

SYLLABUS FOR THE TRADE

OF

**MECHANIC REPAIR & MAINTENANCE OF LIGHT
VEHICLES
(Semester Pattern)**

**UNDER
CRAFTSMAN TRAINING SCHEME (CTS)**

Designed in– 2013

By

Government of India

CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE

Directorate General of Employment & Training

Ministry of Labour & Employment

EN-81, Sector-V, Salt Lake City

Kolkata-700 091

**List of members attended the Trade Committee Meeting to finalise the draft syllabus for the trade of
" MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES Under C.T.S.**

Sl. No.	Name and Designation	Representing Organisation	Remarks
1	Sri M.S. Lingaiah, Director	CSTARI, Salt Lake, Kol.	<u>Chairman</u>
2	Sri P. K. Roy, Sr. Envr. Engineer	W.B.Pollution Control Board	Member
3	Sri T.S. Ramanathan, Dy. Manager (HRD)	CSC Ltd. Kolkata	Member
4	Kashi Nath Karmakar, Sr. Faculty Automobile Engineering	G.T.T.I. Sealdah Branch	Member
5	Maj.(Retd.) D.K.Ghosh, G.M.	Dewar's Garage Kolkata	Member
6	Mr. Debabrata Halder, Works Manager	Rolta Motor (Bajaj Auto) Kolkata	Member
7	Sri R. Senthil Kumar, JDT	CSTARS, Salt Lake, Kol.	Member
8	Sri T. Mukhopadhyay, DDT	CSTARS, Salt Lake, Kol.	Member
9	Sri A. Chakraborty, ADT	-DO-	Member
10	Sri P.K. Koley, T.O.	-DO-	Member
11	Sri A.B. Dhara. T.O.	-DO-	Member
12	Sri S.B. Sarder, T.O.	-DO-	Member

List of members attended the Workshop to finalize the syllabi of existing CTS into Semester Pattern held from 6th to 10th May'2013 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1.	R.N. Bandyopadhyaya, Director	CSTARI, Kolkata-91	Chairman
2.	K. L. Kuli, Joint Director of Training	CSTARI, Kolkata-91	Member
3.	K. Srinivasa Rao, Joint Director of Training	CSTARI, Kolkata-91	Member
4.	L.K. Mukherjee, Deputy Director of Training	CSTARI, Kolkata-91	Member
5.	Ashoke Rarhi, Deputy Director of Training	ATI-EPI, Dehradun	Member
6.	N. Nath, Assistant Director of Training	CSTARI, Kolkata-91	Member
7.	S. Srinivasu, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
8.	Sharanappa, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
9.	Ramakrishne Gowda, Assistant Director of Training	FTI, Bangalore	Member
10.	Goutam Das Modak, Assistant Director of Trg./Principal	RVTI, Kolkata-91	Member
11.	Venketesh. Ch. , Principal	Govt. ITI, Dollygunj, Andaman & Nicobar Island	Member
12.	A.K. Ghate, Training Officer	ATI, Mumbai	Member
13.	V.B. Zumbre, Training Officer	ATI, Mumbai	Member
14.	P.M. Radhakrishna pillai, Training Officer	CTI, Chennai-32	Member
15.	A.Jayaraman, Training officer	CTI Chennai-32,	Member
16.	S. Bandyopadhyay, Training Officer	ATI, Kanpur	Member
17.	Suriya Kumari .K , Training Officer	RVTI, Kolkata-91	Member
18.	R.K. Bhattacharyya, Training Officer	RVTI, Trivandrum	Member
19.	Vijay Kumar, Training Officer	ATI, Ludhiana	Member
20.	Anil Kumar, Training Officer	ATI, Ludhiana	Member
21.	Sunil M.K. Training Officer	ATI, Kolkata	Member
22.	Devender, Training Officer	ATI, Kolkata	Member
23.	R. N. Manna, Training Officer	CSTARI, Kolkata-91	Member
24.	Mrs. S. Das, Training Officer	CSTARI, Kolkata-91	Member
25.	Jyoti Balwani, Training Officer	RVTI, Kolkata-91	Member
26.	Pragna H. Ravat, Training Officer	RVTI, Kolkata-91	Member
27.	Sarbojit Neogi, Vocational Instructor	RVTI, Kolkata-91	Member
28.	Nilotpal Saha, Vocational Instructor	I.T.I., Berhampore, Murshidabad, (W.B.)	Member
29.	Vijay Kumar, Data Entry Operator	RVTI, Kolkata-91	Member

GENERAL INFORMATION

1. Name of the Trade : **MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES**
2. N.C.O. Code No. :
3. Duration of Craftsmen Training : 1 year (Two Semester)
4. Power Norms : 6KW
5. Space Norms : 280 sq. mtr.
(Vehicle parking in common garage)
6. Entry Qualification : Passed 10th class examination under 10+2 system of education with Science and Mathematics or its equivalent.
7. Unit strength : 16 (No. of Trainees)
8. Instructors Qualification : a) Diploma in Mechanical/Automobile Engg From recognized board of technical education with two years experience in the relevant field with LMV Driving license
OR
10th Passed + NTC/NAC in the Trade with 3 Years post qualification experience in the relevant field with LMV Driving license

b) Preference will be given to a candidate with Crafts Instructor Certificate (CIC)

* **Note:** At least one Instructor must have Degree/Diploma in Mechanical/Automobile Engg. when applied for 02 units.

