

COVER

SYLLABUS FOR (TRADE NAME)

:- AUTO ELECTRICIAN

UNDER CODE OF REGULATIONS FOR
INDUSTRIAL SCHOOL

:-

AS APPROVED BY

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

LIST OF COMMITTEE MEMBERS
FOR THE TRADE OF AUTO ELECTRICIAN

1. Member and Experts

1. **Mr. S.SUBBAIYA, ME., MBA.,**
R.J.D. COIMBATORE
2. **Mr. K. KADIRVELU, BE., MBA.,**
DD/ PRL
GOVT. ITI. SALEM-7
3. **Mr. RAJENDRAN B.E., T.O.,**
GOVT. ITI , SALEM - 7
4. **Mr. M. RAVICHANDRAN, BE., A.T.O.,**
GOVT. ITI. SALEM - 7.
5. **Mr. E.B. SAMRAJ D.M.E.,**
PRINCIPAL
ST. THERESA'S I.T.C. SALEM - 7.
6. **Mr. J. KESAVAN, D.M.E., J.T.O.,**
S.S.P. I.T.C. SALEM - 7.

COURSE DETAILS

Name of Trade : AUTO ELECTRICIAN

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 : 400 sq.feet

ClassRoom : 200 sq. feet

Power Required in KW : 2 k.w.

INDEX

1. Introduction	.....	3 Weeks
2. Safety	.....	1 Weeks
3. Basic Electrical	.....	2 Weeks
4. General Wiring layout	.....	1 Weeks
5. Battery	.....	2 Weeks
6. Lighting Circuit	.....	9 Weeks
7. Starting circuit	.....	4 Weeks
8. Charging Circuit	.....	4 Weeks
9. Ignition Circuit	.....	8 Weeks
10. M.P.F.I Electrical Circuit	.....	2 Weeks
11. Car A/C	.....	5 Weeks
12. Dash board unit	.....	2 Weeks
13. General Machinery and Equipment's	.....	5 Weeks
14. Sensor unit	.....	1 Weeks
15. Local Visit (Work shop)	.....	1 Weeks
16. Revision	.....	1 Weeks
17. Exam	.....	1 Weeks

Week No.	Practical	Theory	Engg. Drawing	W.Sci.& Cal
1 & 2	INTRODUCTION AND ADMISSION FORMALITIES			
3.	Importance to the Trade Machinery used in Trade – Types of work done by the student in shop floor	General Introduction to the course duration of study of the syllabus – general rules of the Institute Hostel – recreation – Medical Library – working Hrs Time Table	Introduction to engineering drawing and their importance uses and application of drawing Instruments	Kind of Fraction – reduction of fractions to their lowest terms – comparison of value of fractions –addition – subtractions –simple problems
4.	Safety rules to be observed in an automobile repair shop – up keep of fire extinguishers tool and machinery available in the shop	Important of safety precautions to be observed in the shop .fire extinguishers used in different types of fire →handling of inflammable materiel – first aid	Geometrical construction and angle and triangle standard printing style for letter and numbers as per IS 696	Multiplication – division –simplification of complex fraction – decimal fraction accuracy of answers – conversion of fraction in to decimal vice versa
5.	Practice in jointing wire & soldering	Simple electrical circuits series and parallel circuit Identification of A.C & D.C Meter –Insulation –conductors	Types of line and their meaning application as per IS 696 free hand sketch of soldering Iron	Decimal – multiplication-division-addition – subtraction – simple problems
6.	Practice in simple electrical circuit measuring current Voltage and resistance	Types of resistance Ohm's law and its application common electrical symbols	Uses of Different types of Scales	Squares – square root factorization – division method – square root of whole number – decimal fraction simple problems

