COVER

SYLLABUS (TRADE NAME) .. AUTOMOBILE MECHANIC

UNDER CODE OF REGULATIONS FOR INDUSTRIAL SCHOOLS

AS APPROVED BY

DEPARTMENT OF EMPLOYMENT AND TRAINING, CHEPAUK, CHENNAI 600 005.

..... 2004

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LIST OF COMMITTEE MEMBERS

FOR THE TRADE OF AUTOMOBILE MECHANIC

1. Members and Experts: ---

1. Mr.S.SUBBAIAH,M.E.,M.B.A.,
   REGIONAL JOINT DIRECTOR ,
   COIMBATORE

2. Mr.K.KADIRVELU, B.E.,M.B.A.,
   DEPUTY DIRECTOR
   PRINCIPAL
   GOVT.I.T.I, SALEM.

3. Mr.R.RAJENDRAN, B.E.,
   TRAINING OFFICER,
   GOVT.I.T.I, SALEM.

4. Mr.M.RAVICHANDRAN, B.E.,
   ASSISTANT TRAINING OFFICER,
   GOVT.I.T.I, SALEM.

5. Mr.E.B.SAMRAJ,D.M.E.,
   PRINCIPAL
   ST.THERESA'S I.T.C., SALEM.

6. Mr.J.KESAVAN, D.M.E.,
   JUNIOR TRAINING OFFICER,
   S.S.P.,I.T.C., SALEM.

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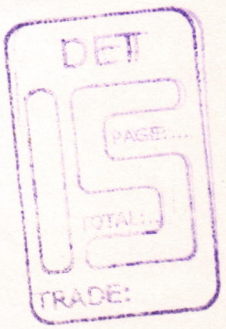
COURSE DETAILS

Name of Trade	**: AUTOMOBILE MECHANIC**
Qualification	**: 10TH PASS / FAIL**
Age	**: 14-40 Years**
Duration	**: 1 Year**
Number of Trainees	**: 20**
Number of Practical hours	**: 32 hrs. per week**
Number of Theory Hours	**: 8 hrs. per week**
Number of Workshop Calculation hours	**: 2 hrs. per week.**
Number of Engineering Drawing hours	**: 2 hrs. per week**
Space Required	
Workshop	**: 500sq. feet**
ClassRoom	**: 200 sq. feet**
Power Required in KW	**: 2 k.w.**

BREAK UP OF TRAINING RERIOD OF ONE YEAR FOR THE TRADE OF AUTOMOBILE MECHANIC
PERIOD OF TRAINING : 1 YEAR (52 WEEKS)



The syllabus for the One year (52 weeks):

1.	INTRODUCTION	-	2 Weeks
2.	Transmission work	-	7 Weeks
3.	Front axle, Suspension of steering work	-	4 Weeks
4.	Brake work	-	5 Weeks
5.	Engine work petrol	-	8 Weeks
6.	Fuel feed system (Petrol)	-	3 Weeks
7.	Engine work Diesel	-	6 Weeks
8.	Engine testing & Tune up	-	1 Week
9.	Fuel system MPF I & Sensor	-	1 Week
10.	Electrical & Electronics works	-	9 Weeks
11.	Industrial Visit	-	1 Week
12.	Cooling System work	-	1 Week
13.	Lubricating System work	-	1 Week
14.	Air Conditioning & Vehicle Pollution	-	1 Week
15.	Revision and Test	-	2 Weeks

