Model Curriculum

Automotive Electrician

SECTOR: AUTOMOTIVE
SUB-SECTOR: AUTOMOTIVE VEHICLE SERVICE
OCCUPATION: TECHNICAL SERVICE & REPAIR
REF ID: ASC/Q1408, Version 1.0
NSQF LEVEL: 4

Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

for

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Automotive Electrician**' QP No. '**ASC/Q 1408 NSQF Level 4**'

Date of Issuance: **April 9th, 2016**

Valid up to*: **April 10rd, 2018**

**Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)*

Authorised Signatory
(Automotive Skills Development Council)

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Automotive Electrician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a "Automotive Electrician", in the "Automotive" Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	**Automotive Electrician**		
Qualification Pack Code	ASC/Q 1408		
Version No.	1.0	**Version Update**	06– 03– 2017
Pre-requisites to Training	Class 12th standard		
Training Outcomes	**After completing this programme, participants will be able to:** • **Carry out service and repairs of electrical and electronic faults in a vehicle:** Introduction to automobile electricals and electronics,Components/ aggregates of electricals and electronics, Repairing the electrical and electronic systems fault, Servicing any electrical/ electronic part within an aggregate Maintenance of tools and equipment, Maintenance of work place area, Trainings organized by OEM (This includes Petrol, Diesel, CNG, Electrical and Hybrid Vehicles) • **Plan and organize work to meet expected out comes,** plan & understand work content and output required in a given time, maintain set quality standards, identify and manage organizational resources efficiently and effectively. • **Work Effectively in a Team:-**know and follow organizational policies and procedures for working with colleagues. • **Maintain a healthy, safe and secure working environment: -** know prevailing environmental norms, government policies, and work to eliminate common breaches in health &safety.		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of "Automotive Electrician" Qualification Pack issued by "Automotive Skills Development Council".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	Introduction **Theory Duration** (hh:mm) 5:00 **Practical Duration** (hh:mm) 00:00	• Brief outline of the course and the scope • Knowledge about service process of an automobile workshop • Responsibilities of an automotive electrician and customer expectation • Job opportunities for an automotive electrician	Laptop White board, Marker, Projector, Stationery
2	**Carry out service and repairs of electrical and electronic faults in a vehicle.** **Theory Duration** (hh:mm) 105:00 **Practical Duration** (hh:mm) 180:00 **Corresponding NOS Code** ASC/N1406	At the end of the module the learner should be able to • Understand the auto component manufacturer specifications and functions related to the various electrical and electronic components and allied aggregates • Follow standard operating procedures for using workshop tools and equipment for repairing electrical/ electronic components in a vehicle • Assess the job card and identify and record the work to be carried out in the electrical/ electronic aggregates as indicated by the supervisor or service advisor • Make sure that the correct spare parts tools and other materials required for service and repair of the electrical/ electronic components have been obtained • Repair all electrical and electronic faults including direct and indirect faults • Remove, refit and test electrical components for normal operation following major/ minor body repair activities • Dismantle, assess, repair, clean, replace, adjust and reassemble vehicle electric and electronic units • Make sure that all dismantled components (other than the electrical or electronic components) are cleaned and conditioned prior to reassembly	Laptop White board, Marker, Projector, Stationery **Safety Equipment**: Safety gloves, Safety Goggles, Aprons, Safety shoes, Ear Plug, Hard hat, Respirator, Fire Extinguisher, First Aid kit **Measuring & testing Equipment**: Steel rule, Vernier callipers, Micrometer Feeler gauges, Flow metre Temp gauge Dial gauge, Analogue and digital multi-meters, Lab oscilloscopes, Data scanners, Test lights, Test LEDs, Pulse generators, Battery testing equipment, Hydrometer, Air bag scan tools, Graphing scanner, Fuel pressure testers Manifold gauges, Oil pressure gauges, Tire pressure gauges, A/c leakage tester, BC clamp meter, **Tools and other equipment:** Alignment wrenches Chain wrenches Locking wrenches, Lug wrenches, Scrapers, Hammers, Torque wrenches, Crimping tool, Screw driver set, Combination plier, Files, Allen key set,

