

National Competency Standards
for
AUTOMOBILE MECHANIC
(Level-2,3 &4)

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INTRODUCTION

An Automobile Mechanic/Auto-Mechanic is a tradesman who specializes in the mechanical systems contained within automotive vehicles. This person is an expert on engine overhauling and the entire vehicle systems i.e. repair of Ignition System, Fuel System, Carburetor, EFI system, Engine Cooling & Lubrication Systems, repair of manual & automatic transmissions, braking, suspension, steering, wheel balancing and alignment - all fall under the Auto Mechanic's domain of expertise. The job of an Automobile Mechanic is perfect for those who love to work with their hands. This is a job that involves constant activity, so it is perfect for someone who dreads the idea of sitting at a desk all day. Automobile Mechanic is hired by car manufacturers, car dealers and auto repair shops.

Automobile industry is dynamic and every changing as complex technological advancements are taking place in this sector. