

**Syllabus**

**For the Trade**

**Of**

**MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES**

UNDER CTS

**2005**

Designed by:-

Government of India  
Ministry of Labour (DGE&T)  
**Central Staff Training And Research Institute**  
EN Block, Sector-V, Salt Lake City,  
Kolkata-700 091.

**LIST OF MEMBERS ATTENDED TRADE COMMITTEE MEETING**

<b>Sl. No.</b>	<b>Name</b>	<b>Office</b>	
1	Sri M.S. Lingaiah, Director	CSTARI, Salt Lake, Kol.	<b><u>Chairman</u></b>
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

## **GENERAL INFORMATION**

1. Name of the Trade : Mechanic Repair & Maintenance of Light Vehicles.
  
2. N.C.O. Code No. :
  
3. Duration : One Year
  
4. Entry Qualification : Passed Class 10<sup>th</sup> Exam. Under 10 + 2 System of Education or its Equivalent.
  
5. Workshop Space : 30 X 60 ft.

**WEEK – WISE BREAK-UP OF CURRICULUM**

**NAME OF THE CTS COURSE: MECHANIC REPAIR & MAINTENANCE OF LIGHT VEHICLES**

**DURATION: ONE YEAR**

<b>Week No.</b>	<b>Practical</b>	<b>Theory</b>	<b>Engg. Drawing</b>	<b>W/Cal. &amp; Science</b>
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 Extinguishes 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 each locking methods and devices used in vehicles hydraulic and screw jacks hydraulic hoist & air compressor- their description & uses.	Free hand sketching of nuts bolts studs with dimensions from samples.	Properties of ferrous & non-ferrous metals and their 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 packings cutting packings and gaskets practice in use of locking devices such as lock nuts, cotter and split pins-keys, circlips, 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 & aluminum.
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 <sup>st</sup> 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 bushes 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 units.
8.	Removing king pins and bushes replacing new bushes & plus after removing bushes & lubrication of king pin bushes in the front, independent suspension system.	Description of different types of independent suspension system, special features in each system maintenance and lubrication of front suspension system.	Explanation of 3 <sup>rd</sup> angle projection. Free hand sketching of front axle assembly.	Shop problems in metric 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 hollow 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 slacke 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 checking condition of flywheel and pressure plate surface for reconditioning.	Clutch linings types materials used bonded & riveted lining clutch plate constructions, purpose of damper spring precautions while relining a clutch plate.	Isometric view of clutch pedal clutch release bearing fork and clutch plate free hand sketching of clutch assembly.	Shop problems on force, work done energy and power.
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 troque 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.
25.	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.	-do-

26.	Removing rear axle assembly from vehicle, dismantling, cleaning, inspecting parts for wear and damage, cutting packings/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.
27.	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-
28.	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.
29.	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.
30.	Dismantling an un-serviceable engine, cleaning of parts in the engine, measuring of cylinder bore-crank pins main journals pistons studying valve operating mechanism.	Two-stroke cycle operation difference between 4 stroke & 2 stroke cycle engines. Description of valve operating mechanism & valve timing description and function of valve spring guide tappets, valve seals and locks.	-do-	-do-
31.	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 <sup>rd</sup> angle projection.	Calculations of cylinder wear ovality taper and compression ratios problems on compression ratios.



32.	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.
33.	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.
34.	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-
35.	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 <sup>rd</sup> angle projection of a curved objects.	Geometry properties of angles, triangles and circles.
36.	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.

37.	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-
38.	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.
39.	Practice in engine up in a vehicle-testing vacuum and compression of engine, adjusting tappets setting, ignition timing & adjusting carburetors for slow speeds by using of tachometer.	Explanation of engine tunes up job-description of compressions & vacuum testing description of ignition timing setting and slow speed adjustment.	Exercise in Blue Print Reading.	Plotting and reading of simple Blue Prints.
40.	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.

41.	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.
42.	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.
43.	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.
44.	Practice on unserviceable diesel engine-removing jammed nuts, broken studs and reconditioning damaged threaded holes-removing cylinder head connecting rods, and pistons cleaning, inspecting and refitting them	History & Development of compression ignition engines classification of C.I. Engine Advantages and disadvantages over petrol engines, constructional details of single and multi-cylinder engines.	Free hand sketching of combustion chambers of different types.	Lubricants types special purpose viscosity effects of temperature on viscosity high detergent oil and its applications.
45.	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.
46.	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.

47.	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.
48 & 49.	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.
50.	Testing injectors for missing on the vehicle removing dismantling, cleaning, inspecting replacing defective parts reassembling the injectors and testing them.	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.
51.	Demonstrating retrofitting of vehicles CNG & LPG system Euro II, III, IV,	Emission standard, Catalyzing converter, noise pollution, Battery operated vehicle, Hy-bridge vehicle	Revision	Revision
52.	TRADE TEST	TRADE TEST	TRADE TEST	TRADE TEST

**LIST OF TOOLS & EQUIPMENT FOR A BATCH OF UNIT OR 16 TRAINEES**

<b>Sl.No</b>	<b>Trainee's Kit</b>	<b>For Instructor</b>	<b>For trainees</b>
1	2	3	4
1.	Hammer Ball Peen 0.75 kg	1	16
2.	Chisel Cold Flat 19 mm	1	16
3.	Center Punch 10 mm dia X 100 mm	1	16
4.	Steel Rule 15 cm English and Metric	1	16
5.	Screw Driver 30 cm X 9 mm blade	1	16
6.	Screw Driver 20 cm X 9 mm blade	1	16
7.	Spanner D.E. Set of 12 pieces (10 mm – 32 mm)	1	16
8.	Pliers Combination 15 cm	1	16
9.	Hand file 20 cm second cut	1	16
10.	Feeler gauge 20 blades (metric)	1	16
11.	Ring spanner set of 12 pieces (10 mm – 32 mm)	1	16
12.	Steel tool box with Lock and Key (folding type) size 400 X 200 X 150 mm	1	16
13.	Allen Key set of 12 Pcs. (2 mm – 14 mm)	1	4 sets
14.	Circlip Piler (Ext. & Int.) 150 mm and 200 (two each)	1	8 sets
15.	Philips Screw Driver Type set of 5 Pieces 100 mm – 300 mm	1	4 sets

**TOOLS, MEASURING INSTRUMENTS AND GENERAL SHOP OUTFIT**

<b>Sl.No</b>	<b>Trainee's Kit</b>	<b>For Instructor</b>	<b>For trainees</b>
1	2	3	4
1	Rule Steel 300 mm	1	2
2	Divider Spring Joint 150 mm	1	2
3	Prick Punch 15 cm	1	2
4	Chisel cross cut 200 mm X 6 mm	1	1
5	Hammer Ball Peen 0.5 kg	1	2
6	Hammer copper 1 kg with handle	1	1
7	Engineering square 15 cm blade	1	2
8	Scriber 15 cm	1	2
9	Scriber block Universal	1	1
10	Marking out tables 90 x 60 x 90 CM (high)	1	1
11	Surface Plate 60 X 60 cm	1	1
12	Hacksaw frame for 30 cm blade	1	4
13	'V' Block 75 X 38 mm pair with clamps	1	2
14	Punch Hollow 6, 7, 8, 9, 10.5 and 12 mm set	1	1 set
15	Punch figure set 3 mm	1	1 set
16	Punch letters set 3 mm	1	1 set
17	Hand vice 37 mm	1	2
18	Screw Driver Electrician type 15 cm size	1	2
19	File, flat 35 cm bastard	1	2
20	File, flat 25 cm second cut	1	2
21	File, flat 20 cm smooth	1	2
22	File, flat safe edge 25 cm smooth	1	2
23	File, triangular 15 cm second cut	1	2

24	File, half round 20 cm second cut	1	2
25	File, square 30 cm rough	1	2
26	File, square 20 cm second cut	1	2
27	Twist Drill, metric 3 mm to 12 mm (1 mm step)	1	1 set
28	Tape and dies complete set in box B.A., B.S.W., B.S.F., American and metric with handles	1	2 sets
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	1	1 set
30	Scraper flat 25 cm	1	1
31	Scraper triangular 25 cm	1	1
32	Scraper half round 25 cm	1	1
33	Sets of Morse socket MT 0-1, 1-2, and 2-3	1	1
34	Micrometer outside 25 – 50 mm	1	1
35	Micrometer outside 0 – 25 mm	1	1
36	Micrometer outside 50-57 mm	1	1
37	Micrometer outside 75 – 100 mm	1	1
38	Micrometer inside 50 to 75 mm and 150 mm and 25 mm to 50 mm	1	1 each
39	Vernier Caliper set 250 or 200 mm inside, outside and depth	1	1
40	Safety goggles.	1	2 pairs
41	Hammer, planishing	1	1
42	Setting hammer	1	1
43	Mallet (Wooden)	1	1
44	Trammel 30 cm	1	1
45	Blow Lamp 0.5 litre	1	1
46	Soldering iron 120 watts	1	2
47	Soldering iron Copper 225 gms (fire heated) 150 mm and 200 mm	1	2
48	Pliers nose (round and straight) 150 mm and 200 mm	1	2 each
49	Snip straight 250 mm	1	1
50	Spanners double ended set of 12 metric sizes 6 to 32 mm	1	1 set
51	Spanner off-set double ended set of 7 Pds. (6 mm to 17 mm)	1	1 set
52	Double open ended ignition spanner set of 5 (0 to 9 mm)	1	4 sets
53	Spanners adjustable 20 cm	1	1 set
54	Spanner Ring off-set of 6 (SAE)	1	1 set
55	Spanner for sparking plug 14 mm	1	1 set
56	Magneto spanner set of 8 spanners	1	1 set
57	Spanner socket set 6-32 mm sockets (complete set)	1	2
58	Spanner T.Flex for screwing up and unscrewing in inaccessible position	1	1
59	Double open ended Tappet spanner.	1	1 set
60	Drift copper 10 mm dia X 150 mm	1	2
61	Spray Gun – Kerosene	1	1
62	Pressure Grease Gun	1	1
63	Chain Pulley Block – 3 ton capacity	1	1
64	Tray cleaning 45 X 30 cm	1	16
65	Drilling machine (bench) 12 mm dia.	1	1
66	Oil can 0.5 litre	1	1
67	Lifter, Valve spring	1	1
68	Tool, Valve grinding, suction type (consumable tool)	1	6
69	Valve seat cutting tools complete with Guides and Pilot bar (all angles) in Box	1	1 set
70	Extractor, Stud Ezy out type	1	1
71	Compression gauge to read 17.6 kg/Sq cm	1	1