7.	Study and testing of car wiring as per diagram	Description of car wiring and types of wiring systems	Free hand sketch of hand tools	Square root of mixed decimal fraction – Imperfect squares – common fraction.
8.	Cleaning and topping up of a lead acid battery	Description of cells – types of cells Description of battery and types of batteries	Free hand sketch of straight lines oblique lines circles square polygons and ellipse	Conversion of fraction in to percentage – Decimal in to percentage – percentage to decimal (or) fraction simple problems.
9.	Testing battery with a hydrometer and cell tested charging battery	Lead acid battery description construction common troubles and remedies care while handling battery. Effects of mis-handling of batteries on environment – Charging of battery and types of charging	Free hand sketch of electrical symbol and battery	Ratio between the two quantities parts – properties ratio as representative fraction – simple problems.
10.	Trace the circuit test bulbs align head lamps- find out short and open circuit in the light wiring	Description of light circuit – different components in light circuit description and function of each pre for caused bulbs and scaled beams.	Free hand sketch of simple geometrical solids – cube cone and prism	Ratio between three quantities – expressing the two as one ratio
11.	Practice in Head light circuit including pass light.	Fuses and their importance – Head light circuit	Method of dimension and practice	Proportion – Direct proportions inverse proportion – simple problems

12.	Practice in Indicator light wiring flasher – three way switch	Description of Flasher – three way switch Indicator circuit.	Orthographic projection of third angle Method	Expressions – Kings of terms simplification of like terms
13	Practice in parking light wiring.	Description of parking circuit pillar switch	Orthographic projection of First Angle Method	Simplification of unlike terms problems leading to simple equation.
14	Practice in brake light wiring oil pressure switch – air pressure switch mechanical brake light switch	Description of brake light circuit oil pressure switch – air pressure switch – mechanical brake light switch.	Free hand sketch of brake light wiring, oil pressure sketch	Area – Side – perimeter of regular polygon – simple problems.
15	Practice in heater – clock – roof light wiring	Description of heater circuit – clock wiring roof light and cabin lights	Orthographic projection practice Heater wiring	Find the lateral surface area – total surface area – volume of cube – cuboids – prism – simple problems.
16	Troubles shooting in lighting circuit		Orthographic projection practice	Find the curved surface area – Area of base – total surface area – simple problems
17	Removing a wiper motor dismantling cleaning – checking inspecting – repairing electrical wiper motors assembling and fitting setting blades for correct functioning.	Description and operation of an electrical wiper motor care and maintenance – common trouble and remedies.	Orthographic Projection of First	Find the area – perimeter – Diagonal – side of the square – rectangle – rhombus – parallelogram – trapezium – triangle simple problems.

18	Removing and electrical horn from vehicle – dismantling cleaning point testing wires – assembling the horn and adjusting the horn for correct sound	Electrical horn circuit – description of electric horn operation of relay and horn – operation of relay and horn switches common troubles and their remedies.	Orthographic Projection Practice Free hand sketch of wiper motor.	Find the circumference and area of circle and hollow circle – find the area perimeter and length of sector simple problems.
19	Study of starter motor circuit	Description of stator motor circuit constructional details and operation of starter motor and types	Orthographic Projection practice free hand sketch of starter motor	Perpendicular height of cone Isosceles triangle right angle triangle simple problems.
20	Checking starter motor dismantling assembling servicing of starter motor and testing of starter motor.	Description of brushes commutator field winding – armature winding bearing – brush gear clutch – pinion gear.	Free hand sketch of commutator, armature winding, pinion gear	Find the outer area – Volume of sphere and hollow sphere – simple problems.
21	Study – Dismantling assembling and testing of different types of solenoid switches.	Description of different types of solenoid switches testing and adjustment of starter motor.	Free hand sketch of solenoid switch.	Kinds of units – system of measurements – units of length – relationship between FPS and MKS system
22	Trouble shooting of Starter Motor circuit and starter motors.		Free hand sketch of stator motor circuit	Units of Mass – units of area relation between FPS & MKS system
23	Study of charging circuit	Description of charging circuit – Difference between – dynamo and alternator.	Free hand sketch of charging circuit	Units of time – units of Volume relation between FPS & MKS System.

