0.5/0.25 litter capacity	2 nos.
66.	Oil Stone 15 cm x 5 cm x 2.5 cm CONSUMABLE	1 no.
67.	Straight edge gauge 2 ft.	1 no.
68.	Straight edge gauge 4 ft.	1 no.
69.	Thread pitch gauge metric, BSX, BSF, MC, MF & SAE	1 each
70.	Ladle 150mm Dia	1 no.
71.	Blow Lamp 1 litre	2 nos.
72.	Crow bar 910 x25mm	2 nos.
73.	Electric Soldering Iron 230 V 60 watts 230 V 25 watts	2 each
74.	Wire Gauge (metric)	5 nos.
75.	Hand operated crimping tool (i) for crimping up to 4mm and (ii) for crimping up to 10mm	2 nos.
76.	Hand rubber gloves tested for 5000 V CONSUMABLES	5 pair
77.	Digital Multi meter range of 0-500v AC/DC, 0-10A AC/DC, 3½ Digit(min),Diode test mode and continuity mode, accuracy ±0.01%	5 nos.
78.	Growler	1 no.
79.	Hydrometer (CONSUMABLE)	10 nos.
80.	battery analyzer with printer	1nos
81.	Carburettor – Solex, Mikuny for dismantling and assembling	1 each
82.	Philips allen key set	1 set
83.	Starter motor axial type, pre-engagement type & Co-axial type	(3each)
84.	Distributor –Duel advance type, reluctance type	3 each
85.	Tester sparking plug 'NEON' Type	1 no.
86.	Alternator assembly used for LMV	2 nos.
87.	Starter motor assembly used for LMV	2 nos.

88.	Electronic engine control module	1 no.
89.	Fuel feed pump	2 no.
90.	Fuel pump for MPFI	2 no.
91.	Inline fuel injection pump and rotor type fuel injection pump	2no.each
92.	Petrol nozzle	8 nos.
93.	Drift copper 10 mm dia x 150 mm	2 nos.
94.	Piston ring compressor	4 nos.
95.	Piston ring expander	1 no.
96.	Valve spring compressor	1 no.
97.	Valve seat cutter complete set with guide and pilot bar (all angle in a	1 set
98.	Timing light	1 no.
99.	Tachometer digital	1 no.
100.	Battery 12V (Lead acid & Alkaline)	4 nos.
101.	Electrical horn (different types)	2 sets
102.	AC alternator slip ring puller	1 no.
103.	Executive Auto Electrical tool kit	2 nos.
104.	Magnetic stick	1 no
105.	Piston ring groove cleaner	1 no
106.	Oil filter wrench adjustable	1 no
107.	Looking glass	1 no
108	Coil spring compressor for suspension spring	1no.
109	Turbo charger , variable Turbo charger	1 each
110	Timing Light with tachometer	1 no.
111	Battery Tester 12V	1 no.
112	Spark Plug spanner	1 no.
113	Sparkplug gap gauge	1 no.
114	Ambient temp. gauge	1 no.
<u>GENERAL INSTLLATIONS/MACHINERES FOR 1ST SEMESTER</u>		
1.	Demonstration board of 2Wheeler Ignition system.	1 no.
2.	Demonstration board of electronic Ignition system. 4W	1 no.
3.	Spark Plug cleaning and testing equipment	1 no.
4.	Working Condition of Petrol MPFI Engine Assembly with fault simulation board	2 nos.
5.	MPFI petrol engine with swiveling stand along with special tools for dismantling and assembling	2 nos.
6.	Demonstration board of MPFI system	1 no.
7.	Ultrasonic Injection cleaning equipment	1 no.
8.	Working Model of power windows	2 nos.

