Syllabus For Auto Electric Technician

Course Name	**AUTO ELECTRIC TECHNICIAN, V2**
Course Code	**STC-AUT / 2021 /0403, V2**
Level	**3**
Occupation	**AUTO-ELECTRIC TECHNICIAN**
Job Description	***Auto-electric Technician*** provides after sales electrical service to the Motor Vehicle users. The technician interacts with customer and diagnoses the problem to assess the possible causes of malfunction. Once the problem and causes have been identified the technician rectifies minor problem or replaces faulty modules for failed parts or recommends factory repair for major faults.
Course Duration	**Total Duration 390 Hrs (T-90, P-180, OJT-60 and ES-60)**
Trainees' Entry Qualification	Grade 10 OR Grade 8 with two year of (NTC/ NAC) after 8 th OR Grade 8 pass and pursuing continuous schooling in regular school with vocational subject OR 8th grade pass with 2 yrs relevant experience OR Previous relevant Qualification of NSQF Level 2 with one yr experience OR Previous relevant Qualification of NSQF Level 2.5 with 6 months experience
Trainers Qualification	CTS/ATS in the trade of mechanic auto electrical and electronics with 3 years experience in the relevant field OR/ Diploma in Automobile Engineering/Mechanical Engineering with 2 years experience in the relevant field OR/ B. Tech/BE in Automobile Engineering/Mechanical Engineering with 1 years experience in the relevant field
Recognition of Prior learning (RPL):	Candidates with class 5 pass out and who have prior learning experience of more than 5 years in the relevant field and are desirous of being certified will be considered. Such candidates, if applying for certification, will undergo training for **12 Hrs** and appear for an assessment of their skills. Assessment will be based on all the modules. Certificates will be provided to candidates after successful assessment.

Structure of Course:

Module No.	Module Name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]	RPL Duration (Hrs)
1	**Occupational safety Hazards at workplace**	Maintain safety at the work site and housekeeping	**10**	**20**	**30**	**1**

Module No.	Module Name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]	RPL Duration (Hrs)
2	**Precision Measurement of components**	Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.	**20**	**40**	**60**	**1**
3	**Troubleshoot and repair electrical components**	Locate and troubleshoot electrical components like starter motor, wiper motor and dynastart	**20**	**40**	**60**	**2**
4	**Diagnose different electrical and electronics sub-systems faults of a vehicle.**	Diagnose and troubleshoot faults in different electrical and electronics sub-systems of a vehicle.	**20**	**40**	**60**	**2**
5	**Diagnose faults in electrical and electronics accessories of a vehicle**	Diagnose and troubleshoot faults in electrical and electronics accessories of a vehicle	**10**	**20**	**30**	**2**
6	**Maintenance of electrical and electronics devices of a vehicle.**	Perform servicing, repairing, adjusting, testing and maintenance of electrical and electronics devices of a vehicle.	**10**	**20**	**30**	**2**
7	**OJT**	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).		**60**	**60**	**--**
8	**Employability Skill**	As per NCVET guided curriculum	**60**		**60**	**2**
		TOTAL	**150**	**240**	**390**	**12**

SYLLABUS:

Module No. 1: Occupational safety Hazards at workplace

Outcome: Maintain safety at the work site and housekeeping

Theory Content:

- Reading of 'Instruction Manual of tools' while using them.
- Keep the tools in working condition and ensure the required maintenance.
- Know electrical hazards and its types.
- Use different electric protection methods.

- Classification of fire.
- Electric fire and the method of extinguish.
- Different types of fire extinguishers.
- First-Aid box and its use.
- First-Aid for burning, electric shock, etc.
- Safety devices used for protection of auto-electrician.

Practical Content:

- Demonstrate Knowledge of Safe working practices on construction sites,
- Demonstrate first-aid box and its components.
- Identify hazards and procedure to avoid accidents at work sites.
- Identify fire extinguisher for different fire.
- Operate fire extinguisher.
- Demonstrate first aid for the victim undergone burning and electric shock.
- Demonstrate the use of helmet, gloves, goggles, shoe, apron, etc.