Sr. No.	Module	Key Learning Outcomes	Equipment Required

		• Understand the various precautions to be taken to avoid damage to other components/aggregates of a vehicle while working on electrical/electronic aggregates
		• Make sure that the trainings organized by the OEM from time-to-time are attended and knowledge levels are upgraded (esp. In case of newly launched products, product refreshes)
		• repair and overhaul:
		  • stability/steering/ suspension systems (including electronic stability systems, vehicle dynamic control, closed loop electronic steering and multi-class Bus systems)
		  • electric over hydraulic systems (including garbage compactors, crane rams, steering control, excavator bucket control, steering rudder control etc.)
		  • engine management systems (including fuel cell technology/hydrogen, on line maintenance and remote diagnostics, common rail diesel direct injection, drive by wire, multi-class Bus systems and closed loop diesel engine management systems)
		  • transmission/driveline systems (including clutches, torque converters, mechanical and automatic transmissions, drive and power take-off shafts and differentials, macaronis modules and multi-class Bus systems)
		  • braking systems (including ABS, engine brakes, electric retarders, electric trailer brakes, brake by wire and multi-class Bus systems)
		  • safety systems (including fire suppressing, work load detecting, tyre pressure control, speed/load limiting, traction control, seat belt pre-tensioning, roll over protection, object detection, navigation aids, intelligent transport systems, intelligent SRS systems, adaptive cruise control, multi-class Bus systems, active and passive collision
			Adjustable hacksaw frame with blades, Inspection lamp with guard, Air compressor,
			Bench grinder, Fender covers, Hydraulic jacks, Oil draining and filling equipment, Parts washing station, Pneumatic tools, Post lift, Vehicle safety stands, Work benches, Bench vice
			
			Training Vehicles and cut sections:-
			• All types of vehicles covering petrol, diesel, electric , hybrid & CNG
			• Cut section of engine showing application of electric and electronic parts, wiring harness & circuits.
			Cleaning materials:
			Cleaning fluid, water, sponge, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		avoidance, infrared vision, lighting and windscreen wipers control) • monitoring/protection systems (including display types such as LCD, VFD, CRT, HUD, re-configurable systems, electronic analogue display, on board diagnostics, remote/wireless monitoring systems and multi-class Bus systems) • convenience and entertainment systems (including audio and visual units, compact disks, analogue tapes, radio, speaker types, amplifiers, crossovers, balancers, aerials and multi-class Bus systems) • theft deterrent systems (including remote keyless entry (RKE), immobiliser system design, passive entry systems, two way RKE, fingerprint technologies, rolling codes, transmitter and receiver operation, satellite systems) • electric and hybrid vehicle systems (including battery technology, motor drive systems, motor controllers, air conditioning systems, electronic protection systems and multi-class Bus systems) • climate control systems (including air conditioning, heating, blending systems and multi-class Bus systems) • gearbox, drive-train assembly and transmission systems (manual, automatic etc.) • electrical wire harness, lighting, ignition, electronic and air-conditioning systems etc. • electronic active and passive safety, media, comfort and convenience, supplementary restraint systems (SRS), networking and other systems • electronic control unit • hydraulic and pneumatic system • Repair all electrical and electronic faults including direct faults in: • input sensors • output actuators	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		• wiring harnesses • computer systems • calibration/adjustment specifications • component specifications • component assembly • component damage • system modifications	
3	**Plan and organize work to meet expected outcomes** **Theory Duration** (hh:mm) 15:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS Code** ASC/N001	At the end of the module the learner should be able to • Perform the job within given time as per quality standards/work schedule • Identify and manage resource and use it efficiently and effectively • Perform in accordance with the organisational policies and procedures • Manage his/her time effectively at work • Apply best practices to keep workplace clean • Acquire knowledge and understanding required for planning & organising.	Whiteboard/ Markers, Computer, Projector, screen typical 5 S literature
4	**Work effectively in a team** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 20:00 **Corresponding NOS** Code ASC/N 0002	At the end of the module the learner should be able to • Interact & communicate effectively with • colleagues including members in the own group as well as other groups • Use all forms of verbal and non-verbal methods to communicate clearly and effectively with colleagues, supervisors, • customers and other stakeholders • Judge customers' body language and use an appropriate approach to deal with them • Apply the best practices for grooming to look presentable and make good impression on customers • Use proper personal etiquettes at workplace • Acquire knowledge and understanding required for team working	Whiteboard/ Markers, Computer, Projector, screen, case studies
5	**Maintain a Healthy, Safe and Secure working environment**	• Perform as per organisation policies & procedures to maintain a safe, secure working environment • Maintain safe & secure workplace	Whiteboard/ Markers, Computer, Projector, Fire extinguisher, First aid, , BS IV-VI and disposal of hazardous items and parts to

