Automotive Skills Development Council

QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR AUTOMOTIVE INDUSTRY

Contents

What are Occupational Standards (OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Introduction

Qualifications Pack-Auto Service Technician Level 6

SECTOR: AUTOMOTIVE

SUB-SECTOR: AUTOMOTIVE VEHICLE SERVICE

OCCUPATION: TECHNICAL SERVICE & REPAIR

JOB ROLE: AUTO SERVICE TECHNICIAN LEVEL 6

REFERENCE ID: ASC/ Q 1404

ALIGNED TO: NCO-2004/Nil

Auto Service Technician Level 6 is also known as Master Technician, Master Mechanic, Senior Technician, Technical Manager, *Mistry and Ustaad*.

Brief Job Description: An Auto Service Technician Level 6 is responsible for managing advanced diagnosis and repairs. The individual carries out all types of diagnosis of faults and repairs and is responsible for supervising work of other technicians/senior technicians.

Personal Attributes: An individual on this job must have good communication and interpersonal skills in addition to being a team player, as the job requires coordination with other technicians during diagnosis. The individual must have a technical bend of mind to understand the technical aspects related to various aggregates in a vehicle, to assist in the fault diagnosis. The individual should be proactive, process and customer centric with ability to guide junior technicians. Keeping oneself abreast of the latest developments and newer technologies used in the various systems of the vehicle and its aggregates is highly desirable.

Job Details

Qualifications Pack Code	**ASC/ Q 1404**		
Job Role	**Auto Service Technician Level 6**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**12/06/13**
Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**12/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**
NSQC Clearance on	**28/09/15**		

Job Role	**Auto Service Technician Level 6**
Role Description	Responsible for managing advanced diagnosis and repairs and supervising a team of technicians.
NSQF level	6
Minimum Educational Qualifications	Diploma in Mechanical/Automobile Engineering
Maximum Educational Qualifications	Bachelors in Mechanical/Electrical/Automobile Engineering
Training	On the job training: • Desirable for ASDC Auto Service Technician Level 6 Certificate or Bachelor's in Mechanical/ Electrical/ Automobile Engineering • Compulsory for all other qualifications
Minimum Job Entry Age	1 ASDC recommends that candidates should seek full employment not before attaining an age of 18 years. 2 However, as per Factories Act 1948 and Shops & Establishment Act 1953 - No one can be employed before attaining the age of 14 3 Please note that under the Factories Act 1948, and Shops & Establishment Act 1953 different States may have slightly varying provision, which need to be adhered to.
Experience	• 1-2 years if ASDC Auto Service Technician Level 6 Certificate or Bachelor's in Mechanical/ Electrical/ Automobile Engineering • 5 - 8 years for other qualifications

Occupational Standards (OS)	**Compulsory:** **ASC/ N 1407:** Carry out advanced diagnosis of vehicle for engine and other mechanical repairs requirement **ASC/ N 1408:** Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements **ASC/ N 1409:** Carry out servicing, repairs and overhauling of a vehicle (Advanced) **ASC/ N 1410:** Carry out electrical and electronic repairs and overhauling of a vehicle (Advanced) **ASC/ N 1411:** Liaise with external automotive stakeholders **ASC/ N 0001:** Plan and organise work to meet expected outcomes **ASC/ N 0002:** Work effectively in a team **ASC/ N 0003:** Maintain a healthy, safe and secure working environment **Optional:** N.A.
Performance Criteria	As described in the relevant NOS units

Definitions

Keywords /Terms	Description
Core Skills/Generic Skills	Core Skills or Generic Skills are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.
Dealership	A business established or operated under an authorisation to sell or distribute an automotive company's goods and services
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate NOS they are looking for.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Knowledge and Understanding	Knowledge and Understanding are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
National Occupational Standards (NOS)	NOS are Occupational Standards which apply uniquely in the Indian context.
Occupation	Occupation is a set of job roles, which perform similar/related set of functions in an industry.
Organisational Context	Organisational Context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Performance Criteria	Performance Criteria are statements that together specify the standard of performance required when carrying out a task.
Qualifications Pack(QP)	Qualifications Pack comprises the set of NOS, together with the educational, training and other criteria required to perform a job role. A Qualifications Pack is assigned a unique qualification pack code.
Qualifications Pack Code	Qualifications Pack Code is a unique reference code that identifies a qualifications pack.
Scope	Scope is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.
Sector	Sector is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.

Sub-Sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Sub-functions	Sub-functions are sub-activities essential to fulfil the achieving the objectives of the function.
Technical Knowledge	Technical Knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Unit Code	Unit Code is a unique identifier for an NOS unit, which can be denoted with an '**N**'.
Unit Title	Unit Title gives a clear overall statement about what the incumbent should be able to do.
Vehicle	Mode of personal transport including 2-wheelers, 3-wheelers and 4-wheelers (including passenger vehicles and commercial vehicles). This includes gasoline, petrol, CNG, electrical and hybrid vehicles
Vertical	Vertical may exist within a sub-sector representing different domain areas or the client industries served by the industry.

Acronyms

Keywords /Terms	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
OEM	Original Equipment Manufacturer
OS	Occupational Standard(s)
QP	Qualifications Pack

ASC/ N 1407 **Carry out advanced diagnosis of vehicle for engine and other mechanical repairs requirement**

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of an individual to diagnose advanced faults and troubleshoot problems in a vehicle, including 2-wheelers, 3-wheelers and 4-wheelers (including passenger vehicles and commercial vehicles). This also includes diesel, petrol, CNG, electrical and hybrid vehicles.

ASC/ N 1407 **Carry out advanced diagnosis of vehicle for engine and other mechanical repairs requirement**

National Occupational Standard

Unit Code	ASC/ N 1407
Unit Title (Task)	Carry out advanced diagnosis of vehicle for engine and other mechanical repairs requirement
Description	This NOS unit is about diagnosing advanced faults in vehicle and troubleshooting problems.
Scope	This unit/task covers the following: • identify various operational faults in the mechanical systems of the vehicle • complete diagnosing & repair requirements in the engine and other mechanical aggregates
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Carry out advance diagnosis for operational faults in the mechanical aggregates	To be competent, the user/individual on the job must be able to: PC1. identify and explain the functioning of each system, component and aggregate of a vehicle PC2. obtain sufficient information from the job card and customer/ service advisor to make an assessment of service and repair needs of the vehicle PC3. review the job card and develop clear and complete understanding of customer complaints PC4. use checklists and standard OEM operating procedures as per the vehicle service manual to confirm need for servicing, replacement of oils, filters and other parts etc. PC5. conduct routine and non-routine inspections for vehicle fitness assessment, emission testing, safety assessment, post-accident diagnostic assessment, post-repair serviceability assessment and manufacturer recall assessment PC6. ensure any additional malfunctions or repair requirements observed in the vehicle are reported to the service advisor and discussed with the customer PC7. follow standard operating procedures as prescribed by the suppliers in the user manuals of workshop tools and equipment PC8. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary PC9. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC10. conduct inspection of the engine and all other mechanical parts & aggregates to diagnose need for repairs or adjustment PC11. conduct test drives to assess need for repairs, calibration or adjustment PC12. supervise dismantling and reassembly of aggregates of a vehicle for the purpose of diagnosing faults PC13. compare results of diagnostic inspections and tests against vehicle specifications and any regulatory requirements PC14. utilise various tools including computer-based diagnostic tools for accurate assessment of vehicle's operating parts and systems