Tools & Equipment needed:

Module No. 2: Precision Measurement of components

Outcome: Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.

Theory Content:

- Voltage & Current – AC , DC
- UnitsofVoltageandCurrent,relationshipbetweenmV,V,mA,A,
- Instrumentsusedtomeasurecurrent,voltage,power,theirconnectionandapplication
- Relationshipbetweenvoltage,current,power,energy,simplecalculation
- Sourcesofelectricalpowerinanautomobile.
- Capacitor , Resistor & Inductor
- Conceptofinsulator,conductor,semi-conductor.
- Fuse (AC , DC) & application in Automobiles
- Basic·electro-magnetism,conceptofinductance.
- Relay, Switches and application in Automobiles
- Conceptofservice,parallelandmixedcircuits,simplecalculation.

Practical Content:

- Measurement of current.
- Measurement of voltage.
- Measurement of power.
- Measurement of resistance.
- Measurement of impedance.
- Identify the measuring instruments and know their specification.

Module No. 3: Troubleshoot and repair electrical components

Outcome: Locate and troubleshoot electrical components like starter motor, wiper motor and dynastart

Theory Content:

- Flow Chart – Trouble shooting
- Location and function of starter motor & wiper motor
- Electrical circuit between battery and starter motor as well as wiper motor
- Standard trouble shooting proceduresforstartingsystemandstartingmotor

- Standard trouble shooting proceduresforwipingsystemandwipermotor
- Location and functions of a dynastart.
- Dynastart wiring diagram.

Practical Content:

- Overhaulstarterdrive.
- Testandoverhaulsolenoid
- Conductondrivetestofstarter.
- Identifyandrectifyitstarterfailstorotate,rotatesslowly,doesnotcracktheengine,unabletoengageanddisengage.
- OverhaulWiperMotorfollowingmanufacture'smanual.
- Overhauldynastartfollowingmanufacture'smanual.
- Testperformanceafteroverhauling.

Module No. 4: Diagnose different electrical and electronics sub-systems faults of a vehicle.

Outcome: Diagnose and troubleshoot faults in different electrical and electronics sub-systems of a vehicle.

Content:

- Identify fault in motor
- Identify fault in Electronics System
- Locate the faulty part
- Clear the fault quickly

Module No. 5: Diagnose faults in electrical and electronics accessories of a vehicle.

Outcome: Diagnose and troubleshoot faults in electrical and electronics accessories of a vehicle.

Content:

- Identify the different parts of the system
- Identify the fault in the system
- Separate the faulty part

Tools & Equipment needed:

Module No. 6: Maintenance of electrical and electronics devices of a vehicle

Outcome: Perform servicing, repairing, adjusting, testing and maintenance of electrical and electronics devices of a vehicle.

Content:

- Service the electrical and electronics part of the system.
- Repair the faulty part
- Replace the faulty part
- Test the system

LearningOutcome–AssessmentCriteria

Module no	Learning Outcome	AssessmentCriteria
1	Maintain safety at the work site and housekeeping	1.1 Followandmaintainprocedurestoachieveasafeworkingenvironmentinlinewithoccupationalhealthandsafetyregulationsandrequirementsandaccordingtositepolicy. 1.2 Identifyandtakenecessaryprecautionsonfireandsafety. 1.3 Identify,handleandstore/disposedangerousgoodsandsubstancesaccordingto safety regulationsandrequirements. 1.4 Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures. 1.5 Observe site evacuation procedures according to site policy. 1.6 Identify Personal Productive Equipment (PPE) and use the same as per related working environment. 1.7 Identify basic first aid and use them under different circumstances. 1.8 Identify different fire extinguisher and use the same as per requirement. 1.9 Describe different components and their functions in a first-aid box 1.10 Demonstrate first-aid for a burn patient as well as for a victim undergone electric shock. 1.11 Illustrate safe driving practice in forward/backward, turning, and in parking condition.
2	Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.	2.1 Explain insulator,conductor,semi-conductor, inductance, capacitors. 2.2 Explain meaning of current, voltage along with relation with power. 2.3 Measure different basic electrical parameters such as current, voltage, power, resistance, 2.4 Identify electrical and mechanical tools and demonstrate their use in automotive industry 2.5. Name different instruments (like Hydraulic jack, battery charger, digital multi meter etc.) and illustrate their use. 2.6 Explain parallelandmixedcircuits and their service.