TRADE: " MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES"

FIRST SEMESTER

Semester Code – MLV;SEM-I

Week No.	Trade Practical	Trade Theory	Engg. Drawing	Workshop Calculation & Science
1	Familiarization with institute, Importance of the trade-Machinery used in Trade. Types of work done by the students in the Institute-shop floor of the Institute.	Introduction to Central Outer Vehicle Acts & Rules. General introduction to the course-duration of the course & course content. Study of the Syllabus General Rules pertaining to the Institute Facilities available hostel, recreation and medical facilities library working hours-time table		
2.	Description of safety equipment their use safety rules to be observed in an Automobiles repair shop. Accident & their causes-up keep of fire extinguishers. Familiarization of the tools and machinery available in the shop. Their use and up-keep, importance of cleanness of workshop, tools, jacks, trays and horses.	Importance of safety & general precautions to be observed in the shop, fire extinguishers used for different types of fire storing & handling of inflammable materials elementary first aid. Different types of Fire Extinguishers used for different types of fires.	Introduction to Engineering Drawing & Blue print reading. Free hand sketching of straight lines, rectangles, squares and circles.	Common fractions, additions, subtraction multiplication & Divisions. Applied workshop problems involving fractions & vulgar fractions
3.	General servicing of vehicles washing, cleaning, oiling, greasing and lubrication of vehicle.	General description of motor vehicles-major assemblies-description location and function of	Free hand sketching of nuts bolts studs with dimensions from samples.	Properties of ferrous & non-ferrous metals and their

		each locking methods and devices used in vehicles hydraulic and screw jacks hydraulic hoist & air compressor-their description & uses.		
4 & 5	Inspection of under carriage of vehicle. Tightening all loose bolts & nuts-use of hydraulic jacks hoist and horses used in the shop selecting materials for packing cutting packing's and gaskets practice in use of locking devices such as lock nuts, cotter and split pins-keys, Circlip, lock rings, lock washers-wire, locking location where they are used.	-do-	Free hand sketching of solids and hollow bodies such as square rectangular, cylinder, rings and cones.	Brief description of manufacturing process of steel, copper & aluminium
6.	Removing wheels from vehicle, dismantling tyres and tubes checking puncture assembling inflating to correct pressure. Rotating the wheels in vehicle minor repairs to wheels and tyres.	Description of wheels and tyres-types selection of tyres, ply rating, inflation pressure and carrying capacity, storage of tyres.	Explanation of simple orthographic projection 1 st angle. Free hand sketching of tyres and wheels.	Metric system, met weight & measurement units used conversion from FPS to Metric system & vice versa.
7.	Inspection the frame checking alignment of frame servicing of spring replacing new bushes in shackle pins changing hushes in shock absorbers-cleaning & lubrication of wheel bearings, adjusting wheel bearings.	Frames-description and function common troubles conventional suspension system. Types of leaf springs used different types of shock absorbers. Their description operation & maintenance.	Exercise in simple orthographic projection.	Exercise involving metric and FPS
8.	Removing king pins and bushes replacing new bushes & plus after removing bushes & lubrication of king pin	Description of different types of independent suspension system,	Explanation of 3 rd angle projection. Free hand sketching of front axle assembly.	Shop problems in metric system.