	PC15. prepare a list of all the service, repair and replacement requirements of the vehicle PC16. finalise the list of all the service, repair and replacement requirements of the vehicle in consultation with service advisor PC17. ensure safe movement and parking of the vehicle in the workshop PC18. supervise junior technicians in their work PC19. 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) PC20. drive a relevant 2/3/4 wheeler vehicle which is an important part of the diagnosis of the type of vehicle that is dealt by the relevant OEM
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. standard operating procedures of the organisation/ dealership for inspection and diagnosis of faults in a vehicle KA2. standard operating procedures recommended by the dealership/ suppliers/OEM for using tools and equipment KA3. safety requirements for equipment and components (e.g. preventing/ dealing with oil spillage and inflammable materials) KA4. documentation requirements for each procedure carried out KA5. organizational and professional code of ethics and standards of practice KA6. safety, health, environmental policies and regulations for the workplace as well as for automotive trade in general (e.g. safe practices while working in pits/ under vehicles)
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. the basic technology used in and functioning of various components and aggregates of the vehicle including: • engine and fuel system (diesel, petrol, electrical, gas, hybrid etc.) • cooling system • air supply systems • emission and exhaust system • ignition systems • clutch assembly • clutch operating system • gearbox (manual and automatic) • drivelines and hubs • drive-train assembly and transmission systems (manual, automatic etc.) • steering system • suspension system • brake system (including regenerative braking systems)

	• tyres and wheels (including wheel alignment) • radiator • batteries and power storage system • power-generating systems (including charging systems especially for electrical and hybrid vehicles) • electrical wire harness, lighting, ignition, electronic and air-conditioning systems etc. • energy recuperation systems, if applicable (e.g. in electric, gas and hybrid vehicles) • electronic active and passive safety, media, comfort and convenience, supplementary restraint systems (SRS), networking and other systems • electronic control unit • hydraulic and pneumatic system • various lubrication systems KB2. the tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including use of: • organic light emitting displays — anti-lock braking system abs/air bag scan tools, automotive scanners, graphing scanners, modular diagnostic information systems • pressure indicators: fuel pressure testers, manifold gauge sets, oil pressure gauges, tire pressure gauges • measuring equipment: Vernier callipers, micrometre, feeler gauges, spanner, compression gauge, brake fluid tester, brake fluid bleeding equipment, refractometer, radiator pressure gauge, hydrometer, thermometer, strut compressor, bearing installer, installer and puller for bearings, oil seal installer and mandrel, AC manifold gauge, multi-metre, flow metre, temp gauge, dial gauge etc. • other tools: laptops KB3. the various sources of information available for assessing service and repair requirements of the vehicle including: • diagnostic displays • visual inspections • test drives • vehicle/equipment manufacturer specifications • standard operating procedures for diagnosis KB4. typical symptoms of common technical faults in a vehicle including fluid levels, leaks, wear and tear, damage to a part/ aggregate and need for adjustments KB5. basic computer skills including the following: • OEM specific computer applications • basic computer based tasks (e.g. use of productivity tools such as word, excel etc.)

	• basic internet based tasks (e.g. accessing and responding to emails etc.)
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing skills**
	The user/ individual on the job needs to know and understand how to: SA1. complete and maintain workplace record son inspection, diagnosis and repair activities SA2. maintain all office records required on the job (e.g. stock records, job cards, repair quotations, personnel records, time sheets, meeting notes etc.) SA3. record all diagnostic inspections and tests carried out on a vehicle SA4. write in at least one language
	Reading skills
	The user/individual on the job needs to know and understand how to: SA5. read and interpret workplace related documentation
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. clearly communicate workplace information and ideas with workplace colleagues (verbal and non-verbal) SA7. use terms, names, grades, and other nomenclature pertaining to the automotive trade, tools, specific workshop equipment etc. SA8. communicate with colleagues to handle verbal enquiries, such as clarifying instructions and responding to requests for information
B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. determine the nature and objective of the analysis and evaluation required and decide on the diagnostic techniques to be applied
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan work assigned on a daily basis and provide estimates of time required for each piece of work(e.g. by evaluating work assigned on a job card and providing time estimates for each service/ repair activity) SB3. organise the workplace and work according to the principles of 5S SB4. prioritise actions to achieve required outcomes
	Customer Centricity
	The user/individual on the job needs to know and understand how to:

	SB5. interpret the needs of customers by evaluating job cards and talking to service advisor and superiors SB6. ensure that customer needs are assessed and satisfactory service is provided SB7. follow up with the service advisor on any unfavourable feedback received from customer
	Problem solving
	The user/individual on the job needs to know and understand how to: SB8. recognise a workplace problem or a potential problem and take action SB9. determine problems needing priority action SB10. refer problems outside area of responsibility to concerned person(e.g. unavailability of required spare parts or materials in the workshop) SB11. gather information and provide assistance as required to solve problems
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB12. analyse the complexity of work to determine if it can be successfully carried out
	Critical thinking
	The user/individual on the job needs to know and understand how to: SB13. analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

ASC/ N 1407: Carry out advanced diagnosis of vehicle for engine and other mechanical repairs requirement

NOS Version Control

NOS Code	**ASC/ N 1407**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**12/06/13**
Industry Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**12/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of an individual to diagnose advanced electrical and electronic faults and troubleshoot problems in a vehicle, including 2-wheelers, 3-wheelers and 4-wheelers (including passenger vehicles and commercial vehicles). This also includes diesel, petrol, CNG, electrical and hybrid vehicles.

ASC/ N 1408: Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements

National Occupational Standard

Unit Code	ASC/ N 1408
Unit Title (Task)	Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements.
Description	This NOS unit is about diagnosing advanced faults in vehicle and troubleshooting problems.
Scope	This unit/task covers the following: • identify and diagnose advanced electrical and electronic faults in a vehicle

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Carry out advance diagnosis for faults in the electrical and electronic aggregates	To be competent, the user/individual on the job must be able to: PC1. identify and explain the functioning of various electrical systems, components and aggregates of a vehicle PC2. obtain sufficient information from customer/ service advisor to make an assessment of service and repair needs of the vehicle PC3. review the job card and understand customer complaints PC4. use checklists and standard OEM operating procedures to confirm need for servicing, replacement of oils, filters and other parts etc. PC5. follow standard operating procedures for using workshop tools and equipment PC6. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary PC7. ensure any additional malfunctions or repair requirements observed in are reported to the service advisor and discussed with the customer PC8. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC9. conduct routine and non-routine inspections for pre-purchase assessment, vehicle fitness assessment, emission testing, safety assessment, post-accident diagnostic assessment, post-repair serviceability assessment and manufacturer recall assessment PC10. select the most appropriate analytical and evaluative methodology including diagnostic process, sequence, tests and testing equipment PC11. identify, select and prepare tools and material required for the specific diagnostic process PC12. prepare system components for the diagnostic process including park-up, isolation and cleaning requirements PC13. conduct inspection of electrical and electronic systems including: • 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 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) PC2. diagnose need for repairs, adjustment or part replacement in electrical and electronic systems PC3. conduct test drives to assess need for repairs, calibration or adjustment PC4. compare results of diagnostic inspections and tests against vehicle specifications and any regulatory requirements PC5. prepare a list of all the service, repair and replacement requirements of the vehicle PC6. finalise the list of all the service, repair and replacement requirements of the vehicle in consultation with service advisor PC7. ensure safe movement and parking of the vehicle in the workshop PC8. assist junior technicians in their work PC9. utilise any computer-based diagnostic applications PC10. 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) PC11. drive a relevant 2/3/4 wheeler vehicle which is an important part of the diagnosis of the type of vehicle that is dealt by the relevant OEM

ASC/ N 1408: Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements

Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. standard operating procedures of the organization/ dealership for inspection and diagnosis of faults in a vehicle KA2. standard operating procedures recommended by the dealership/ suppliers/OEM for using tools and equipment KA3. safety requirements for equipment and components (e.g. preventing/ dealing with oil spillage and inflammable materials) KA4. documentation requirements for each procedure carried out KA5. organizational and professional code of ethics and standards of practice KA6. safety, health, environmental policies and regulations for the workplace as well as for automotive trade in general (e.g. safe practices while working in pits/ under vehicles)
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. the basic technology used in and functioning of various components and aggregates of the vehicle including: • engines and fuel system (diesel, petrol, electrical, gas, hybrid etc.) • cooling system • air supply systems • emission and exhaust system • ignition systems • clutch assembly • clutch operating system • gearbox (manual and automatic) • drivelines and hubs • drive-train assembly and transmission systems (manual, automatic etc.) • steering system • suspension system • brake system (including regenerative braking systems) • tyres and wheels (including wheel alignment) • radiator • batteries and power storage system • power-generating systems (including charging systems especially for electrical and hybrid vehicles) • electrical wire harness, lighting, ignition, electronic and air-conditioning systems etc. • energy recuperation systems, if applicable (e.g. in electric, gas and hybrid vehicles)