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	Theory Duration (hh:mm) 15:00 **Practical Duration** (hh:mm) 25:00 **Corresponding NOS** Code ASC/N0003	• Use best practice to remove potential hazards at workplace and prevent accidents • Apply appropriate strategies to deal with emergencies and accidents at workplace • Apply relevant norms to the vehicles and spare parts to ensure no damage to the environment	provide an overview
	Total Duration **Theory Duration** (hh:mm) 150:00 **Practical Duration** (hh:mm) 250:00	**Unique Equipment Required:** Laptop White board, Marker, Projector, Stationery, Safety gloves, Safety Goggles, Aprons, Safety shoes, Ear Plug, Hard hat, Respirator, Fire Extinguisher, First Aid kit, Steel rule, Vernier callipers, Micrometer Feeler gauges, Flow metre Temp gauge Dial gauge, Analogue and digital multi-meters, Lab oscilloscopes, Data scanners, Test lights, Test LEDs, Pulse generators, Battery testing equipment, Hydrometer, Air bag scan tools, Graphing scanner, Fuel pressure testers Manifold gauges, Oil pressure gauges, Tire pressure gauges, A/c leakage tester, BC clamp meter, Alignment wrenches Chain wrenches Locking wrenches, Lug wrenches, Scrapers, Hammers, Torque wrenches, Crimping tool, Screw driver set, Combination plier, Files, Allen key set, Adjustable hacksaw frame with blades, Inspection lamp with guard, Air compressor, Bench grinder, Fender covers, Hydraulic jacks, Oil draining and filling equipment, Parts washing station, Pneumatic tools, Post lift, Vehicle safety stands, Work benches, Bench vice, Cleaning fluid, water, sponge, Cleaning cloth, Waste container, Dust pan & brush set, Liquid soap, Hand towel, Safety signs, SOP Charts on safety norms and drills, Charts of Dos and Don’ts in work area Training Vehicles and cut sections:- • All types of vehicles covering petrol, diesel, electric , hybrid & CNG • Cut section of engine showing application of electric and electronic parts, wiring harness & circuits	

Grand Total Course Duration: 400Hours, 0 Minutes

*(This syllabus/ curriculum has been approved by**Automotive Skills Development Council***

Trainer Prerequisites for Job role: "Automotive Electrician" mapped to Qualification Pack: "ASC/Q1408, Version 1.1"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "ASC/Q1408".
2	**Personal Attributes**	• Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. • Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused. • Eager to learn and keep oneself abreast of the latest developments and newer technologies used in the various systems of the vehicle and its aggregates is highly desirable. • Should be able to demonstrate the usage of workshop equipment, instruments, special instruments and tools. • Should have sharp diagnostic abilities for identifying reasons of problems in vehicles and troubleshoot. • Should be hands-on with servicing of vehicles to provide experiential training.
3	**Minimum Educational Qualifications**	ITI/ Diploma /Engineer (mechanical engineering) from a recognized institute
4a	**Domain Certification**	Certified for Job Role: "Automotive Electrician" mapped to QP: ASC/Q1408. Minimum qualifying score-80 %, as per ASDC guidelines.
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "SSC/1402". Minimum qualifying score-80%, as per ASDC guidelines.
5	**Experience**	▪ Minimum 3 years of experience in Automotive Service Industry for ITI ▪ Minimum 2 years of experience in Automotive Service Industry for Diploma/ Engineer (mechanical engineering) ▪ Working experience on latest tools and equipments used for vehicle servicing