	Total	-	52 Weeks

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
1.	**INTRODUCTION:** Familiarisation with Institute – Importance of the Trade Machinery used in Trade. Types of work done by the Students in the Shop floor.	General Introduction to the Course - Duration of the Course and Course contents. Study of the Syllabus.	-	-
2.	Familiarisation of the tools and Machinery available in the shop. Their use and up-keep.	Importance of safety & general precautions to be shop. Introduction of Automobile Major Assembly.	-	-
3.	**TRANSMISSION WORK** Dismantling clutch assembly cleaning and Inspecting parts. Adjusting Clutch Pedal free play.	Layout of transmission system, description of single plate and multiplate clutches.	Introduction to the subject of Engineering drawing.	Introduction to the subject of Workshop Calculation & Science.
4.	Dismantling a sliding mesh gear box. Cleaning, inspecting and assembling.	The purpose of gear box in vehicle. Functions of sliding mesh gear box.	Sketching of lines, Rectangles, Squares and Circles.	Addition, Subtraction Multiplication and division of whole numbers.
5.	Studying Synchromesh gear box assembly & Shifting mechanism.	Description of Synchromesh gear boxes advantages. Types of synchromesh gear boxes.	Sketching of Simple solids such a Cubes, Prisms, Cylinder and lines etc.,	Common Fractions - Addition, Subtraction, Multiplication & Division - Simple shop problems.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
6.	Removing open type propeller shaft from vehicle removing universal joints – cleaning, inspecting – replacing of work – out parts, assembling and fitting to vehicle.	Description of Universal joints and propeller shafts. Important of Slip joint C.V. Joint.	Free hand Sketching of nuts, bolts and studs.	Common Fractions - Addition, Subtraction, Multiplication & Division – Simple shop problem.
7.	Removing rear axles assembly from vehicle, dismantling, cleaning, inspecting and assembling of differential assembly.	Description and functions of final drive assembly.	Free hand sketching of propeller shaft with Universal joint.	Decimal Fractions - Conversion, Addition, Subtraction, Multiplication & Division – Simple shop problems.
8.	Removing transfer case from the vehicle Inspecting parts.	Description and operation of four wheel drive.	Use of drawing Instruments - T-Squares and drawing board construction of simple figures.	- do -
9.	Trouble shooting in the transmission system of vehicles – detecting noises from clutch, gear box, universal joints and rear axle.	Common troubles and their remedy in Transmission system.	Construction of simple figures with dimensions and titles use of different types of scales.	Unit - Fundamental units, Derived units. Measurements - British System, Metric System.
	FRONT AXLE, SUSPENSION & STEERING WORK :			
10.	Inspect the front axle assembly. Inspect and correct the wheel alignment	The front axle – description and function. Description of Wheels and tyres.	Drawing of 3 views stepped and taper blocks in 3rd angle projection.	Properties of ferrous metals - Cast Iron, wrought iron, plain and high carbon steel and their uses.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
11.	Inspect and overhaul front and rear suspension.	The purpose of suspension in vehicle. Types of leaf sprigs, shcok absorbers - description and operation.	Free hand sketching of shcok absorbers.	Properties of Non-ferrous metals, lead, tin, brass, aluminium bronze and their uses.
12.	Inspect and adjust steering linkages.	Description of Different types of steering box. Power steering.	Drawing of Plan, Elevation and Side. View of tapered hollow objects	-do-
13.	Inspect and overhaul steering boxes adjusting steering.	Description of Ackerman's angle, caser, Camber, Toe in and Toe-out.	Drawing the 3 views 3rd angle projection of curved objects.	Square root - Square root of whole numbers and decimals.
14.	**BRAKE WORK :** Dismantling wheel brake assembly - cleaning and Inspecting - Adjusting proper clearances bleeding hydraulic brakes.	Layout of mechanical and hydraulic braking system in cars. Hand brake desciption.	Isometric drawing of simple objects such as square and rectangular blocks.	Percentage - Conversion - Simple shop problems.
15.	Removing master cylinder - dismantling cleaning and inspection of parts - assembling.	Master Cylinders - types - functions. Common troubles and remedy.	Free hand sketching of master cylinder.	Heat treatment – Purpose - Different methods of Heat Treatment.
16.	Removing Dismantling cleaning of brake drums. Inspecting wheel cylinders.	Brake linings – Types and uses. Description and function of wheel cylinders.	Explain of Simple orthographic projection, IIIrd angle.	Ratio – Simple shop problems.
17.	Studying Air brakes° System. Over Hauling of wheel chambers.	Description fair brake system - description and purpose of each part. Caliber Brakes	Exercise in Simple, Orthographic projection, IIIrd angle.	Proportion - Direct, Inverse – simple shop problems.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
18.	Trouble tracing in braking system of a vehicle – Adjusting brakes, precaution to be observed while testing brake.	Common troubles in brakes and their remedy.	-do-	Heat and temperature, Thermometers, Centigrade and Fahrenheit scales their conversion, use of temperatures measuring instruments.
	Engine Work (Petrol) :			
19.	Dismantling unserviceable engine – Cleaning & Studying parts.	Description of Internal and external combustion engines, different types of I.C. Engines.	Drawing of 3 view stepped and taper blocks in 3rd angle projection .	-do-
20.	Dismantling the cylinder head from the engine, decarbonising the cylinder head, removing the valves, valve grinding, valve lapping cleaning and reassembling.	4 stroke and 2 stroke cycle engines. Description of valve operating mechanism.	Free hand sketching of 4 stroke cycles and 2 stroke cycles	Geometry – properties of angles, triangle and circles.
21.	Removing position and connecting rod assembly from engine – dismantling, cleaning, inspecting, cylinder reboring & Honing reassembling.	Description and function of cylinder block, cylinder liners and pistons.	Free hand sketching of piston and connecting rod.	-do-
22.	Removing crank shaft from the engine – Cleaning, inspecting and reassembling.	Description and function of connecting rod cam shaft and crank shaft.	Free hand sketching of crank shaft.	Force, work done, energy and power – simple shop problems.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
23.	Assembling Crank shaft, Piston and Rings, Connecting rod assembly in the engine. Fitting Cylinder head on engine block.	Firing order of the engine. Description and function of the wheels.	Drawing of plan, elevation and side views of tapered hollow objects.	Force, work done energy and power – simple shop problems.
24.	Removing valve timing cover – checking and correct setting of valve timing replacing timing chains.	Valve timing gears, timing marks, timing chains and chain tensioners. Valve timing - lifters.	-do-	Calculation of areas of Square, Rectangles, Triangles, Circles and Regular polygons.