	bushes in the front, independent suspension system.	special features in each system maintenance and lubrication of front suspension system.		
9 & 10	Inspection and overhaul front & rear suspension rear springs, coil spring torsion bars, check up main axle for alignment.	The front axle description & functions types of steering knuckles arrangement of steering knuckle joint general layout of steering linkages.	Views of simple hallow and solids bodies with dimensions sketching of steering linkages.	Meaning of tenacity, elasticity brittleness, hardness, compressibility and ductility examples of each
11.	Inspect and adjust steering linkages, after replacement of worn parts alignment of steering wheels with respect to front wheel, check and correct toe-in.	Description of different types of steering boxes (latest type of steering boxes), special features of each adjustments repair and maintenance of steering and boxes power steering description and its advantages.	Free hand sketching of different types of steering boxes	Effect of alloying elements and properties of cast iron and steel alloys.
12.	Inspect and overhaul steering boxes adjusting steering gear backlash, and end play check and adjust toe-in, camber angles checking king-pin angle & caster angle with special gauges. Inspect and overhauling of different types of power steering (Egg. Hydraulic and Electronic Power Steering)	Description of Ackerman's angle, caster, camber toe-in and toe-out on turns, purpose and effects of these angles.	Free hand sketching of caster, camber, king-pin angle. Ackerman's angle toe-in & toe-out.	Problems in steering geometry-calculation of caster, camber.
13.	Adjusting brake pedal play dismantling wheel break assembly cleaning and inspecting adjusting brake shoes for proper clearances, bleeding hydraulic brakes & Disk brakes.	Arrangement of brakes in cars and trucks-description of hand brakes, its purposes layout of mechanical and hydraulic breaking system in cars.	Free hand sketching of break linings wheel brake assembly sectioned views of master cylinder.	Square root of perfect square, square root of whole numbers and decimals relating to braking distance.

14.	Removing master cylinder, dismantling cleaning and inspection of parts-assembling and testing bleeding the braking system after cleaning the pipelines. Dismantling and Assembling of Vacuum Servo brakes.	Master cylinders-common troubles & remedy. Engine Exhaust brakes. T.B. Valves used in light vehicles.	-do-	Simple levers, problems related to as applied to motor vehicles.
15.	Dismantling wheel brake assembly removing old lining & fitting new lining on the brake shoe removing, cleaning of brake drums inspecting wheel cylinders & brake drums-fitting new cups and brake hosepipes, re-assembling adjusting wheel bearing ad testing adjusting all 4 wheel brakes.	Brake lining types of uses relining the brake shoes precautions to be observed wheel cylinders description function and types brake fluids. Description and use types of fluids used.	Free hand sketching of brake wheel cylinders cam adjuster, brake shoe assembly and anchor pins.	Meaning of friction examples of useful and wasteful friction in vehicles co efficient of friction-simple problems on friction
16 & 17	Trouble tracing in braking system of a vehicle adjusting brakes and balancing all four wheel brakes, precautions to be observed while testing brakes points to be remember while preparing the vehicle for brake certificate.	Brake testing efficiency of brakes braking distance, weight transference during braking a vehicle common trouble in brakes & their remedies.	Free hand sketching of the layout of the Air Brake system & sketching of slake adjuster. Free hand sketching the layout of vacuum assisted Hydraulic braking system.	Properties of matter molecules and atoms-atomic symbols and atomic number, simple chemical formula. Definition of mass unit of force weight of a Body energy and power
18.	Adjusting clutch pedal play removing gear box and clutch assembly from vehicle. Dismantling clutch assembly, cleaning inspecting parts.	Layout of transmission system description of single plate clutch different types of clutches used in vehicle. Study of Hydraulic clutches.	Isometric drawings of simple objects such as square, and rectangular blocks with grooves key ways.	Shop problems on force- work done energy and power.
19.	Removing & fitting of new pilot bearing, removing & fitting of ring gear in fly wheel relining a clutch plate	Clutch linings types materials used bonded & riveted lining clutch plate	Isometric view of clutch pedal clutch release bearing fork and clutch plate free hand	Shop problems on force, work done energy and power

	checking condition of flywheel and pressure plate surface for reconditioning.	constructions, purpose of damper spring precautions while relining a clutch plate.	sketching of clutch assembly.	
20.	Assembling of pressure plate adjusting the fingers checking run out of fly wheel and aligning clutch assembly with flywheel.	Fluid coupling description operation & advantage of using fluid coupling common troubles and remedy.	-do-	Applied problems on work, energy & power.
21 & 22	Dismantling a synchromesh gear box, cleaning, inspecting parts replacing worn out defective parts assembling & testing for correct performance identifying noises from gear boxes and rectifying.	Synchromesh gear box advantages description, operation in different gear positions common trouble and remedy types of synchromesh gearboxes their special features. Study about overdrives. Transfer cause used in 4 wheel drive vehicles.	Free hand sketching of the arrangement of gears inside the sliding mesh gear box in different gear position.	Explanation of horse power and indicated horse power electrical equivalent of H.P.
23.	Dismantling cleaning and assembling of gear shift mechanism changing oil in gear box studying gear ratios in the gear box.	Lubrication of gearbox constant mesh gearbox description and advantages.	Free hand sketching of shifter mechanism and hear shift lever.	Applied problems in horsepower calculation of speed ratios in 4-speed gearbox & 25 speed gear box.
24.	Removing open type propeller shaft from vehicle, removing universal joints cleaning replacing worn out parts, re-assembling & refitting to vehicle-special precautions while removing torque tube drive shaft.	Universal joints and propeller shaft-open and closed type propellers shaft types of universal joints, care and maintenance-constant velocity joints special and advantages.	Use of drawing instruments T-square and drawing boards-construction of simple figures.	Ratios and proportions, simple problems gear ratios in gear box & rear axles.