72	Vacuum gauge 0 to 75 cm	1	1
73	Stone, Carborandum 15 X 5 X 3.75 cm rough and smooth	1	2
74	Cylinder Dial Gauge	1	1 set
75	Torque wrench (0 to 67.5 Kg. Meter) set of 3	1	1
76	Work bench 240 X 120 X75 cm with 4 vices 12.5	1	4
77	Lockers with 8 drawers (standard size)	1	2
78	Metal rack 180 X 150 X 45 cm	1	1
79	Fuel pump } old for practice	1	2
80	Distributor }	1	2
81	Carburetor (two different types)	1	2 each
82	Water Pump and Oil Pump	1	1 each
83	Filing jig for adjusting the piston ring gap	1	1
84	Steel almirah 180 X 90 X 50 cm	1	1
85	Black Board 180 X 90	1	1
86	Desk or table 90 X 60 cm (for Instructor)	1	1
87	Fire Extinguisher	1	2
88	Fire buckets with stand	1	4
89	Tachometer	1	1
90	Lifting Jack Screw type	1	1
91	Tester sparking plug "NEON" Type	1	1
92	Compressor Air piston type (vehicular)	1	1
93	Wheel alignment gauge – magnetic type with turn tables	1	1
94	Sectionised engine gear box and differential mounted on chassis	1	1
95	Brake Assembly, master cylinder, wheel cylinder and servo	1	1
96	Vacuum assisted hydraulics brake assembly with vacuum booster	1	1
97	Air brake assembly	1	1
98	Brake lining riveting machine (foot operated)	1	1
99	Clutches, different types such as Cone type disc type diaphragm type etc.	1	1
100	Axle, Gear Boxes, steering boxes fount axle assembly independent front wheel spring assembly	1	1
101	Full floating axle and semi – floating axle assembly	1	1 each
102	Steering Assembly – Rack and Pinion type	1	1
103	Steering Assembly – Power Steering	1	1
104	Spring tension scale – 0 –4.5 Kg.	1	1
105	Valve spring compressor	1	1
106	Carburetor repair tool Kit	1	1
107	Puller set steering wheel universal	1	1
108	Puller set universal bearing and bushes	1	1 set
109	Lifting jack, screw type	1	4
110	Coil spring compressor for suspension spring	1	1
111	Hot patch clamp	1	2
112	Piston ring compressor	1	2
113	Valve key inserter	1	1
114	Wall charts (driving instructions)	1	1
115	Connecting rod alignment fixture	1	1
116	Valve refacer	1	1
117	Piston ring expander	1	1
118	High rate discharge tester	1	1
119	A.V.O.Meter /Digital Millimeter	1	1
120	Pneumatic tools	1	1 set

121	Impact Screw Driver	1	1 set
122	General purpose puller	1	1 set
123	Stud Extractor	1	1 set
124	Spring Pliers 150, 200 mm	1	1 set
125	Torque Wrench (set of three nos)	1	1 set
126	Growler	1	1
127	Battery Charger	1	1
128	Timing light	1	1
129	Hydrometer	1	1
130	Continuity meter	1	1
131	Tyre Changer	1	1
132	Sound Meter	1	1
133	Gas Analyzer	1	1
134	Smoke Meter – with Engine r.p.m. & Temp. Sensor	1	1
135.	4- - gas analysis with temp. & Engine r.p.m. Sensors.		

**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

**GENERAL MACHINERY**

- |  |        |
|--|--------|
| 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<br>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   |

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