ASC/ N 1408: Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements

	• electronic active and passive safety, media, comfort and convenience, supplementary restraint systems (SRS), networking and other systems • electronic control unit • hydraulic and pneumatic system • various lubrication systems KB2. basic principles of: • ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction etc. • vehicle earthing and earthing methods • vehicle engine systems (e.g. types, applications and operation of sensors, actuators, etc.) • types of circuit protection and their use • electrical safety procedures • the operation of warning, charging and starter circuits • symbols, units and terms associated with electric systems and components • battery charging • electrical/electronic control systems • operation of electronic and electric engine systems (including electrical component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fiber optics principles) • electrical theory and operation covering automotive digital computers, networked vehicles, voltage, current, resistance, power, capacitance, electrostatics, magnetics, inductance, discrete electronic components, logic families, and radio frequency KB3. the tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including use of: • measuring equipment: analogue and digital multi-meters, lab oscilloscopes, data scanners, test lights, test LEDs, pulse generators etc. • electrical and electronic testing equipment: voltmeters, ammeters, ohmmeters, battery testing equipment, dedicated and computer based diagnostic equipment, oscilloscopes, scanner, battery tester, cell discharge tester, hydrometer, multimeter etc. • other tools: laptops KB4. the theory of diagnosis including concept, design and planning KB5. types, functions, operations and limitations of diagnostic testing equipment KB6. methods and processes for recording and reporting diagnostic findings and recommendations KB7. the tests used to assess and confirm technical faults that cannot be determined through a visual inspection, including testing: • wiring and connector integrity • operator and specification of input and output devices

ASC/ N 1408: Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements

	• controlling electronic components and computers • readings related to direct, indirect and intermittent causes KB8. the various sources of information available for assessing service and repair requirements of the vehicle including: • diagnostic displays • visual inspections • test drives • vehicle/equipment manufacturer specifications • standard operating procedures for diagnosis KB9. typical symptoms of common technical faults in a vehicle including fluid levels, leaks, wear and tear, damage to a part/ aggregate and need for adjustments KB10. basic computer skills including the following: • OEM specific computer applications • basic computer based tasks (e.g. use of productivity tools such as word, excel etc.) • basic internet based tasks (e.g. accessing and responding to emails etc.)
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing skills**
	The user/ individual on the job needs to know and understand how to: SA1. complete and maintain workplace record son inspection, diagnosis and repair activities SA2. maintain all office records required on the job (e.g. stock records, job cards, repair quotations, personnel records, time sheets, meeting notes etc.) SA3. record all diagnostic inspections and tests carried out on a vehicle SA4. write in at least one language
	Reading skills
	The user/individual on the job needs to know and understand how to: SA5. read and interpret workplace related documentation (e.g. stock records, job cards, repair quotations, personnel records, time sheets, meeting notes etc.)
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA6. clearly communicate workplace information and ideas with workplace colleagues (verbal and non-verbal) SA7. use terms, names, grades, and other nomenclature pertaining to the automotive trade, tools, specific workshop equipment etc. SA8. communicate with colleagues to handle verbal enquiries, such as clarifying instructions and responding to requests for information

ASC/ N 1408: Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements

B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. determine the nature and objective of the analysis and evaluation required and decide on the diagnostic techniques to be applied
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan work assigned on a daily basis and provide estimates of time required for each piece of work(e.g. by evaluating work assigned on a job card and providing time estimates for each service/ repair activity) SB3. organise the workplace and work according to the principles of 5S SB4. prioritise actions to achieve required outcomes
	Customer centricity
	The user/individual on the job needs to know and understand how to: SB5. interpret the needs of customers SB6. ensure that customer needs are assessed and every effort is made to provide satisfactory service
	Problem solving
	The user/individual on the job needs to know and understand how to: SB1. recognise a workplace problem or a potential problem and take action SB2. determine problems needing priority action SB3. refer problems outside area of responsibility to concerned person(e.g. unavailability of required spare parts or materials in the workshop) SB4. gather information and provide assistance as required to solve problems
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB5. analyse the complexity of work to determine if it can be successfully carried out
	Critical thinking
	The user/individual on the job needs to know and understand how to: SB6. analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

ASC/ N 1408: Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements

NOS Version Control

NOS Code	**ASC/ N 1408**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**12/06/13**
Industry Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**12/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of an individual to carry out servicing, repairs& overhauling of mechanical systems of a vehicle, including 2-wheelers, 3-wheelers and 4-wheelers (including passenger vehicles and commercial vehicles). This also includes diesel, petrol, CNG, electrical and hybrid vehicles.

National Occupational Standard

Unit Code	ASC/ N 1409
Unit Title (Task)	Carry out servicing, repairs and overhauling of a vehicle (Advanced)
Description	This NOS unit is about an individual carrying out repairs and overhauling of mechanical, electrical and electronic systems of a vehicle.
Scope	This unit/task covers the following: • repair and overhauling of engine and related aggregates • repair and overhauling of other mechanical aggregates and systems

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Advanced repair and overhauling of engine and mechanical aggregates	To be competent, the user/individual on the job must be able to: PC1. ensure that the correct spare parts, lubricants, tools and other materials required have been obtained PC2. service, repair and overhaul: • engine and fuel system (diesel, petrol, electrical, gas etc.) • radiator • emission and exhaust system • brake system • clutch assembly • gearbox, drive-train assembly and transmission systems (manual, automatic etc.) • steering system • suspension system • 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 • tyres and wheels • cooling system • hydraulic and pneumatic system • various lubrication systems PC3. carry out service, repair and overhauling activities safely to ensure: • no damage to the vehicle or other vehicles • no damage to vehicle components and systems • no contact with hazardous materials PC4. remove, refit and test electrical components for normal operation following body repair activities PC5. dismantle, assess, repair, clean, replace, adjust and reassemble vehicle

	mechanical, electric and electronic units PC6. ensure all dismantled components are cleaned and conditioned prior to reassembly PC7. conduct routine and non-routine inspections for vehicle fitness assessment, emission testing, safety assessment and post-repair serviceability assessment PC8. ensure disposal of materials in accordance with the organisation's policies PC9. ensure, in consultation with the service advisor, approval of the customer on all repairs carried out PC10. record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure PC11. follow standard operating procedures for using workshop tools and equipment PC12. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary PC13. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC14. use resources responsibly (e.g. use of grease and other consumables) PC15. assist junior technicians in their work PC16. inform the relevant persons where repairs are economically or technically infeasible PC17. utilise any computer-based applications relevant to repairs and installations 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)
Knowledge and Understanding (K) w.r.t. the Scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. standard operating procedures for servicing, repair and replacement of parts KA2. safety requirements for equipment and components prescribed by the OEM (e.g. preventing/ dealing with oil spillage and inflammable materials) KA3. identification codes, nomenclature and grades of lubricants, components and aggregates KA4. standard operating procedures recommended by the dealership/ suppliers/ OEM for using tools and equipment KA5. standard operating procedures for rectification of errors in information (e.g. rectification of job card, reissue of correct tools and equipment etc.) KA6. documentation requirements for each procedure carried out KA7. organisational and professional code of ethics and standards of practice KA8. safety, health and environmental policies and regulations for the workplace and the general automotive trade (e.g. safe working practices inside pits/ under vehicles) KA9. regulatory requirements for vehicles including road safety, refrigerant handling, fuel storage and other requirements