3	Locate and troubleshoot electrical components like starter motor, wiper motor and dynastart.	3.1Identify different symbolandnotationsofelectrical/electroniccomponents along with wire colourcodeusedinAutomobile 3.2Demonstrate the use of multimeter used for tracing different circuit 3.3 Illustrate development of different circuits used in automobile with the help of drawing. 3.4 Demonstrate trouble shooting of battery and their remedies. 3.5 Describe location and function of starter motor, wiper motor and dynastart 3.6 Troubleshoot problems of starter motor, wiper motor and their remedies. 3.7 Demonstrate overhauling of dynastartfollowingmanufacture'smanual
4	Diagnose and troubleshoot faults in different electrical and electronics sub-systems of a vehicle.	4.1 Describe location, application of different electrical components like • Different motors (AC & DC) • Battery • Ignition components: name and application, • Different light and • Different important sensors & actuator**:** name & applications • Alternator & application in Vehicle 4.2 Describe constructiondetailsofD.CGenerator&A.CGenerator 4.3 Explainworkingprinciple,specificationsofD.C&ACG e n e r a t o r 4.4 DemonstrateoverhaulingofD.C&ACG e n e r a t o r 4.5 Preparewiringharnessasperwiringdiagramproperly 4.6 Identify types, location and function of ignition system 4.7 Explain the application of Magneticpulsedistributorelectronicignitionsystem 4.8 Trouble shoot problems of ignition system including rectification of sparking problems
5	Diagnose and troubleshoot faults in electrical and electronics accessories of a vehicle**.**	5.1 Describe types of light used in automobile and their function 5.2 Demonstrate checking of faults in lighting circuits, fault location & rectification 5.3 DemonstrateidentifyinganEIchecklayoutofvariouslightingcircuit softhevehicle
6	Perform servicing, repairing, adjusting, testing and maintenance of electrical and electronics devices of a vehicle	6.1 Identify the function and location of engineanalyzer,autooscilloscope 6.2 Check fault Codes in a service station 6.3 Define OBD, Scanners and Analysers and their function

Tools and Equipment(For a batch of 30 candidate)