	Removing rear brake drums and adjusting the wheel bearings in full floating rear axles & semi floating axles, replacing oil seals in rear axles.	Description and purpose of different types of rear axles special features and advantages in each type lubrication of rear axles-reasons for oil in brake drum.	Construction of simple solid figures with dimensions and titles use of different types of scales.	
25	Project work / Industrial visit (Optional)			
26	Examination			

TRADE: MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES

SECOND SEMESTER

Semester Code: MLV;SEM- II

Week No.	Trade Practical	Trade Theory	Engg. Drawing	Workshop Calculation & Science
1.	Removing rear axle assembly from vehicle, dismantling, cleaning, inspecting parts for wear and damage, cutting packing's/gaskets- removing tail pinion and bearings cleaning and inspection of oil-seals and bearings.	Description & functions of final drive assembly-crown wheel and tail pinion hypoid gear and its lubrication descriptions of differential and its principle of operation.	Free hand sketching of different types of rear axles.	Calculations of areas of square, rectangular, triangles, circles & regular polygons
2.	Checking tooth contact in crown land pinion and adjusting back-lash-assembling the rear axle assembly on vehicles and testing.	Description and function of differential gears types tooth contact and back lash, preloading adjustment. Common troubles and their remedy in rear axle assembly.	Free hand sketching of universal joints, silencer brackets and spring shackles.	-do-
3.	Trouble shooting in the transmission system of vehicle detecting noises from clutch, gear box, universal joints and rear axle assembly dismantling transfer case from vehicle, cleaning, inspecting replacing worn parts, reassembling & fitting to vehicle.	Description & purpose of optional fittings such as transfer case free wheel power take off common troubles in these unit and their remedy care and maintenance.	-do-	Calculation of volume of square, rectangular and conical blocks volume of cylinders solid and hollow.
4.	Dismantling of unserviceable engine cleaning studying the parts in the engine and reassembling the engine practice in the use of correct tools and right procedure.	Description of internal and external combustion engines, different types of I.C. engines. Important working parts in the engine, the 4-stroke cycle of operation.	Free hand sketching of 4 stroke cycles and 2 stroke cycles.	Calculation of volumes and weight of cubes, hexagonal prisms shop problems.
5.	Dismantling an un-serviceable engine, cleaning of parts in the engine, measuring of cylinder bore-crank pins main journals pistons studying valve	Two-stroke cycle operation difference between 4 stroke & 2 stroke cycle engines. Description of valve operating mechanism &	-do-	-do-

	operating mechanism.	valve timing description and function of valve spring guide tappets, valve seals and locks.		
6.	Checking compression pressure in a running engine dismantling the cylinder head from the engine, decarbonising the cylinder head, removing the valves cleaning re assembling and adjusting tappets.	Description & function of cylinder block-cylinder head cylinder liners reconditioning of cylinder heads.	Drawing of 3 views of stepped & taper blocks in 3 rd angle projection.	Calculations of cylinder wear ovality taper and compression ratios problems on compression ratios.
7.	Removing pistons and connecting rods from engine, dismantling, cleaning, inspecting, checking clearances installing rings and pistons pins.	Description & functions of different types of pistons, piston rings and piston pins common troubles and remedy.	-do-	Center of gravity examples problems involving center of gravity in vehicles.
8.	Removing connecting rod assembly, cleaning & checking bearing clearances, replacing bearing shells, setting correct clearances. Measuring wear in crank pins and main journals in crank shaft.	Description & functions of connecting rod. Materials used for connecting rods-big end and main bearings shells piston pins and locking methods of piston-pins crank shaft description function & types common trouble & remedy.	Drawing of plan, elevation and side views of tapered hollow objects.	Heat and temperature thermometers centigrade & Fahrenheit scales their conversion. Use of temperature measuring instruments their description & uses.
9.	Assembling crankshaft, main bearings, connecting rods and piston assembly in the engine, fitting cylinder head and starting the engine and tuning up engine for smooth slow speed running with the help of using torque wrench, at proper torque & sequence.	Firing order of the different types engine and crank shaft balancing description of the fly wheel and its function crank case and oil sump.	-do-	-do-
10.	Checking cooling system for overheating cleaning radiators, dismantling, cleaning, assembling and testing water pump, reverse flushing the system and adjusting the fan belt tension.	Engine cooling methods air & water-cooling radiators, pump, thermostats and fan, their description, function care and maintenance reasons for engine overheating.	Drawing the 3 views in 3 rd angle projection of a curved objects.	Geometry properties of angles, triangles and circles.