24	Removing from vehicle – Dismantling – cleaning and checking – reassembling and testing of dynamo.	Description of dynamo lubrication – inspection of brush gear belt adjustment – method of checking the dynamo	Free hand sketch of dynamo	Units of capacity – units of Speed relation between FPS & MKS System.
25	Testing and checking of control box	Description of control box (Voltage – Regulator current regulator – cut out) temperature compensation diode)	Free hand sketch of control box regulator	Units of pressure – units of Power relation between FPS & MKS System.
26	Servicing of Alternator – Alternator out put checking on vehicle – bench testing – Assembling and fitting to vehicle, checking & belt adjustment brush gear – rotor slip rings bearing – trouble shooting.	Description of Alternator service precaution routine Maintenance trouble shooting of Alternator circuit.	Free hand sketch of alternator	Types of materials – Difference between ferrous and non ferrous materials classification of metals – physical – mechanical – chemical properties.
27	Study & checking of magneto ignition and battery ignition circuit.	Types of Ignition system battery Ignition system – Magneto ignition system – and fly wheel magnetos, types special features, Advantages and disadvantages each type.	Free hand sketch of magneto Ignition wiring	Mechanical properties of metals – kinds of non – ferrous metal

28	Servicing and testing Distributor	Description of distributor contact breaker adjustment Advance, retard mechanisms.	Free hand sketch of Distributor	Ores – chemical symbol properties and uses of copper – Aluminum – lead, tin, Zinc, Brass – types bearing metals – Duraluminum solder – non metals.
29	Testing and servicing of spark plug.	Description of spark plug – H.T. coil Ignition switch.	Free hand sketch of spark plug	Movement – motion – types of quantities – kinds of speeds – Displacement simple problems.
30	Setting of Ignition timing & Testing	Setting of Ignition timing advance retard adjustment	Further practice in orthographic projection.	Velocity – kinds – Acceleration – Difference Acceleration of de acceleration uniform acceleration – equation of motion.
31	Identification of electronic control unit – testing of electronic control unit – fault finding in electronic circuit and remedies	Introduction to electronics capacitor, resistor, inductor and their principal of working. Different types of diodes – transistors power supply for electronic circuit.	Orthographic projection	Newton's laws of motion & momentum – units of force – difference between mass and weight.

32	Trouble shooting of Ignition System		Orthographic projection	Defined units of work, power, energy – definition of BHP, IHP and Efficiency, Torque.
33	Visits to Local work shop.		Visits to Local work shop.	
34	Servicing and testing of Ammeter – oil pressure gauge – Ignition switch	Description of Ammeter oil pressure Gauge ignition switch brake fluid level switch	Free hand sketch oil pressure gauge ignition switch	Machines – Simple machines parts of simple machines – mechanical advantage.
35	Servicing and testing of temperature gauge – Fuel level indicator dash board light	Air pressure gauge oil level indicator temperature gauge fuel level indicator dash board lights and switches.	Free hand sketch oil level indicator fuel level indicator dash board light	Velocity ratio and efficiency – Parts of level – types of levers
36	Practice in M.P.F.I general wiring	Description of M.P.F.I. wiring diagrams with components engine control module – E.C.M. description and operation.	Free hand sketch of M.P.F.I. wiring	Bell crank level – Screw Jack. Simple problems.
37	Servicing of Electrical & Electronic petrol fuel pump – fuel injector.	Description of electrical and Electronic fuel pump petrol fuel injector.	Free hand sketch of electrical fuel pump and Injector.	Wheels – Axles – pulleys – Simple problems.
38	Study of car A/C system – compressor – condenser – cooling coil unit – expansion Valve – pipe lines	Description of car air condition layout	Free hand sketch of car A/C layout	Units of heat – heat and mechanical energy – effects of heat.