S No	Name of the Tools & Equipment	Specification	Quantity
TRAINEES TOOL KIT			
1.	Allen Key set of 12 pieces	2mm to 14mm	6+1 nos.
2.	Calliper inside with spring	15 cm	6+1 nos.
3.	Callipers outside with spring	15 cm	6+1 nos.
4.	Center Punch.	10 mm. Dia. x 100 mm	6+1 nos.
5.	Dividers with spring	15 cm	6+1 nos.
6.	Electrician Screw Driver	250mm	6+1 nos.
7.	Hammer ball peen with handle	0.5 kg	6+1 nos.
8.	Hands file for Second cut flat	20 cm.	6+1 nos.
9.	Philips Screw Driver set of 5 pieces	100 mm to 300 mm	6+1 nos.
10.	Pliers combination	20 cm	6+1 nos.
11.	Screw driver Blade	20cm.X 9mm.	6+1 nos.
12.	Screw driver Blade	30 cm. X 9 mm.	6+1 nos.
13.	Scriber	15 cm	6+1 nos.
14.	Spanner D.E. set of 12 pieces	6mm to 32mm	6+1 nos.
15.	Spanner, ring set of 12	6 to 32 mm. (metric)	6+1 nos.
16.	Spanners socket with speed handle, T-bar, ratchet and universal set of 28 pieces with box	up to 32 mm	6+1 nos.
17.	Steel rule	30 cm inch and metric	6+1 nos.
18.	Steel tool box with lock and key (folding type)	400x200x150 mm	6+1 nos.
19	Electric testing screw driver		4 nos.
GENERAL SHOP OUTFIT			
20	Battery –charger	Capable to charge batteries from 5AH – 150AH.	2 nos.
21	Electric Soldering Iron	230 V 60 watts – 230 V 25 watts	2 each
22	Feeler gauge 20 blades (metric)		4 nos.
23	File flat , bastard	20 cm	4 nos.
24	Grease Gun		2 nos.
25	Hacksaw frame adjustable	20-30 cm	12 nos.
26	Hammer Ball Peen	0.75 Kg	4 nos.
27	Hammer Mallet		4 nos.
28	Hammer Plastic		4 nos.
29	Oil can	0.5/0.25 liter capacity	4 nos.
31	Outside micrometer	0 to 25 mm	2 nos.
32	Spanner, adjustable	15cm	2 nos.
33	Torque wrenches	5-35 Nm, 12-68 Nm & 50-225 Nm	1 each
34	Circlip pliers Expanding and contracting	15 cm	4 nos.
35	Verniercalliper	0-300 mm with least count 0.02mm	2 nos.
36	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	4 nos.
37	Digital multi-meter		4 nos.
38	Demonstration board of MPFI system	With injectors, rail, inlet manifold, throttle body, distributor, ECU, purge valve, sensor, crank pulley, fuel tank module.	1 no.

39	Hydraulic jack HI-LIFT type	3 ton capacity	1 no.
40	Battery Charger	Capable to charge batteries from 5AH – 150AH.	1 no.
41	Electric Soldering Iron	230 V 60 watts	2 nos.
42	Punch Letter	4mm (Number)	2 sets
43	Work bench	250 x 120 x 60 cm with 4 vices 12cm Jaw	4 nos.
GENERAL SHOP OUTFIT			
44	All types of lights required in an automobile along with harness	Latest types of lights such as head light, tail light, different indicator lights, and all sensors, relay switches, wiring harness, all fitted on a test table & instrument cluster.	1 no.
45	Starter motor assembly.	Latest starter motor assembly along with wiring harness	1 no.
46	Wiper motor assembly	Latest Wiper motor assembly along with wiring harness	1 no.
CONSUMABLE			
47	Hacksaw blade (consumable)		As required
48	Steel wire Brush	50mmx150mm	5 nos.
49	Emery paper	36–60 grit , 80–120	As required
50	Battery	12 Volt	As required
51	Solder		As required
52	Cable		As required
53	Lubricating oil		
54	Deionized water		
CLASS ROOM FURNITURE FOR TRADE THEORY			
55	Instructor's table and Chair	Steel	1 set
56	Students chairs with writing pads		24 nos.
57	White board	Size 1200mm X 900 mm	1 no.
58	Instructors lap top with latest configuration pre-loaded with operating system and MS Office package.		1 no.
59	LCD projector with screen.		1 no.

Marks Distribution

Outcome	Outcome Code	Total Th marks	Total Pr marks	Total OJT marks
Maintain safety at the work site and housekeeping	AUT/0403/OC1	20	80	0
Perform precision measurements on the components and compare parameters with specifications used in automotive work shop practices.	AUT/0403/OC2	30	130	0
Locate and troubleshoot electrical components like starter motor, wiper motor and dynastart	AUT/0403/OC3	30	130	0
Diagnose and troubleshoot faults in different electrical and electronics sub-systems of a vehicle.	AUT/0403/OC4	30	130	0
Diagnose and troubleshoot faults in electrical and electronics accessories of a vehicle	AUT/0403/OC5	20	90	0
Perform servicing, repairing, adjusting, testing and maintenance of electrical and electronics devices of a vehicle.	AUT/0403/OC6	20	90	0
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	AUT/0403/OC7	0	0	150
Employability Skills – 60 Hrs	DGT/VSQ/N0102	50	0	0