25.	Dismantling cylinder head, check and correct valve tappet clearance.	Precautions to be observed while assembling engine components.	Free hand sketching valve operating mechanism.	-do-
26.	Removing inlet and exhaust mani fold, silencers and tail pipe – Cleaning and refitting importance of back – pressure.	Inlet and exhaust mani fold description and purpose. Description of silencers and tail pipe. Catalytic converter its function.	Free hand sketching of sectional view of silencer box – exhaust pipes and tail pipe.	Simple levers, problem related to levers as applied to motor vehicles, screw jeck.
	Fuel Feed System (Petrol)			
27.	Studying the fuel flow in fuel feed system from vehicle	Fuel feed system in motor vehicles description and layout of the system. Description of oil pump and oil filters.	Drawing the 3 views 3rd angle projection of curved objects.	Meaning of friction – examples of useful and wasteful friction in vehicles – co-efficient of friction, simple problem on friction.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
28.	Dismantling a A.C. Mechanical fuel pump. Inspecting parts. Replacing work out defective parts – assembling and testing.	Description and operation of fuel pump – types. Intake and Inline pumps on MPFI.	Free hand sketching of Fuel pumps	Meaning of friction – examples of useful and wasteful friction in vehicles – co-efficient of friction, simple problem on friction.
29.	Repair to a car carburetors – adjusting float level and slow speed adjustments.	Types of carburetors special features – Advantages.	Free hand sketching of simple carburetors.	Problems on various Trigonometric ratios. Reading of trigonometric tables. Problems on height and distance.
	Engine Work – Diesel :			
30.	Practice on unserviceable diesel engine – removing cylinder head, connecting fods and piston – cleaning, Inspecting and refitting them.	History of compression ignition engine. Classification of C.I. Engines. Advantages over petrol engines.	Free hand sketching of combustion chambers of different types.	-do-
31.	Practice in starting and stopping of stationary and a transport vehicles engine. General maintenance of engine – checking oil, fuel, water levels of diesel engine.	The four stroke and two stroke diesel engine. Scavenging, turbo charger.	-do-	Calculation of volume of square rectangular and conical blocks, volume of cylinders, solid and hollow.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
32.	Bleeding fuel lines for Air locks. Repairing fuel teaks in the pipe lines and unions.	Specifications of diesel engines, material used for different engine parts. Combustion chambers -- types.	Free hand sketching of fuel feed system in diesel engines.	Density and specific gravity – shop problems.
33.	Removing feed pump – dismantling, cleaning, inspection – reassembling.	General layout of fuel feed system. Fuel feed pump -- description and operation.	Free hand sketching of fuel feed pump.	Explanation of horse power, brake horse power and indicated horse power.
34.	Dismantling an unserviceable fuel injection pump cleaning, inspecting studying parts and reassembling.	Fuel injection. pump – types – Operation.	Free hand sketching of F.I. pump.	Applied problems in horse power.
35.	Testing injectors for missing on the vehicle – Removing, dismantling, cleaning, inspecting – reassembling.	Need of Governors – types. Injector nozzles – types. Reasons for black, white and blue smoke in exhaust.	Free hand sketching of fuel. Injector, nozzles, types.	Algebra – Simple equations – problems.
	ENGINE TESTING & TUNE UP:			
36.	Practice in engine tune up a vehicle – testing. Vacuum and compression of engine, adjusting tappets setting ignition timing and adjusting car – burettor for slow speeds.	Explanation of engine tune up. Job description of compression and vacuum testing.	Free hand sketching of rivets, screws, washers from samples sketching of riveted joints.	Algebra -- Addition, Subtraction, Multiplication, Division, use Brackets – Problems.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
	FUEL SYSTEM MPFI & SENSOR:			
37.	Circuit checking of multipoint fuel injection pump and petrol nozzle.	Constructions and working of multipoint fuel injection pump and petrol injector, sensor – uses.	Free hand sketching of rivets, screws, washers from samples sketching of riveted joints.	Algebraic formulae use for simple problems. Simultaneous equations – shop problems.
	ELECTRICAL & ELECTRONICS WORK:			
38.	Practice in joining wires & soldering. Forming simple electrical circuit.	Simple electrical circuits and parallel circuits. Common electrical terms & symbols.	Free hand sketching of electrical symbols and drawing of simple electrical circuits.	-do-
39.	Cleaning and topping up of a lead acid battery charging battery	Primary & Secondary cells, lead acid battery – description – construction.	-do-	Electricity and its effects of state & dynamic electricity.
40.	Check and replace ignition coil. Overhauling distributor assembly. Cleaning and checking spark plug.	Ignition coil – Function – distributor types – function, spark plugs – function.	Free hand sketching of ignition circuit of a vehicle.	AC & DC differences, Definition of ampere, volt and ohms, units of current.
41.	Removing dismantling cleaning and assembling magnetos.	Magneto ignition system – description and operation, Advantages – Electronic ignition – Principle.	Free hand sketching of magneto ignition system.	Ohm's law – Calculation base on ohm's law.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
42.	Removing alternator/dynamo in a vehicle – overhauling and testing.	Description of charging circuit. Operation of dynamo & alternator – description of regulators.	Free hand sketching of charging circuit.	Applied problems on resistance the series and parallel circuits.
43.	Removing starter motor from vehicle – Overhauling and testing of starter motor.	Description of starter motor circuit – operation of starter motor and solenoid switch.	Free hand sketch of starter motor.	-do-
44.	Checking instruments & gauges on dash board. Removing and electrical horn from vehicle – dismantling, cleaning point, testing and Assembling.	Different gauges used in automobiles their function. Description and operation of electric horn.	Free hand sketch of gauges and their circuit.	Calculation of volumes and weight of cubes, hexagonal prisms – shop problems.
45.	Trace the light circuit – test bulbs, align head lamps. Check tail lights, brake lights and Indicating lamp – replacing fuse bulb.	Description of light circuits – different components in light circuit – description and function of each.	Free hand sketching of light circuit of vehicle.	-do-
46.	Trace the wiring circuit of traffic signal flasher light circuit – tracing defects, replacing fuse bulb. Removing a wiper motor – Dismantling, cleaning, inspecting, repairing and assembling.	Flasher circuit its description and operation. Description and operation of an electric wiper motor.	Free hand sketching of flasher light circuit with symbols.	Meaning of stress, strain, modulus of elasticity, ultimate strength examples.