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Automotive Electrician
Qualification Pack	ASC/Q1408, V1.1
Sector Skill Council	Automotive

Sr. No.	Guidelines for Assessment
1	Assessment to be conducted by ASDC as per competency output defined in the NOS/QP an d theassessment criteria provided in the NOS/QP
2	Assessment to be carried out by a third party Assessment Body duly affiliated to the SSC.
3	ASDC assessments will be comprehensive and cover all aspects of acquired knowledge, Practical skills and also basic ability to communicate. Accordingly, evaluation process would include: i. Theory/Knowledge test ii. Practical demonstration test iii. Face to Face Viva-Voce
4	Theory/Knowledge assessment will be carried out on line throughalink provided for eachassessment that generates a random paper from a bank of questions available at the back end. - Exception to an online test in favour of Paper Test would be subject to non-availability of requisitebroad band and/or hardware. - On line test would be conducted in the presence of an ASDC assessor till web enabled proctoringis deployed.
5	ASDC assessor would be conducting Practical and Viva as per the criteria provided in the NOS/QP.
6	Cut off criteria for certification (Marks obtained in %):80 %

NOS Title/ NOS Elements	NOS & Performance Criterion Description	Marks allocation		
ASC/N 1406	**Carry out Service &major repair of the electrical & electronic faults in a vehicle**	**Theory**	**Viva**	**Practical**
Service and repairs in electrical & electronic aggregates	To be competent, the user/individual on the job must be able to: PC1. understand the auto component manufacturer specifications related to the various electrical and electronic components and allied aggregates PC2. follow standard operating procedures for using workshop tools and equipment for repair of electrical/ electronic components in a vehicle PC3. review the job card and understand work to be carried out in the electrical/ electronic aggregates as indicated by the supervisor or service advisor PC4. ensure that the correct spare parts tools and other materials required for service and repair of the electrical/ electronic components have been obtained PC5. repair and overhaul: • stability/steering/ suspension systems (including electronic stability systems, vehicle dynamic control, closed loop electronic steering and multi-class Bus systems) • Electric over hydraulic systems (including garbage compactors, crane rams, steering control, excavator bucket control, steering rudder control etc). • engine management systems (including fuel cell technology/hydrogen, on line maintenance and remote diagnostics, common rail diesel direct injection, drive by wire, multi-class Bus systems and closed loop diesel engine management systems) • transmission/driveline systems (including clutches, torque converters, mechanical and automatic transmissions, drive and power take-off shafts and differentials, mechatronic modules and multi-class Bus systems) • braking systems (including ABS, engine brakes, electric retarders, electric trailer brakes, brake by wire and multi-class Bus systems) • safety systems (including fire suppressing, work load detecting, tyre pressure control, speed/load limiting, traction control, seat belt		5 15	15 30

	pre-tensioning, roll over protection, object detection, navigation aids, intelligent transport systems, intelligent SRS systems, adaptive cruise control, multi-class Bus systems, active and passive collision avoidance, infrared vision, lighting and windscreen wipers control) • monitoring/protection systems (including display types such as LCD, VFD, CRT, HUD, re-configurable systems, electronic analogue display, on board diagnostics, remote/wireless monitoring systems and multi-class Bus systems) • convenience and entertainment systems (including audio and visual units, compact disks, analogue tapes, radio, speaker types, amplifiers, crossovers, balancers, aerials and multi-class Bus systems) • theft deterrent systems (including remote keyless entry (RKE), immobiliser system design, passive entry systems, two way RKE, fingerprint technologies, rolling codes, transmitter and receiver operation, satellite systems) • electric and hybrid vehicle systems (including battery technology, motor drive systems, motor controllers, air conditioning systems, electronic protection systems and multi-class Bus systems) • climate control systems (including air conditioning, heating, blending systems and multi-class Bus systems) • Gearbox, drive-train assembly and transmission systems (manual, automatic etc). • Electrical wire harness, lighting, ignition, electronic and air-conditioning systems etc. • electronic active and passive safety, media, comfort and convenience, supplementary restraint systems (SRS), networking and other systems • electronic control unit • hydraulic and pneumatic system PC6. repair all electrical and electronic faults including direct faults in: • input sensors		20	40