	KA10. operating specifications provided by the OEM for limits, fits and tolerances relating to engine mechanical, electrical, electronic and hydraulic and fluid systems for the vehicle
B Technical Knowledge	The user/individual on the job needs to know and understand: KB1. the basic technology used in and functioning of various components and aggregates of the vehicle including: • engines and fuel system (diesel, petrol, electrical, gas etc.) • radiator • emission and exhaust system • brake system • clutch assembly • gearbox, drive-train assembly and transmission systems (manual, automatic etc.) • steering system • suspension system • 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 • tyres and wheels • cooling system • hydraulic and pneumatic system • various lubrication systems KB2. basic principles of: • Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction etc. • vehicle earthing and earthing methods • vehicle engine systems (e.g. types, applications and operation of sensors, actuators, etc.) • types of circuit protection and their use • electrical safety procedures • the operation of warning, charging and starter circuits • symbols, units and terms associated with electric systems and components • battery charging • electrical/electronic control systems • operation of electronic and electric engine systems (including electrical component function, electrical inputs, outputs, voltages and oscilloscope

patterns, digital and fibre optics principles)

KB3. the tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including use of:

- organic light emitting displays — anti-lock braking system abs/air bag scan tools, automotive scanners, graphing scanners, modular diagnostic information systems
- pressure indicators: fuel pressure testers, manifold gauge sets, oil pressure gauges, tire pressure gauges
- pullers: ball joint separators, bearing pullers, gear puller tools, slide hammers
- specialty wrenches: alignment wrenches, chain wrenches, locking wrenches, lug wrenches
- trim or moulding tools: carbon scrapers, gasket scrapers, scrapers, spoons
- measuring equipment: vernier callipers, micrometer, feeler gauges, multi-metre, flow metre, temp gauge, dial gauge etc.
- other tools: hand tools, power tools, lifting and jacking equipment, tensioning equipment, laptops, brake roller tester, chassis dynamometer, suspension activation, security activator etc.
- tools for other tasks such as cleaning of vehicles, tools, equipment and workshop

KB4. how to select the right materials for the job such as seals, sealants, fittings, gaskets, joints, fasteners etc.

KB5. how to carry out routine maintenance including:

- checking vehicle condition against OEM specifications to identify damage, corrosion, wear and tear, fluid levels, leaks and other problems in serviceability
- make adjustments to settings, alignment, pressures, tension, speeds and levels relevant to:
  - engine and aggregates (including fuel injection pump, ignition, intake and exhaust systems)
  - steering system
  - clutch and brake assembly
  - transmission system (including gearbox, differential, propeller shaft and axles)
  - electrical and electronic components (including alternator, wiper motor, lights, wire harness etc.)
  - other components (including tyres and body fittings)

KB6. the various sources of information available for assessing serviceability of the vehicle including:

- diagnostic displays
- visual inspections

	• test drives • vehicle/equipment manufacturer specifications • standard operating procedures KB7. how to repair and replace engine and its components KB8. how to dismantle, assess, repair, clean, condition, replace, adjust and reassemble and test mechanical, electronic and electric components for correct operation KB9. the method to correctly tag, seal and package checked engine components KB10. how to troubleshoot faults and document the causes in engines and components KB11. how to dispose of replaced components in accordance with safety, health and environmental policies and regulations KB12. precautions to be taken to ensure the following while working (including specific precautions to be taken when working with alternative fuel/ hybrid vehicles): • no damage to the vehicle or other vehicles • no damage to vehicle components and systems • no contact with hazardous materials
Skills (S) w.r.t. the Scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/ individual on the job needs to know and understand how to: SA1. complete and maintain workplace records SA2. write in at least one language
	Reading skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret workplace related documentation
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. clearly communicate workplace information and ideas with workplace colleagues, including use of automotive terms SA5. communicate with colleagues and customers to handle verbal enquiries, such as clarifying instructions and responding to requests for information
B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. be proactive and creative in responding to workplace problems, changes and challenges
	Plan and Organise

	The user/individual on the job needs to know and understand how to: SB2. plan work assigned on a daily basis and provide estimates of time required for each piece of work SB3. organise the workplace and work according to the principles of 5S SB4. prioritize actions to achieve required outcomes
	Customer centricity
	The user/individual on the job needs to know and understand how to: SB5. interpret the needs of customers SB6. provide customer and personal services SB7. ensure that customer needs are assessed and satisfactory service is provided
	Problem solving
	The user/individual on the job needs to know and understand how to: SB7. recognise a workplace problem or a potential problem and take action SB8. determine problems needing priority action SB9. refer problems outside area of responsibility to appropriate person SB10. gather information and provide assistance as required to solve problems SB11. use a range of problem-solving techniques SB12. develop practical responses to common breakdowns in workplace systems and procedures
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB13. analyse the complexity of work to determine if they can successfully carry them out and if required, escalate to a superior
	Critical thinking
	The user/individual on the job needs to know and understand how to: SB14. analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

NOS Version Control

NOS Code	ASC/ N 1409		
Credits(NSQF)	TBD	Version number	1.0
Industry	Automotive	Drafted on	12/06/13
Industry Sub-sector	Automotive Vehicle Service	Last reviewed on	12/06/13
Occupation	Technical Service & Repair	Next review date	Under revision expected date of revised version 31-Dec-15

ASC/ N 1410

Carry out electrical and electronic repairs and overhauling of a vehicle (Advanced)

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of an individual to carry out repairs & overhauling of electronic and electrical systems of a vehicle, including 2-wheelers, 3-wheelers and 4-wheelers (including passenger vehicles and commercial vehicles). This also includes diesel, petrol, CNG, electrical and hybrid vehicles.

National Occupational Standard

Unit Code	ASC/ N 1410
Unit Title (Task)	Carry out electrical and electronic repairs and overhauling of a vehicle(Advanced)
Description	This NOS unit is about an individual carrying out repairs and overhauling of electrical and electronic systems of a vehicle.
Scope	This unit/task covers the following: • repair and overhauling of electrical and electronic systems
Performance Criteria (PC) w.r.t the Scope	
Element	**Performance Criteria**
Advanced repair and overhauling of electrical & electronic systems	To be competent, the user/individual on the job must be able to: PC1. ensure that the correct spare parts, lubricants, tools and other materials required have been obtained PC2. 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 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 PC3. repair all electrical and electronic faults including direct faults in: • input sensors • output actuators • wiring harnesses • computer systems • calibration/adjustment specifications • component specifications • component assembly • component damage • system modifications PC4. repair indirect faults caused by the influence of external systems (electrical and electronic) PC5. carry out service, repair and overhauling activities safely to ensure: • no damage to the vehicle or other vehicles • no damage to vehicle components and systems • no contact with hazardous materials PC6. remove, refit and test electrical componentry for normal operation following body repair activities PC7. dismantle, assess, repair, clean, replace, adjust and reassemble vehicle electric and electronic units

	PC8. ensure all dismantled components are cleaned and conditioned prior to reassembly PC9. conduct routine and non-routine inspections for vehicle fitness assessment, emission testing, safety assessment and post-repair serviceability assessment PC10. ensure disposal of materials in accordance with the organisation's policies PC11. ensure, in consultation with the service advisor, approval of the customer on all repairs carried out PC12. record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure PC13. follow standard operating procedures for using workshop tools and equipment 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. use resources responsibly (e.g. use of grease and other consumables) PC17. request assistance from a senior technician when required PC18. assist junior technicians in their work PC19. inform the relevant persons where repairs are economically or technically infeasible PC20. utilise any computer-based applications relevant to repairs and installations PC21. 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)
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. standard operating procedures for servicing, repair and replacement of parts KA2. safety requirements for equipment and components prescribed by the OEM(e.g. preventing/ dealing with oil spillage and inflammable materials) KA3. identification codes, nomenclature and grades of lubricants, components and aggregates KA4. standard operating procedures recommended by the dealership/ suppliers/ OEM for using tools and equipment KA5. standard operating procedures for rectification of errors in information (e.g. rectification of job card, reissue of correct tools and equipment etc.) KA6. documentation requirements for each procedure carried out KA7. organisational and professional code of ethics and standards of practice KA8. safety, health and environmental policies and regulations for the workplace and the general automotive trade(e.g. safe working practices inside pits/ under vehicles) KA9. regulatory requirements for vehicles including road safety, refrigerant handling,