11.	Studying the lubrication oil flow system in engine, overhauling oil filters, oil pump and setting the pressure release valve for correct oil pressure maintenance and repairs in the lubrication system in engine.	Need for lubrication of engine parts-friction lubrication oil and its properties, lubrication system types full flow and by pass flow system, components in lubrication system oil filters and pumps, types their special features and uses.	Free hand sketching of oil filters oil flow circuits oil pumps.	Properties of angles, triangles, circles contd.
12.	Simple repairs in fuel feed system overhauling of petrol pump, carburetors, fuel filters & air cleaners.	Fuel feed system in motor vehicles description and layout of the system description, operation, maintenance of fuel pump & fuel injector's filters and carburetors. Study of Diesel fuel supply systems, FIP timing setting, Injector testing, Diesel fitter changing Air bleeding from Diesel supply system, Engine Idling speed adjusting. Study about CRDI (Common Rail Diesel Injector System) Study about LPG and CNG driving vehicles. Study about vehicle Air-conditioning.	-do-	-do-
13.	Repairs to solex and S.U. carburetors adjusting float level and slow speed adjustments studying the flow circuit in carburetors. Function of E.C.M. system & sensors	Types of carburetors special features advantages different adjustments & their purposes. Types of sensors	Reading of simple Blue Prints.	Reading of simple graphs.
14.	Practice in engine up in a vehicle-testing vacuum and compression of engine, adjusting tappets setting, ignition timing & adjusting	Explanation of engine tunes up job-description of compressions & vacuum testing description of ignition	Exercise in Blue Print Reading.	Plotting and reading of simple Blue Prints.

	carburetors for slow speeds by using of tachometer.	timing setting and slow speed adjustment.		
15.	Practice in joining wires and soldering forming simple electrical circuits measuring of current, voltage & resistance cleaning and topping up of a lead acid battery testing battery with hydrometer-cell tester, connecting battery to charge.	Simple electrical circuit, series & parallel, circuits identification of alternating current and direct/current meters insulators conductors types of resistance-ohm's law and its application common electrical terms and symbols primary and secondary cells lead acid battery description construction common troubles and remedy.	Free hand sketching of electrical symbols and drawing of simple electrical circuits.	Electricity and its effects static & dynamic electricity – AC & DC differences
16.	Studying electrical circuit in the engine assembly checking loose open and short circuits cleaning and testing spark plugs-overhauling of distributor assembly checking and setting ignition timing.	Description of electrical circuits-ignition system and the components purpose of induction coil, condenser, spark plugs common troubles in ignition circuit & remedy.	Free hand sketching of ignition circuit of a vehicle sketching the circuit line diagram of magneto ignition.	Magnets natural and artificial types poles of magnets Magnetic fields.
17.	Removing dynamo alternators from vehicle, dismantling cleaning, checking for defects, assembling and testing for motoring action of dynamo & fitting to vehicles. Study of wiring harness of 1 or 2 E.C.M. system(Euro – II vehicle), Octane No. & Ucten No.	Description of charging circuit operation of dynamo alternatives regulator unit ignition warning lamp troubles and remedy in charging system.	Free hand sketching of charging system.	Definition of ampere, volt and ohm-units of ampere, volt ohm, ohm's law.
18.	Removing starter motor from vehicle and overhauling the starter motor testing of starter motor.	Description of starter motor circuit constructional details of starter motor solenoid switches, common troubles and remedy in starter circuit.	Sketching starter motor circuit and solenoid switch circuit.	Calculations based on Ohm's.
19.	Practice on unserviceable diesel engine-removing jammed nuts, broken studs	History & Development of compression ignition engines classification of	Free hand sketching of combustion chambers of different	Lubricants types special purpose viscosity effects