39	Study and servicing of Magnetic clutch.	Description of compressor types – testing magnetic clutch.	Free hand sketch of A/C compressor and Magnetic Clutch.	Transmission of heats – temperature – Thermo – metric scales – Heat and temperature – measurement of Temperature.
40	Servicing of Expansion valve wiring switch – thermostat & adjustment.	Description of expansion Valve – types wiring switch – thermostat	Free hand sketch of bolt and nut	Types of Thermometers – relation between temperature scales.
41	Car A/C assembling leak testing – oil charging in to compressor – gas charging.	Anti – Freeze oil (Solution) gas used in car A/C and its properties.	Free hand sketch car A/C wiring.	Conversion of degree centigrade to Fahrenheit to centigrade.
42	Trouble shooting in car A/C system		Free hand sketch of car A/C Thermostat	Magnet – Properties – kinds of magnet – types of artificial magnets.
43	Trouble tracing in electrical wiring – use of resistance meter	Lucas – colour code for wiring in the motor vehicle	Orthographic Projection Practice	Methods of magnetization magnetic field – magnetic force uses of magnets.
44	Tracing fault in different electronic Ignition system and rectification	Principle of electronic Ignition system Thyristor (Transisterised) based ignition system and	Free hand sketch of electronic Ignition wiring.	Source of electricity effects of electric current – uses of electricity kinds of electricity – advantages of AC over DC.

45	Repair of Drilling M/C – testing and cleaning of spark plug machine.	Construction and operation of spark plug tester drilling M/C care and maintenance	Free hand sketch of spark plug tester.	Definition EMF – potential difference – Ampere – resistance – Volt ohms law – laws of Resistance.
46	Testing of Growler and timing light	Construction and operation – Growler – timing light	Free hand sketch Growler and timing light	Effects of heat on resistance – Grouping of Resistance – simple problems
47	Testing of high rate discharge test and hydrometer	Construction and operation high rate discharge test and hydrometer	Free hand sketch of high rate discharge tester – hydrometer	Power – power consumption cells and batteries.
48	Practice in car Audio and video system – power window system and theft alarm	Car Audio and video system wiring diagram and power window system and theft alarm	Free hand sketch layout car music system wiring.	Cells in series – parallel combination of series and parallel circuit.
49	Study of all types of sensor units.	Electrical security system Description and operation	Free hand sketch of sensor unit water sensor – oil sensor – Temperature sensor.	Cell efficiency – electroplating slip of induction motors.
50	Study and checking of Radiator Fan – relays – Malfunction of Indicator lamps	Description and Construction of sensor units – Radiator Fan – relays indicator lamps – water sensor – oil sensor – temperature sensor – etc.	Orthographic projection practice.	AC circuits – power consumption – Transformers.
51	REVISION			
52	REVISION AND TEST			

ACHIEVEMENTS

- Practice in making wire connection and Soldering
- Forming series and parallel circuit in the Motor Vehicle
- Maintaining and testing battery
- Trace and rectify defects in wiring circuits
- Over haul the starter motor, dynamo, alternator, and distributor
- Trace fault in electrical wiring and accessories and rectify them
- Setting of Ignition timing in petrol engine
- Undertake servicing, rectification and Installation of air conditioning system in motor vehicle
- Follow necessary safety precautions.

INDUSTRIAL SCHOOLS**TRADE SYLLABUS – REVISED**

Name Of The Trade : AUTO ELECTRICIAN

SPACE REQUIRED: -

(1) Workshop/Lab : 400 sq.ft.

(2) Class Room : 200 sq.ft.

Trade Theory : No change

Trade Practical : No change

Trade Social Science : No Change

Trade Engineering : No Change

LIST OF TOOLS & EQUIPMENTS**For The Trade Of AUTO ELECTRICIAN****THE LIST INDICATES THE REQUIREMENT****FOR A BATCH OF 20 TRAINEES****TOOL KIT**

<u>SL.NO</u>	<u>NAME OF THE ITEMS</u>	<u>REVISED NUMBER</u>
1	Hammer ball pen 0.75kg	5
2	Chisel cold flat 19mm	5
3	Center punch 10mm dia x 100mm	5
4	Steel rule 15cm English metric	5
5	Screw driver 30cm x 9mm blade	5
6	Screw driver 20cm x 9mm blade Electrician type	5
7	Spanner D.E. set of 12 pieces (10mm to 32mm)	5
8	Plier combination 15cm	5
9	Ring spanner set of 12 pieces (10mm to 32mm)	5
10	Tool box steel (400x200x150mm)	5
11	Wire cutter	5
12	Philip screw driver type set of 5 pieces (100mm-300mm)	4sets