	fuel storage and other requirements KA10. operating specifications provided by the OEM for limits, fits and tolerances relating to engine electrical, electronic and hydraulic and fluid systems for the vehicle
B Technical Knowledge	The user/individual on the job needs to know and understand: KB1. the basic technology used in and functioning of various components and aggregates of the vehicle including: • engines and fuel system (diesel, petrol, electrical, gas etc.) • radiator • emission and exhaust system • brake system • clutch assembly • gearbox, drive-train assembly and transmission systems (manual, automatic etc.) • steering system • suspension system • 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 • tyres and wheels • cooling system • hydraulic and pneumatic system • various lubrication systems KB2. basic principles of: • Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction etc. • vehicle earthing and earthing methods • vehicle engine systems (e.g. types, applications and operation of sensors, actuators, etc.) • types of circuit protection and their use • electrical safety procedures • the operation of warning, charging and starter circuits • symbols, units and terms associated with electric systems and components • battery charging • electrical/electronic control systems • operation of electronic and electric engine systems (including electrical

	component function, electrical inputs, outputs, voltages and oscilloscope patterns, digital and fiber optics principles) • electrical theory and operation covering automotive digital computers, networked vehicles, voltage, current, resistance, power, capacitance, electrostatics, magnetics, inductance, discrete electronic components, logic families, and radio frequency KB3. the tools used to assess and confirm technical faults that cannot be determined through a visual inspection, including use of: • organic light emitting displays — anti-lock braking system abs/air bag scan tools, automotive scanners, graphing scanners, modular diagnostic information systems • pressure indicators: fuel pressure testers, manifold gauge sets, oil pressure gauges, tire pressure gauges • pullers: ball joint separators, bearing pullers, gear puller tools, slide hammers • specialty wrenches: alignment wrenches, chain wrenches, locking wrenches, lug wrenches • trim or moulding tools: carbon scrapers, gasket scrapers, scrapers, spoons • measuring equipment: venire callipers, micrometer, feeler gauges, flow metre, temp gauge, dial gauge, analogue and digitalmulti-meters, lab oscilloscopes, data scanners, test lights, test LEDs, pulse generators etc. • electrical and electronic testing equipment: volt meters, ammeters, ohmmeters, battery testing equipment, dedicated and computer based diagnostic equipment, oscilloscopes etc. • other tools: hand tools, power tools, lifting and jacking equipment, tensioning equipment, laptops, brake roller tester, chassis dynamometer, suspension activation, security activator etc. • tools for other tasks such as cleaning of vehicles, tools, equipment and workshop KB4. how to select the right materials for the job such as seals, sealants, fittings, gaskets, joints, fasteners etc. KB5. how to modify and repair electric and electronic systems to correct faults including: • varying the performance of DC motors to meet changes in operational requirements • varying the performance of alternators to meet changes in operational requirements • changing the electrical sequenced operating order of electric over hydraulic systems • converting vehicle from ground to insulated return

	• external modification (not within the computer) to a digital computer management system that enhances the system performance(e.g. modification to an electronic engine management system, improving the performance of an ECU controlled engine cooling fan system that necessitates changes to relay circuitry) • external modification (not within the computer) to a digital computer management system, utilizing electronic circuit design, development, manufacture, trial, evaluation, improvement, and commissioning, that enhances the system performance (e.g. development of an electronic control unit to delay engine crank whilst sounding an alarm warning of impending start of hazardous equipment) • internal modification (within the computer) to a digital computer management system, utilizing electronic circuit design, reprogramming, development, manufacture, trial, evaluation, improvement, and commissioning that enhances the system performance (e.g. rectifying an original internal computer design/operating deficiency, disabling a function no longer required by customer etc.) KB6. the various sources of information available for assessing serviceability of the vehicle including: • diagnostic displays • visual inspections • test drives • vehicle/equipment manufacturer specifications • standard operating procedures KB7. how to dismantle, assess, repair, clean, condition, replace, adjust and reassemble and test electronic and electric components for correct operation KB8. how to dispose of replaced components in accordance with safety, health and environmental policies and regulations KB9. precautions to be taken to ensure the following while working (including specific precautions to be taken when working with alternative fuel/ hybrid vehicles): • no damage to the vehicle or other vehicles • no damage to vehicle components and systems • no contact with hazardous materials
Skills (S) w.r.t. the Scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills** The user/ individual on the job needs to know and understand how to: SA1. complete and maintain workplace records SA2. write in at least one language

	Reading skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret workplace related documentation
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. clearly communicate workplace information and ideas with workplace colleagues, including use of automotive terms SA5. communicate with colleagues and customers to handle verbal enquiries, such as clarifying instructions and responding to requests for information
B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. be proactive and creative in responding to workplace problems, changes and challenges
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan work assigned on a daily basis and provide estimates of time required for each piece of work SB3. organise the workplace and work according to the principles of 5S SB4. prioritise actions to achieve required outcomes
	Customer centricity
	The user/individual on the job needs to know and understand how to: SB5. interpret the needs of customers SB6. ensure that customer needs are assessed and satisfactory service is provided
	Problem solving
	The user/individual on the job needs to know and understand how to: SB15. recognise a workplace problem or a potential problem and take action SB16. determine problems needing priority action SB17. refer problems outside area of responsibility to appropriate person SB18. gather information and provide assistance as required to solve problems SB19. use a range of problem-solving techniques SB20. develop practical responses to common breakdowns in workplace systems and procedures
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB21. analyse the complexity of work to determine if they can successfully carry them out and if required, escalate to a superior

	Critical thinking
	The user/individual on the job needs to know and understand how to: SB22. analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

NOS Version Control

NOS Code	**ASC/ N 1410**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**12/06/13**
Industry Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**12/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**

National Occupational Standards

Overview

This Occupational Standard describes the knowledge, understanding and skills required of an individual to liaise with external automotive stakeholders.

National Occupational Standard

Unit Code	ASC/ N 1411
Unit Title (Task)	Liaise with external automotive stakeholders
Description	This OS unit is about an individual liaising with external automotive stakeholders.
Scope	This unit/task covers the following: • liaise with ancillary and OEM dealers, auto component field service team and repair workshops for service related processes

Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Liaise with external automotive stakeholders	To be competent, the user/individual on the job must be able to: PC1. establish a process for gathering technical information from the field PC2. identify technical problems with products (tools, spare parts, components etc.) PC3. Assist the service centre in solving persistent technical problems arising from tools, spare parts, components etc. PC4. communicate market demand to OEM service function through market product report PC5. handle persistent customer complaints and technical queries, document and report them to OEM service function PC6. handle persistent problems and technical issues arising with vehicles, tools, components and spare parts PC7. provide technical feedback on failure of automotive components and new complaints PC8. handle problems related to break down of vehicles PC9. manage the availability of spare parts

Knowledge and Understanding (K) w.r.t. the Scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/ Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. standard operating procedures of the organisation/ dealership for inspection, servicing and repair of vehicles KA2. standard operating procedures for servicing, repair and replacement of parts mandated by the OEM KA3. safety requirements for equipment and components prescribed by the OEM KA4. documentation requirements for each procedure carried out as part of roles and responsibilities KA5. organisational and professional code of ethics and standards of practice KA6. safety and health policies and regulations for the workplace

ASC/ N 1411 **Liaise with external automotive stakeholders**

B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. how to monitor product performance by gathering feedbacks KB2. technical problems related with a particular breakdown situation KB3. the fault correction required and whom to contact in case of sudden breakdown or a persistent problem KB4. how to check and manage availability of key spare parts, other accessories and vital components KB5. how to liaison and coordinate with automotive spare parts manager, sales function and the OEM plant for the assigned area KB6. technical issues pertaining to continued or persistent customer complaints
Skills (S) w.r.t. the Scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing skills**
	The user/ individual on the job needs to know and understand how to: SA1. complete and maintain workplace records SA2. write in at least one language
	Reading skills
	The user/individual on the job needs to know and understand how to: SA3. read and interpret workplace related documentation
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA4. clearly communicate workplace information and ideas with workplace colleagues (verbal and non-verbal), including use of automotive terms SA5. communicate with colleagues and customers to handle verbal enquiries, such as clarifying instructions and responding to requests for information
B. Professional Skills	**Decision making**
	The user/individual on the job needs to know and understand how to: SB1. be proactive and creative in responding to workplace problems, changes and challenges
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan work assigned on a daily basis and provide estimates of time required for each piece of work SB3. prioritise actions to achieve required outcomes
	Customer centricity