	and reconditioning damaged threaded holes-removing cylinder head connecting rods, and pistons cleaning, inspecting and refitting them	C.I. Engine Advantages and disadvantages over petrol engines, constructional details of single and multi-cylinder engines.	types.	of temperature on viscosity high detergent oil and its applications.
20.	Practice in starting & stopping of vehicle engines, general maintenance of engines-checking oil, fuel, water levels and accessories of diesel engines.	The four stroke and two stroke diesels- Engine-uni-flow and loop scavenging constant volume cycles the diesel cycle, indicator-diagrams.	Free hand sketching of four stroke cycles and two stroke cycle engines.	Lubricants types, viscosity and effects of temperature on viscosity high detergent oils and their application
21.	Bleeding fuel lines for air locks repairing fuel leaks in the pipe lines and unions cleaning of oil and air filters in diesel engines.	Fuel used in diesel engines, specification of diesel fuels, importance of clean fuel, Air fuel ratio, general layout of the fuel feed system in diesel engines.	Free hand sketching of diesel fuel feed system and fuel filters.	Gears & belt drives, problems on gear and belt drive.
22.	Cleaning and servicing of primary fuel filters and pressure stage filters, removing feed pump dismantling cleaning, re-assembling, re-fitting and testing the feed pump.	Types of CRDI system fuel injection systems air injection & airless injection fuel feed pumps description, operation-common troubles and remedy.	Free hand sketching of diesel fuel feed system and fuel filters.	Gears and belt drives, problems on gear and belt torque definition its relation to forces on engine mounting, steering gear box and torque wrench.
23.	Dismantling an unserviceable fuel injection pump, cleaning inspecting, studying parts and reassembling. Removing F.I. pumps from running engine changing oil in fitting back to engine, testing the governor & setting injection timing.	Fuel injection pumps description & operation types adjustments in the pumps phasing and calibration of pumps checking and fixing injection-timing governors types their description and operation starting and adjusting slow speed.	Free hand sketching of components from assembly's fuel pumps.	Inclined plane its uses examples and applied problems
24.	Testing injectors for missing on the vehicle removing dismantling, cleaning, inspecting replacing defective parts reassembling	Injector nozzles types description, operation testing of injector's special features of pintle nozzles.	Free hand sketching of fuel injectors of different types.	Screws and screw jacks problems on screw jacks.

	the injectors and testing them. Demonstrating retrofitting of vehicles CNG & LPG system Euro II, III, IV,	Emission standard, Catalyzing converter, noise pollution, Battery operated vehicle, Hy-bridge vehicle		
25	Revision			
26	Examination			

TRADE: “MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES”**LIST OF TOOLS AND EQUIPMENTS****A. TRAINEES TOOL KIT FOR 16 TRAINEES +1 INSTRUCTOR**

Sl.No.	Description	Quantity
1.	Hammer ball Peen 0.75 Kg.	17 Nos.
2.	Chisel Cold Flat 19 mm.	17 Nos.
3.	Centre Punch 10 mm. Dia x 100 mm.	17 Nos.
4.	Steel Rule 15 cm English and Metric	17 Nos.
5.	Screw Driver 30 cm x 9 mm. Blade	17 Nos.
6.	Screw Driver 20 cm x 9 mm. Blade	17 Nos.
7.	Spanner DE Set of 12 pieces (6 mm. - 32 mm.)	17 Nos.
8.	Plier Combination 15 cm	17 Nos.
9.	Hand File 20 cm second cut	17 Nos.
10.	Feeler gauge 20 blades (Metric)	17 Nos.
11.	Ring spanner set of 12 pieces (6 mm. - 32 mm.)	17 Nos.
12.	Steel tool box with Lock and Key (folding type) size 400 x 200 x 150 mm.	17 Nos.
13.	Allen Key set of 12 pieces (2 mm.-14 mm.)	5 sets
14.	Circlip Plier (Ext. and Int.) 150 mm. And 200 (two each)	9 sets
15.	Philips screw driver type set of 5 pieces 100 mm. - 300 mm.	5 sets

B. GENERAL SHOP OUTFIT

SL. NO.	Name of the items	For instructor	For Trainees
1	Rule Steel 300 mm	1no.	2 nos.
2	Divider Spring Joint 150 mm	1no.	2 nos.
3	Prick Punch 15 cm	1no.	2 nos.
4	Chisel cross cut 200 mm X 6 mm	1no.	1no.
5	Hammer Ball Peen 0.5 kg	1no.	2 nos.
6	Hammer copper 1 kg with handle	1no.	1no.
7	Engineering square 15 cm blade	1no.	2 nos.
8	Scriber 15 cm	1no.	2 nos.
9	Scriber block Universal	1no.	1no.
10	Marking out tables 90 x 60 x 90 CM (high)	1no.	1no.
11	Surface Plate 60 X 60 cm	1no.	1no.
12	Hacksaw frame for 30 cm blade	1no.	4 nos.
13	‘V’ Block 75 X 38 mm pair with clamps	1no.	2 nos.
14	Punch Hollow 6, 7, 8, 9, 10.5 and 12 mm set	1no.	1 set
15	Punch figure set 3 mm	1no.	1 set
16	Punch letters set 3 mm	1no.	1 set
17	Hand vice 37 mm	1no.	2 nos.
18	Screw Driver Electrician type 15 cm size	1no.	2 nos.
19	File, flat 35 cm bastard	1no.	2 nos.
20	File, flat 25 cm second cut	1no.	2 nos.
21	File, flat 20 cm smooth	1no.	2 nos.