TOOLS MEASURING INSTRUMENTS AND GENERAL SHIP OUTFIT

<u>SL.NO</u>	<u>NAME OF THE ITEMS</u>	<u>REVISED NUMBER</u>
1	Rule steel 300mm	2 Nos.
2	Prick punch 15 cm	2 Nos.
3	Chiesel cross cut 200mm x 6mm	1 No.
4	Hammer Ball pein 0.5kg	2 Nos.
5	Hammer copper 1kg with handle	1 No.
6	Engineering square 15cm Blade	1 No.
7	Scriber 15cm	2 Nos.
8	Surface plate 60x60cm	1 No.
9	Hacksaw frame for 30cm blade	4 Nos.
10	Hand vice 37mm	2 Nos.
11	File flat 25cm second cut	2 Nos.
12	File triangular 15cm second cut	2 Nos.
13	File half round 20 cm second cut	2 Nos.
14	File square 30cm rough	2 Nos.
15	Twist drill metric 3 mm to 12 mm	1 set
16	Scraper flat 25cm	1 No.
17	Set of more socket	1 set
18	Blow lamp 0.5 lit	2 Nos.
19	Soldering iron 120 watts	4 Nos.
20	Soldering iron copper 225 gram fire heated	2 Nos.
21	Plier nose (round and straight) 150mm and 200mm	2 Nos.
22	Spanner double ended set of 12 metric size 6 to 32mm	1 No.
23	Spanner ring set of 12 metric size 6 to 32mm	1 set
24	Spanner spark plug 14mm	1 set
25	Magneto spanner set of (8 spanner)	1 set
26	Spanner Socket set (6-32mm)	1 set
27	T spanner (set of 8 Nos)	1 set
28	Spray gun	1 No.
29	Tray cleaning	10 Nos.
30	Drilling machine (bench)	1 No
31	Oil can 0.5 lit	1 No
32	Work bench 240x120x75cm with 4 vices	2 Nos
33	Steel almirah 180x90x50cm	1 No.
34	Block board 4'x 3'	1 No.
35	Desk and table 90x60cm (for instructor)	1 No.
36	Fire extinguisher	1 No.
37	Tester spark plug (neon type)	1 No.
38	Puller set different type	4 Nos.
39	High rate discharge tester	1 No.
40	A.V.O. Meter	1 No.
41	Impact Screw driver	1 No.
42	Growler	1 No.
43	Battery charger	1 No.
44	Hydrometer	1 No.

45	Timing light	1 No.
46	Continuity meter	1 No.
47	Multi point fuel injection pump	1 No.
48	Petrol Nozzle	2 Nos.
49	Starter motor and types	2 each
50	Dynamo 12 v	2 Nos.
51	Alternator	1 No.
52	Distributor and types	2 Nos.
53	Spark plug and its types	4 Nos.
54	Ignition switch	4 Nos.
55	Pressure, oil fuel gauge, Temperature gauge	1 No. each
56	Flasher unit	2 Nos.
57	Pillar switch ammeter	2 Nos.
58	Old car A/c Blower unit and Car A/c compressor	1 No. each
59	Different types of horn and horn relay	2 Nos. each
60	Battery 6 Volt and 12 Volt	1 each
61	Cut out coil	2 Nos.
62	Radiator Fan Motor (old)	1 No.
63	Different type of sensor	1 each
64	Car A/c gas charging tube with gauge	1 set

GENERAL MACHINERY

<u>SL.No.</u>	<u>NAME OF ITEM</u>	<u>REVISED NUMBER</u>
1	Car wiring work table with accessories	1 No.
2	Spark plug Cleaning and testing equipments	1 No.
3	Petrol engine running condition (carburetor type)	1 No.
4	Arbor press ½ ton	1 No.
5	Old motor car in running condition (petrol)	1 No.