WEEK NO.	PRACTICAL	THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
47.	VISIT TO LOCAL GARAGES AND INDUSTRIES			
48.	**COOLING SYSTEM WORK:** Checking up and correcting water leaks – changing defective. Packing and gaskets. Testing radiator for leaks – testing thermostat.	Cooling system – necessity – methods. Description and operation of cooling system. Components of cooling system.	Free hand sketching of layout of cooling system.	Problems involving stress, strain, modulus of elasticity and ultimate strength.
49.	**LUBRICATION SYSTEM WORK:** Checking up and correcting oil leaks. Changing defective packing and gaskets.	Purpose of lubrication – Types – Description and operation. Components of lubricating system.	Free hand sketching of layout of lubrication system.	Calculating of area, volume and weight of hollow and solid bodies.
50.	**AIRCONDITIONING & VEHICLE POLLUSION:** Studying Air conditioning unit in motor vehicle.	Introduction to air conditioning system in motor vehicle. Vehicle pollution – EURO and BHARAT.	Free hand sketching of layout of Air conditioner in vehicle.	-do-
51.	REVISION			
52.	TRADE TEST			

ACHIEVEMENTS:-

1. Familiarisation of Trade, Tools & Machinery.
2. Overhauling the Transmission system parts.
3. Inspecting and Servicing front axle, Suspension & Steering systems.
4. Inspecting and overhauling brake assembly.
5. Studying Air brake system.
6. Dismantling and assembling of different components of the engine.
7. Servicing the Manifold, Silencers and Tail pipe.
8. Studying fuel feed system.
9. Overhauling feed pump & Injection pump.
10. Bleeding fuel lines for Air lock – Testing Injectors.
11. Practice in engine tune up a vehicle.
12. 'Checking' Multipoint fuel injection pump and petrol nozzle.
13. Servicing and testing Electrical and Electronic system and accessories.
14. Checking and correcting cooling and lubrication system.
15. Studying Air conditioning unit in motor vehicle.