ASC/ N 1411 **Liaise with external automotive stakeholders**

	The user/individual on the job needs to know and understand how to: SB4. interpret the needs of customers SB5. provide customer and personal services SB6. ensure that customer needs are assessed and satisfactory service is provided
	Problem solving
	The user/individual on the job needs to know and understand how to: SB7. recognise a workplace problem or a potential problem and take action SB8. determine problems needing priority action SB9. refer problems outside area of responsibility to appropriate person SB10. gather information and provide assistance as required to solve problems SB11. use a range of problem-solving techniques SB12. develop practical responses to common breakdowns in workplace systems and procedures
	Analytical thinking
	The user/individual on the job needs to know and understand how to: SB13. analyse the complexity of work to determine if they can successfully carry them out
	Critical thinking
	The user/individual on the job needs to know and understand how to: SB14. analyse, evaluate and apply the information gathered from observation, experience, reasoning, or communication to act efficiently

ASC/ N 1411 **Liaise with external automotive stakeholders**

NOS Version Control

NOS Code	**ASC/ N 1411**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**12/06/13**
Industry Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**12/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**

ASC/ N 0001 **Plan and organise work to meet expected outcomes**

National Occupational Standards

Overview

This unit is about planning and organising an individual's work in order to complete it to the required standards, on time and within budget in terms of cost and material

ASC/ N 0001 **Plan and organise work to meet expected outcomes**

National Occupational Standard

Unit Code	ASC/ N 0001
Unit Title (Task)	**Plan and organise work to meet expected outcomes**
Description	This NOS unit is about planning and organising an individual's work in order to complete it to the required standards on time.
Scope	This unit/task covers the following: • work requirements including various activities, deliverables or work output required in the given time, maintain set quality standards • appropriate use of resources (both material / equipment's and manpower)
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
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
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
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. the organisation's policies, procedures and priorities for area of work, role and responsibilities in carrying out that work KA2. the limits of responsibilities and when to involve others KA3. specific work requirements and who these must be agreed with KA4. the importance of having a tidy work area and how to do this KA5. how to prioritize workload according to urgency and importance and the benefits of this KA6. the organisation's policies and procedures for dealing with confidential information and the importance of complying with these KA7. the purpose of keeping others updated with the progress of work KA8. who to obtain guidance from and the typical circumstances when this may be required KA9. the purpose and value of being flexible and adapting work plans

	to reflect change
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. how to complete tasks accurately by following standard procedures KB2. technical resources needed for work and how to obtain and use these
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/individual on the job needs to know and understand how to: SA1. write in at least one language
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. read instructions, guidelines/procedures
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA3. ask for clarification and advice from appropriate persons SA4. communicate orally with colleagues
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. make a decision on a suitable course of action appropriate for accurately completing the task within resources
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. agree objectives and work requirements SB3. plan and organise work to achieve targets and deadlines
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB4. deliver consistent and reliable service to customers SB5. check own work and ensure it meets customer requirements
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB6. refer anomalies to the concerned persons
	Analytical Thinking
	The user/individual on the job needs to know and understand how to:

	SB7. analyse problems and identify work -arounds taking help from concerned persons where required
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB8. apply own judgement to identify solutions in different situations

ASC/ N 0001 **Plan and organise work to meet expected outcomes**

NOS Version Control

NOS Code	**ASC/ N 0001**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**10/06/13**
Industry Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**10/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**

ASC/ N 0002 **Work effectively in a team**

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National Occupational Standards

Overview

This unit is about working effectively with colleagues, either in own work group or in other work groups within organisation.

National Occupational Standard

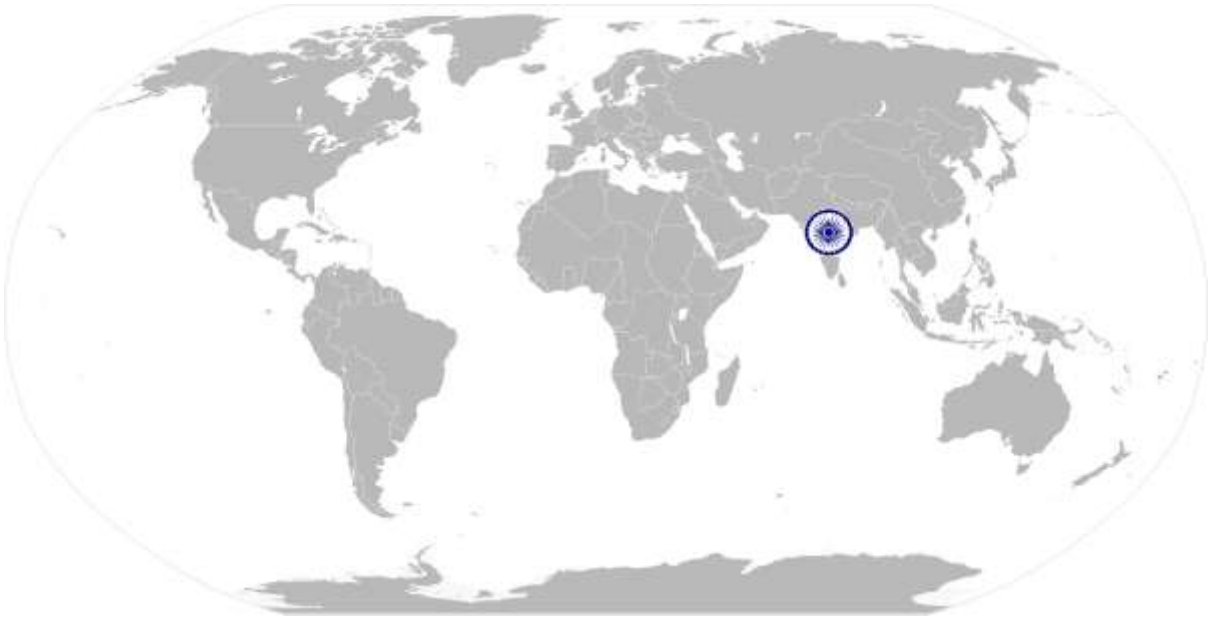
Unit Code	ASC/ N 0002
Unit Title (Task)	**Work effectively in a team**
Description	This NOS unit is about working effectively within a team, either in individual's own work group or in other work groups outside the organisation.
Scope	This unit/task covers the following: Colleagues: • Interact & communicate effectively with colleagues including member in the own group as well as other groups
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
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
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. the organisation's policies and procedures for working with colleagues, role and responsibilities in relation to this KA2. the importance of effective communication and establishing good working relationships with colleagues KA3. different methods of communication and the circumstances in which it is appropriate to use these KA4. the importance of creating an environment of trust and mutual respect KA5. the implications of own work on the work and schedule of others

B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. different types of information that colleagues might need and the importance of providing this information when it is required KB2. the importance of helping colleagues with problems, in order to meet quality and time standards as a team
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/individual on the job needs to know and understand how to: SA1. complete written work with attention to detail
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. read instructions, guidelines/procedures
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA3. listen effectively and orally communicate information SA4. ask for clarification and advice from the concerned person
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. make decisions on a suitable course of action or response keeping in view resource utilization while meeting commitments
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan and organise work to achieve targets and deadlines
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB3. check that the work meets customer requirements SB4. deliver consistent and reliable service to customers
	Problem Solving
	The user/individual on the job needs to know and understand how to: SB5. apply problem solving approaches in different situations
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB6. apply balanced judgements to different situations

NOS Version Control

NOS Code	ASC/ N 0002		
Credits(NSQF)	TBD	Version number	1.0
Industry	Automotive	Drafted on	10/06/13
Industry Sub-sector	Automotive Vehicle Service	Last reviewed on	10/06/13
Occupation	Technical Service & Repair	Next review date	Under revision expected date of revised version 31-Dec-15