22	File, flat safe edge 25 cm smooth	1no.	2 nos.
23	File, triangular 15 cm second cut	1no.	2 nos.
24	File, half round 20 cm second cut	1no.	2 nos.
25	File, square 30 cm rough	1no.	2 nos.
26	File, square 20 cm second cut	1no.	2 nos.
27	Twist Drill, metric 3 mm to 12 mm (1 mm step)	1no.	1 set
28	Tape and dies complete set in box B.A., B.S.W., B.S.F., American and metric with handle	1no.	2 set
29	Hand reamer, adjustable 10.5 mm to 11.25 mm, 11.25 to 12.75 mm, 12.75 mm to 14.25 mm, and 14.25 mm to 15.75 mm	1no.	1 set
30	Scraper flat 25 cm	1no.	1no.
31	Scraper triangular 25 cm	1no.	1no.
32	Scraper half round 25 cm	1no.	1no.
33	Sets of Morse socket MT 0-1, 1-2, and 2-3	1no.	1no.
34	Micrometer outside 25 – 50 mm	1no.	1no.
35	Micrometer outside 0 – 25 mm	1no.	1no.
36	Micrometer outside 50-57 mm	1no.	1no.
37	Micrometer outside 75 – 100 mm	1no.	1no.
38	Micrometer inside 50 to 75 mm and 150 mm and 25 mm to 50 mm	1no.	1 each
39	Vernier Caliper set 250 or 200 mm inside, outside and depth	1no.	1no.
40	Safety goggles	1no.	2 pairs
41	Hammer, planishing	1no.	1no.
42	Setting hammer	1no.	1no.
43	Mallet (Wooden)	1no.	1no.
44	Trammel 30 cm	1no.	1no.
45	Blow Lamp 0.5 litre	1no.	1no.
46	Soldering iron 120 watts	1no.	2 nos.
47	Soldering iron Copper 225 gms (fire heated) 150 mm and 200 mm	1no.	2 nos.
48	Pliers nose (round and straight) 150 mm and 200 mm	1no.	2 each
49	Pliers nose (round and straight) 150 mm and 200 mm	1no.	1 no.
50	Spanners double ended set of 12 metric sizes 6 to 32 mm	1no.	1 set
51	Spanner off-set double ended set of 7 Pds. (6 mm to 17 mm)	1no.	1 set
52	Double open ended ignition spanner set of 5 (0 to 9 mm)	1no.	4 set
53	Spanners adjustable 20 cm	1no.	1 set
54	Spanner Ring off-set of 6 (SAE)	1no.	1 set
55	Spanner for sparking plug 14 mm	1no.	1 set
56	Magneto spanner set of 8 spanners	1no.	1 set
57	Spanner socket set 6-32 mm sockets (complete set)	1no.	2 nos.
58	Spanner T.Flex for screwing up and unscrewing in inaccessible position	1no.	1no.
59	Double open ended Tappet spanner	1no.	1set
60	Drift copper 10 mm dia X 150 mm	1no.	2 nos.
61	Spray Gun – Kerosene	1no.	1no.

62	Pressure Grease Gun	1no.	1no.
63	Chain Pulley Block – 3 ton capacity	1no.	1no.
64	Tray cleaning 45 X 30 cm	1no.	16 nos.
65	Drilling machine (bench) 12 mm dia.	1no.	1no.
66	Oil can 0.5 litre	1no.	1no.
67	Lifter, Valve spring	1no.	1no.
68	Tool, Valve grinding, suction type (consumable tool)	1no.	6 nos.
69	Valve seat cutting tools complete with Guides and Pilot bar (all angles) in Box	1no.	1set
70	Extractor, Stud Ezy out type	1no.	1no.
71	Compression gauge to read 17.6 kg/Sq cm	1no.	1no.
72	Vacuum gauge 0 to 75 cm	1no.	1no.
73	Stone, Carborandum 15 X 5 X 3.75 cm rough and smooth	1no.	2 nos.
74	Cylinder Dial Gauge	1no.	1set
75	Torque wrench (0 to 67.5 Kg. Meter) set of 3	1no.	1 no.
76	Work bench 240 X 120 X75 cm with 4 vices 12.5	1no.	4 nos.
77	Lockers with 8 drawers (standard size)	1no.	2 nos.
78	Metal rack 180 X 150 X 45 cm	1no.	1no.
79	Fuel pump (old for practice)	1no.	2 nos.
80	Distributor (old for practice)	1no.	2 nos.
81	Carburetor (two different types)	1no.	2each
82	Water Pump and Oil Pump	1no.	1each
83	Filing jig for adjusting the piston ring gap	1no.	1no.
84	Steel almirah 180 X 90 X 50 cm	1no.	1no.
85	Black Board 180 X 90	1no.	1no.
86	Desk or table 90 X 60 cm (for Instructor)	1no.	1no.
87	Fire Extinguisher	1no.	2 nos.
88	Fire buckets with stand	1no.	4 nos.
89	Tachometer	1no.	1no.
90	Lifting Jack Screw type	1no.	1no.
91	Tester sparking plug “NEON” Type	1no.	1no.
92	Compressor Air piston type (vehicular)	1no.	1no.
93	Wheel alignment gauge – magnetic type with turn tables	1no.	1no.
94	Sectionised engine gear box and differential mounted on chassis	1no.	1no.
95	Brake Assembly, master cylinder, wheel cylinder and servo	1no.	1no.
96	Vacuum assisted hydraulics brake assembly with vacuum booster	1no.	1no.
97	Airbrakeassembly	1no.	1no.
98	Brake lining riveting machine (foot operated)	1no.	1no.
99	Clutches, different types such as Cone type disc type diaphragm type etc	1no.	1no.
100	Axle, Gear Boxes, steering boxes fount axle assembly independent front wheel spring assembly	1no.	1no.
101	Full floating axle and semi – floating axle assembly	1no.	1each
102	Steering Assembly – Rack and Pinion type	1no.	1no.