INDUSTRIAL SCHOOLS

TRADE SYLLABUS – REVISED

Name of the Trade : **AUTO MOBILE MECHANIC**

SPACE REQUIRED:

(1) **Workshop/Lab** : 500 sq.ft.

(2) Class Room : 200 sq. ft.

Trade Theory : No change

Trade Practical : No change

Engineering Drawing : No change

Workshop calculation and Science : No change

List of Tools &Equipments
For The Trade of AUTOMOBILE MECHANIC
(For a batch of unit of 20 trainees)

SL.No.	DESCRIPTION	QUANTITY
1	Hammer ball pein o.75 kg	5
2	Chisel cold flat 19mm	10
3	Centre punch 10mm dia x 100mm	10
4	Steel rule 15 cm English and Metric	10
5	Screw driver 30 cm x 9mm blade	10
6	Screw driver 20 cm x 9mmblade	10
7	Spanner D.E set of pieces (10mm to 32mm)	10
8	Plier combination 15 cm	10
9	Hand file 20cm second cut	10
10	Feeler gauge 20 blades (metric)	10
11	Ring spanner set of 1 pieces (10mm to 32mm)	10
12	Steel tool box with lock and key (folding type) size : 400 x 200 x 150 mm	10
13	Allen key set 12 pieces (2 mm to 4 mm)	2 sets
14	Circlip plier (external & internal) 150mm and 200 mm	2 each

Tools, Measuring Instruments and General Shop Outfit		
1.	Rule steel 300mm	2
2.	Chisel cross cut 200mm x 6mm	2
3.	Hacksaw frame for 30cm blade	4
4.	Hand vice 37mm	2
5.	Screw driver, electrician type 15cm size	2
6.	Mallet (wooden)	1
7.	Blow lamp 0.5 litre	1
8.	Pliers Nose (round and straight) 150mm and 200mm	2 each
9.	Spanners adjustable 20cm	1
10.	Spanner for sparking plug 14mm	1 set
11.	Spray Gun-Kerosene	1
12.	Pressure Grease Gun	1
13.	Chain pulley block-3 ton capacity	1
14.	Tray cleaning 45x30cm	5
15.	Oil can 0.5 liter	1
16.	Lifter, Valve spring	1
17.	Tool, Valve grinding, suction type (Consumable tool)	2
18.	Valve set cutting tools complete with guides and pilot bar (all cutting) in a box	1 set
19.	Cylinder Dial Gauge	1 set
20.	Torque wrench(0 to 67.5 kg-meter)set of3	1
21.	Work bench 240x120x75cm with 4 vices 12.5cm jaw	2
22.	Lockers with 8 drawers (Standard size)	1
23.	Metal rack 180x150x45cm	1
24.	Fuel pump, distributors-old for practice	2
25.	Carburetor (two different types)	2
26.	Water Pump and Oil pump	2 each
27.	Steel almirah 180x90x50cm	1
28.	Black Board 180x90cm	1
29.	Desk or table 90x60cm(for Instructor)	1
30.	Fire Extinguisher	1
31.	Fire buckets with stand	2
32.	Tachometer	1
33.	Brake assembly, Master cylinder, wheel cylinder and servo old	1
34.	Air brake assembly	1
35.	Clutches-different types such as cone type disk type diaphram type etc., sample old clutches only	1
36.	Steering assembly-Rack and pinion type	1
37.	Valve spring compressor	1
38.	Carburetor repair tool kit	1 set

39.	Puller set steering wheel universal	1 set
40.	Lifting jack, screw type	2
41.	Piston ring compressor	1
42.	Valve key inserter	1
43.	Piston ring expander	1
44.	Stud Extractor	1 set
45.	Torque wrench (set of three Nos.) already	1
46.	Battery charger	1
47.	Soldering iron 120 watts	1
48.	Tyre changer two Levers	1
49.	Fuel injection pump (Diesel) inline	1
50.	Multi-point fuel injection pump	1
51.	Petrol nozzle	2 set

GENERAL MACHINERY

SL. No.	DESCRIPTION	QUANTITY
2. 1	Motor car in running condition (Petrol)	1
3. 2	Petrol engine running condition (vehicle type)	1
4. 3	Petrol engine running condition carburetor type	1
5. 4	Diesel engine running condition (vehicle type)	1
6. 5	Petrol engine (2-stroke) motor cycle/scooter	1
8. 6	Air compressor-2 stage-500 liter with 1 HP motor Single phase old air compressor	1