National Occupational Standards



Overview

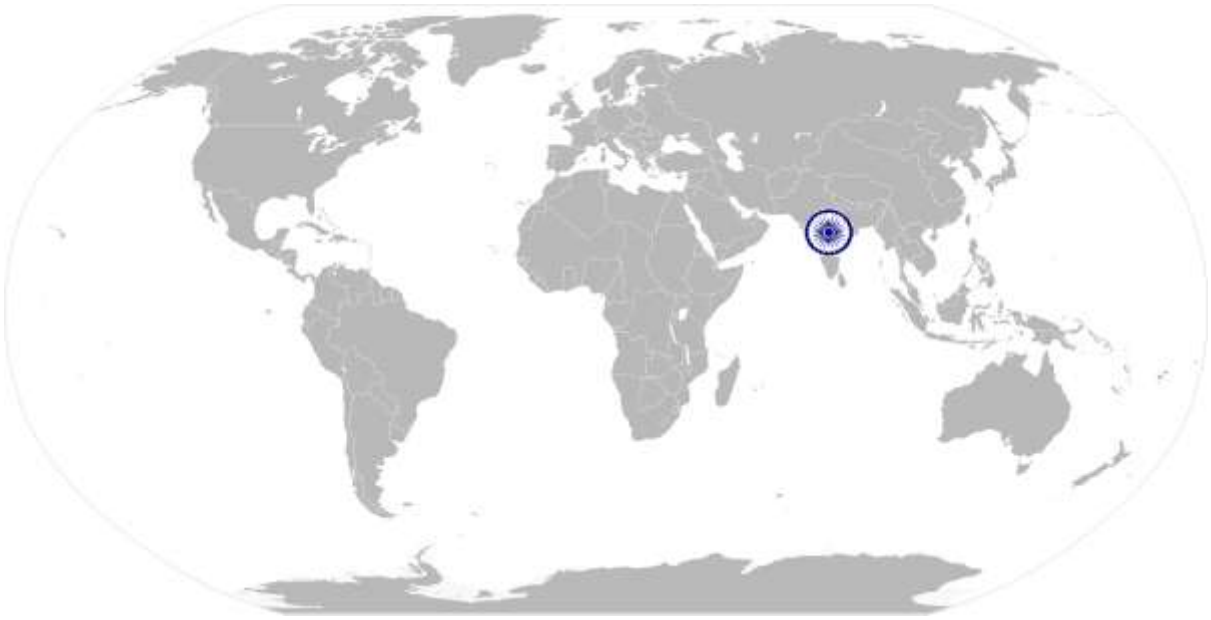
This unit is about monitoring work place practices and making sure they meet requirements for health, safety, security and environmental concerns.

National Occupational Standard

Unit Code	ASC/ N 0003
Unit Title (Task)	**Maintain a healthy, safe and secure working environment**
Description	This NOS unit is about monitoring the working environment and making sure it meets requirements for health, safety and security.
Scope	This unit/task covers the following: • Resources (both material & manpower) needed to maintain a safe working environment as per the prevalent norms & government policies including emergency procedures for Illness, accidents, fires or any other reason which may involve evacuation of the premises
Performance Criteria (PC) w.r.t. the Scope	
Element	**Performance Criteria**
Resources needed to maintain a safe, secure working environment	To be competent, the user/individual on the job must be able to: 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
Knowledge and Understanding (K) w.r.t. the scope	
Element	**Knowledge and Understanding**
A. Organisational Context (Knowledge of the Company/Organisation and its processes)	The user/individual on the job needs to know and understand: KA1. legislative requirements and organisation's procedures for health, safety and security and individual's role and responsibilities in relation to this KA2. what is meant by a hazard, including the different types of health and safety hazards that can be found in the workplace

	KA3. how and when to report hazards KA4. the limits of responsibility for dealing with hazards KA5. the organisation's emergency procedures for different emergency situations and the importance of following these KA6. the importance of maintaining high standards of health, safety and security KA7. implications that any non-compliance with health, safety and security may have on individuals and the organisation
B. Technical Knowledge	The user/individual on the job needs to know and understand: KB1. different types of breaches in health, safety and security and how and when to report these KB2. evacuation procedures for workers and visitors KB3. how to summon medical assistance and the emergency services, where necessary KB4. how to use the health, safety and accident reporting Procedures and the importance of these
Skills (S) w.r.t. the scope	
Element	**Skills**
A. Core Skills/ Generic Skills	**Writing Skills**
	The user/individual on the job needs to know and understand how to: SA1. complete accurate, well written work with attention to detail
	Reading Skills
	The user/individual on the job needs to know and understand how to: SA2. read instructions, guidelines/procedures/rules
	Oral Communication (Listening and Speaking skills)
	The user/individual on the job needs to know and understand how to: SA3. listen to and orally communicate information with all concerned
B. Professional Skills	**Decision Making**
	The user/individual on the job needs to know and understand how to: SB1. make decisions on a suitable course of action or response
	Plan and Organise
	The user/individual on the job needs to know and understand how to: SB2. plan and organise work to achieve targets and deadlines
	Customer Centricity
	The user/individual on the job needs to know and understand how to: SB3. build and maintain positive and effective relationships with colleagues and customers
	Problem Solving

	The user/individual on the job needs to know and understand how to: SB4. apply problem solving approaches in different situations
	Analytical Thinking
	The user/individual on the job needs to know and understand how to: SB5. analyse data and activities
	Critical Thinking
	The user/individual on the job needs to know and understand how to: SB6. apply balanced judgements to different situations



ASC/ N 0003 **Maintain a healthy, safe and secure working environment**

NOS Version Control

NOS Code	**ASC/ N 0003**		
Credits(NSQF)	**TBD**	**Version number**	**1.0**
Industry	**Automotive**	**Drafted on**	**10/06/13**
Industry Sub-sector	**Automotive Vehicle Service**	**Last reviewed on**	**10/06/13**
Occupation	**Technical Service & Repair**	**Next review date**	**Under revision expected date of revised version 31-Dec-15**

Criteria for assessment of Trainees

JOB ROLE	Automotive Service Technician Level 6
Qualification Pack	ASC/Q 1404
No. Of NOS	5 Role specific ,3 generic

Assessable Outcomes	Assessment criteria	Marks Allocation		
		Theory	Viva	Practical
ASC/ N 1407	**Carry out advanced diagnosis of vehicle for engine and other mechanical repairs requirement**			
Carry out advance diagnosis for operational faults in the mechanical aggregates	To be competent, the user/individual on the job must be able to: PC1. identify and explain the functioning of each system, component and aggregate of a vehicle PC2. obtain sufficient information from the job card and customer/ service advisor to make an assessment of service and repair needs of the vehicle PC3. review the job card and develop clear and complete understanding of customer complaints PC4. use checklists and standard OEM operating procedures as per the vehicle service manual to confirm need for servicing, replacement of oils, filters and other parts etc. PC5. conduct routine and non-routine inspections for vehicle fitness assessment, emission testing, safety assessment, post-accident diagnostic assessment, post-repair serviceability assessment and manufacturer recall assessment PC6. ensure any additional malfunctions or repair requirements observed in the vehicle are reported to the service advisor and discussed with the customer PC7. follow standard operating procedures as prescribed by the suppliers in the user manuals of workshop tools and equipment PC8. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary PC9. ensure any malfunctions observed in tools and equipment are reported to the concerned persons		**50**	**80** **80**