103	Steering Assembly – Rack and Pinion type	1no.	1no.
104	Spring tension scale – 0 –4.5 Kg	1no.	1no.
105	Valve spring compressor	1no.	1no.
106	Carburetor repair tool Kit	1no.	1no.
107	Puller set steering wheel universal	1no.	1no.
108	Puller set universal bearing and bushes	1no.	1set
109	Lifting jack, screw type	1no.	4 nos.
110	Coil spring compressor for suspension spring	1no.	1no.
111	Hot patch clamp	1no.	2 nos.
112	Piston ring compressor	1no.	2 nos.
113	Valve key inserter	1no.	1no.
114	Wall charts (driving instructions)	1no.	1no.
115	Connecting rod alignment fixture	1no.	1no.
116	Valve refacer	1no.	1no.
117	Piston ring expander	1no.	1no.
118	High rate discharge tester	1no.	1no.
119	A.V.O.Meter /Digital Millimeter	1no.	1no.
120	Pneumatic tools	1no.	1set
121	Impact Screw Driver	1no.	1set
122	General purpose puller	1no.	1set
123	Stud Extractor	1no.	1set
124	Spring Pliers 150, 200 mm	1no.	1set
125	Torque Wrench (set of three nos)	1no.	1set
126	Growler	1no.	1no.
127	Battery Charger	1no.	1no.
128	Timing light	1no.	1no.
129	Hydrometer	1no.	1no.
130	Continuity meter	1no.	1no.
131	Tyre Changer	1no.	1no.
132	Sound Meter	1no.	1no.
133	Gas Analyzer	1no.	1no.
134	Smoke Meter – with Engine r.p.m. & Temp. Sensor	1no.	1no.
135	4- gas analysis with temp. & Engine r.p.m. Sensors.	1no.	1no.

LIST OF OPTIONAL TOOLS AND EQUIPMENTS, SHOULD BE PROCURED IF POSSIBLE

1. Car Washer with detergent and steam mixed facility.
2. V.C.R./V.C.P. along with the Video Cassettes in the field of Mechanic Motor Vehicle.
3. Engine Tuning Equipments, such as Exhaust Gas, analyzer, Duel Angle. Tester etc.
4. Car Air Conditioning Model.
5. Disc Break Model
6. Engine Model with Petrol Injection.
7. Engine Model equipped with Electronic Ignition System.
8. Car Scanner
9. Illuminated Magnifier 10 X

C. GENERAL MACHINERY

Sl. No.	Description	Quantity
1	Grinder with two 7" wheel capacity	1 no.
2	Arbor press & operated 1 ton capacity	1 no.
3	Light Motor Vehicle in running condition (Diesel) (Indian make)	1 no.
4	Motor Car (Petrol) in running condition (Indian make)	1 no.
5	Petrol engine running condition (Car type) (Indian make)	2 nos.
6	Diesel engine running condition (Vehicle type)	2 nos.
7	Spark plug cleaning and tester equipment	1 set
8	Air compressor – 2 stage – 500 liter with 5 HP motor and air recover	1 no.
9	Car washer – Reciprocating type electrically operated with 5 HP motor – 222 liter tank	1 no.
10	Hydraulic Hoist	1 no.
11	I.P.G. / C.M.G. Retro-fitting Kit (for Dens ant type)	1 no.

D. WORKSHOP FURNITURE

Sl. No.	Description	Quantity
1	Discussion Table	1 No.
2	Tool Cabinet	2 Nos.
3	Trainees locker	Required to accommodate 16 lockers
4	Book shelf (glass panel)	1 No.
5	Storage Rack	2 Nos.
6	Storage shelf	2 Nos.
7	Computer table	1 No.
8	Computer chair	2 Nos.
9	Printer table	1 No.
10	Online UPS 2KVA	1 No.

N.B.: - The subject of Social Studies is common for all Trades is not incorporated in this syllabus