	• output actuators • wiring harnesses • computer systems • calibration/adjustment specifications • component specifications • component assembly • component damage • system modifications PC7. repair indirect faults caused on the major mechanical or other aggregates by the influence of electrical and electronic aggregate (e.g. influence of improper working on the ECU might have damaged the charging of the alternator PC8. remove, refit and test electrical components for normal operation following major/ minor body repair activities PC9. dismantle, assess, repair, clean, replace, adjust and reassemble vehicle electric and electronic units PC10. ensure all dismantled components (other than the electrical or electronic components) are cleaned and conditioned prior to reassembly PC11. ensure disposal of materials (including scrap of failed parts/ aggregates) in accordance with the organisation's policies PC12. understand the various precautions to be taken to avoid damage to other components/ aggregates of a vehicle while working on electrical/ electronic aggregates PC13. record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure PC14. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary PC15. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC16. request assistance from a senior technician or aggregate specialist when required PC17. inform the relevant persons where repairs are economically or technically infeasible PC18. ensure that trainings organized by the OEM from time-to-time are attended and knowledge levels are upgraded (esp. in case of newly launched products, product refreshes)		10 10	30 25
	Subtotal		**60**	**140**

ASC/N 0001	Plan & organize work to meet expected outcome	Theory	Viva	Practical
Work requirements including various activities within the given time and set quality standards	To be competent, the user/individual on the job must be able to: PC1. keep immediate work area clean and tidy PC2. treat confidential information as per the organisation's guidelines PC3. work in line with organisation's policies and procedures PC4. work within the limits of job role PC5. obtain guidance from appropriate people, where necessary PC6. ensure work meets the agreed requirements		15	30
Appropriate use of resources	PC7. establish and agree on work requirements with appropriate people PC8. manage time, materials and cost effectively PC9. use resources in a responsible manner		20	40
	Subtotal		**35**	**70**
ASC/N 0002	**Work effectively in a team**	**Theory**	**Viva**	**Practical**
Interact & communicate effectively with colleagues including member in the own group as well as other groups	To be competent, the user/individual on the job must be able to: PC1. maintain clear communication with colleagues (by all means including face-to-face, telephonic as well as written) PC2. work with colleagues to integrate work PC3. pass on information to colleagues in line with organisational requirements both through verbal as well as non-verbal means PC4. work in ways that show respect for colleagues PC5. carry out commitments made to colleagues PC6. let colleagues know in good time if cannot carry out commitments, explaining the reasons PC7. identify problems in working with colleagues and take the initiative to solve these problems PC8. follow the organisation's policies and procedures for working with colleagues		30	70
	Subtotal		**30**	**70**
ASC/N 0003	**Maintain a healthy, safe and secure working environment**	**Theory**	**Viva**	**Practical**
Resources needed to maintain a safe,	To be competent, the user/individual on the job must be able to:			

secure working environment	PC1. comply with organisation's current health, safety and security policies and procedures PC2. report any identified breaches in health, safety, and security policies and procedures to the designated person PC3. Coordinate with other resources at the workplace to achieve the healthy, safe and secure environment for all incorporating all government norms esp. for emergency situations like fires, earthquakes etc. PC4. identify and correct any hazards like illness, accidents, fires or any other natural calamity safely and within the limits of individual's authority PC5. report any hazards outside the individual's authority to the relevant person in line with organisational procedures and warn other people who may be affected PC6. follow organisation's emergency procedures for accidents, fires or any other natural calamity PC7. identify and recommend opportunities for improving health, safety, and security to the designated person PC8. complete all health and safety records are updates and procedures well defined		30	65
	Subtotal		**30**	**65**
	Total	**15**	**155**	**345**