9.	Petrol Engine(2-stroke) Motor Cycle/Scooter along with special tools and accessories	2 nos.
10.	Cut model of 4 stroke Petrol engine on stand	1 no.
11.	Cut model of 2 stroke Petrol engine on stand	1 no.
12.	Mechanical Hoist/Plate Form Type	1 no.
13.	Multi scan tool /ECU diagnostics kit	1 no.
14.	Four stroke multi cylinder diesel engine in working condition	4 nos.
15.	Four stroke four cylinder CRDI diesel engine in working condition	2 nos.
16.	Functional/experiment model of different type of sensors.	1 set
17.	Auto Electrical test bench	2 nos.
18.	Cut section Model of Mock layout of a motor car –electrical system – working model	1 set
19.	Battery charger 6 – 72 v for charging with cut off circuit	1 no.
20.	Trolley type portable air compressor single cylinder with 45 liters capacity Air tank, along with accessories & with working pressure 6.5	1 no.
21.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth	1 no.
22.	Portable electric drill Machine	1 no.
23.	Spring tension tester	1 no.
24.	Valve refacing machine	1 no.
25.	Injector testing machine for diesel	1 no.
26.	Smoke meter for Diesel with camera and printer	1 no.
27.	Exhaust gas analyser with camera and printer	1 no.
28.	Connecting rod alignment fixture	1 no.
29.	engine lifting crane (jib)	1 NO
30.	Oil draining trolley	1 no
31.	Engine cranker 12v/24v,upto 500 amps to start engine	1 no
32.	Stretcher trolley for under chassis working	1 no

GENERAL INSTLLATIONS/MACHINERES FOR 2ND SEMESTER

Sl. No.	Items	Qty.
1.	Trolley type portable air compressor single cylinder with 45 litters capacity Air tank, along with accessories & with working pressure 6.5 kg/sq cm	1
2.	Grinding machine (general purpose) D.E. pedestal with 300 mm dia wheels rough and smooth	1
3.	Portable electric drill Machine	1
4.	Spring tension tester	1
5.	Multi scan tool	1
6.	Multi cylinder diesel engine fitted	1
7.	Working condition of four stroke CRDI engine with fault simulation	2
8.	Battery charger 6V – 72 V	1
9.	Auto electrical test bench	2
10.	Smoke meter	1
11.	Single cylinder stationary diesel engine and dynamometer with stand	2
16	Four cylinder diesel engine with diesel gen set	1

17	Rotary pump working for dismantling and assembling	2
18	Reciprocating pump working for dismantling and assembling	2
19	Induction Stove – 230 V	01
20	Beaker (consumable)	01
21	Thermometer Max 150 Deg C	01

**FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR
THE MODULES TT-I AND TT-II (COMMON FOR ALL ENGG. TRADES)**

01	Class Room Chairs (armless) / Dual desk may also be allowed	20 /10 nos.
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	20 /10 nos.
03	Chair for Trainer (armed) movable	1no.
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	1no.
05	LCD / LED Projector	1no.
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	1no.
08	White Board (6ft X 4 ft.)	1no.
09	LCD Projector Screen	1no.
10	Air Conditioner 1.5Ton (OPTIONAL)	02 nos.
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Laser Printer with scanner	01 no
14	Steel Cupboard with 8 pigeon lockers	3 nos.
15	Work bench for fitters with two vices of 100mm	2 nos.
16	Steel cupboard 180x90x45cm	2 nos.
17	Steel cupboard 120x60x45cm	2 nos.
18	Multi drawer tool rack trolley with minimum 4 drawers and 20 tool capacity	04 nos.
19	First aid box.	1no.
20	Vacuum Cleaner	01 No.

**LIST OF FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS FOR
AUDIO VISUAL LAB (COMMON FOR ALL ENGG. TRADES)**

01	Class Room Chairs (armless) / Dual desk may also be allowed	30 /15 nos.
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	30 /15 nos.
03	Chair for Trainer (armed) movable	01no.
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01no.
05	LCD Projector	01no.
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01no.
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	01 no.
10	Air Conditioner 1.5Ton (OPTIONAL)	02nos.
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Document Camra / Visualiser	01no.
14	Smart Board / Inter Active Board	01no.
15	Over Head Projector	01no.

16	Video Camera with stand	01no.
17	Printer cum Scanner	01no.