	PC10. conduct inspection of the engine and all other mechanical parts & aggregates to diagnose need for repairs or adjustment PC11. conduct test drives to assess need for repairs, calibration or adjustment PC12. supervise dismantling and reassembly of aggregates of a vehicle for the purpose of diagnosing faults PC13. compare results of diagnostic inspections and tests against vehicle specifications and any regulatory requirements PC14. utilise various tools including computer-based diagnostic tools for accurate assessment of vehicle's operating parts and systems PC15. prepare a list of all the service, repair and replacement requirements of the vehicle PC16. finalise the list of all the service, repair and replacement requirements of the vehicle in consultation with service advisor PC17. ensure safe movement and parking of the vehicle in the workshop PC18. supervise junior technicians in their work PC19. 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) PC20. drive a relevant 2/3/4 wheeler vehicle which is an important part of the diagnosis of the type of vehicle that is dealt by the relevant OEM		**50**	
	Subtotal	**140**	**100**	**160**
ASC/ N 1408	**Carry out complete and advanced level diagnosis of vehicle for electrical and electronic repairs requirements.**	**Theory**	**Viva**	**Practical**
Carry out advance diagnosis for faults in the electrical and electronic aggregates	To be competent, the user/individual on the job must be able to: PC1. identify and explain the functioning of various electrical systems, components and aggregates of a vehicle PC2. obtain sufficient information from customer/ service advisor to make an assessment of service and repair needs of the vehicle PC3. review the job card and understand customer complaints PC4. use checklists and standard OEM operating procedures to confirm need for servicing, replacement of oils, filters and other parts etc. PC5. follow standard operating procedures for using workshop tools and equipment PC6. ensure all workshop tools, equipment and workstations are adequately maintained by		**50**	**80**

	carrying out scheduled checks, calibration and timely repairs where necessary PC7. ensure any additional malfunctions or repair requirements observed in are reported to the service advisor and discussed with the customer PC8. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC9. conduct routine and non-routine inspections for pre-purchase assessment, vehicle fitness assessment, emission testing, safety assessment, post-accident diagnostic assessment, post-repair serviceability assessment and manufacturer recall assessment PC10. select the most appropriate analytical and evaluative methodology including diagnostic process, sequence, tests and testing equipment PC11. identify, select and prepare tools and material required for the specific diagnostic process PC12. prepare system components for the diagnostic process including park-up, isolation and cleaning requirements PC13. conduct inspection of electrical and electronic systems including: • 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)		**50**	**80**

	• 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 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) PC12. diagnose need for repairs, adjustment or part replacement in electrical and electronic systems PC13. conduct test drives to assess need for repairs, calibration or adjustment PC14. compare results of diagnostic inspections and tests against vehicle specifications and any regulatory requirements PC15. prepare a list of all the service, repair and replacement requirements of the vehicle PC16. finalise the list of all the service, repair and replacement requirements of the vehicle in consultation with service advisor PC17. ensure safe movement and parking of the vehicle in the workshop PC18. assist junior technicians in their work PC19. utilise any computer-based diagnostic applications PC20. 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) PC21. drive a relevant 2/3/4 wheeler vehicle which is an			

	important part of the diagnosis of the type of vehicle that is dealt by the relevant OEM			
	Subtotal	**140**	**100**	**160**
ASC/ N 1409	**Carry out servicing, repairs and overhauling of a vehicle (Advanced)**	**Theory**	**Viva**	**Practical**
Advanced repair and overhauling of engine and mechanical aggregates	To be competent, the user/individual on the job must be able to: PC1. ensure that the correct spare parts, lubricants, tools and other materials required have been obtained PC2. service, repair and overhaul: • engines and fuel system (diesel, petrol, electrical, gas etc.) • radiator • emission and exhaust system • brake system • clutch assembly • gearbox, drive-train assembly and transmission systems (manual, automatic etc.) • steering system • suspension system • 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 • tyres and wheels • cooling system • hydraulic and pneumatic system • various lubrication systems PC3. carry out service, repair and overhauling activities safely to ensure: • no damage to the vehicle or other vehicles • no damage to vehicle components and		**25**	**40** **40**

	systems • no contact with hazardous materials PC4. remove, refit and test electrical components for normal operation following body repair activities PC5. dismantle, assess, repair, clean, replace, adjust and reassemble vehicle mechanical, electric and electronic units PC6. ensure all dismantled components are cleaned and conditioned prior to reassembly PC7. conduct routine and non-routine inspections for vehicle fitness assessment, emission testing, safety assessment and post-repair serviceability assessment PC8. ensure disposal of materials in accordance with the organisation's policies PC9. ensure, in consultation with the service advisor, approval of the customer on all repairs carried out PC10. record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure PC11. follow standard operating procedures for using workshop tools and equipment PC12. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary PC13. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC14. use resources responsibly (e.g. use of grease and other consumables) PC15. assist junior technicians in their work PC16. inform the relevant persons where repairs are economically or technically infeasible PC17. utilise any computer-based applications relevant to repairs and installations 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)		**25** **25**	**40**
	Subtotal	**105**	**75**	**120**

ASC/ N 1410	Carry out electrical and electronic repairs and overhauling of a vehicle(Advanced)	Theory	Viva	Practical
Advanced repair and overhauling of electrical & electronic systems	To be competent, the user/individual on the job must be able to: PC1. ensure that the correct spare parts, lubricants, tools and other materials required have been obtained PC2. 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 pre-tensioning, roll over protection, object detection, navigation aids, intelligent transport systems, intelligent SRS systems, adaptive cruise control, multi-class Bus		**25**	**40**

	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 PC3. repair all electrical and electronic faults			**40** **40**

	including direct faults in: • input sensors • output actuators • wiring harnesses • computer systems • calibration/adjustment specifications • component specifications • component assembly • component damage • system modifications PC4. repair indirect faults caused by the influence of external systems (electrical and electronic) PC5. carry out service, repair and overhauling activities safely to ensure: • no damage to the vehicle or other vehicles • no damage to vehicle components and systems • no contact with hazardous materials PC6. remove, refit and test electrical componentry for normal operation following body repair activities PC7. dismantle, assess, repair, clean, replace, adjust and reassemble vehicle electric and electronic units PC8. ensure all dismantled components are cleaned and conditioned prior to reassembly PC9. conduct routine and non-routine inspections for vehicle fitness assessment, emission testing, safety assessment and post-repair serviceability assessment PC10. ensure disposal of materials in accordance with the organisation's policies PC11. ensure, in consultation with the service advisor, approval of the customer on all repairs carried out PC12. record all service and repairs carried out and ensure completeness of tasks assigned before releasing vehicle for the next procedure PC13. follow standard operating procedures for using workshop tools and equipment PC14. ensure all workshop tools, equipment and workstations are adequately maintained by carrying out scheduled checks, calibration and timely repairs where necessary		25 25	

	PC15. ensure any malfunctions observed in tools and equipment are reported to the concerned persons PC16. use resources responsibly (e.g. use of grease and other consumables) PC17. request assistance from a senior technician when required PC18. assist junior technicians in their work PC19. inform the relevant persons where repairs are economically or technically infeasible PC20. utilise any computer-based applications relevant to repairs and installations PC21. 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)			
	Subtotal	**105**	**75**	**120**
ASC/ N 1411	**Liaise with external automotive stakeholders**	**Theory**	**Viva**	**Practical**
Liaise with external automotive stakeholders	To be competent, the user/individual on the job must be able to: PC10. establish a process for gathering technical information from the field PC1. identify technical problems with products (tools, spare parts, components etc.) PC2. Assist the service centre in solving persistent technical problems arising from tools, spare parts, components etc. PC3. communicate market demand to OEM service function through market product report PC4. handle persistent customer complaints and technical queries, document and report them to OEM service function PC5. handle persistent problems and technical issues arising with vehicles, tools, components and spare parts PC6. provide technical feedback on failure of automotive components and new complaints PC7. handle problems related to break down of vehicles PC8. manage the availability of spare parts		**25** **25**	**40** **40**

	Subtotal	**70**	**50**	**80**
ASC/ N 0001	**Plan and organise work to meet expected outcomes**			
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: PC10. keep immediate work area clean and tidy PC11. treat confidential information as per the organisation's guidelines PC12. work in line with organisation's policies and procedures PC13. work within the limits of job role PC14. obtain guidance from appropriate people, where necessary PC15. ensure work meets the agreed requirements			
Appropriate use of resources	PC16. establish and agree on work requirements with appropriate people PC17. manage time, materials and cost effectively PC18. use resources in a responsible manner		**25**	**40**
	Subtotal	**35**	**25**	**40**
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		**25**	**40**

	Subtotal	**35**	**25**	**40**
ASC/ N 0003	**Maintain a healthy, safe and secure working environment**	**Theory**	**Viva**	**Practical**
Resources needed to maintain a safe, secure working environment	To be competent, the user/individual on the job must be able to: 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		**25**	**40**
	Subtotal	**35**	**25**	**40**
	TOTAL	**665**	**475**	**760**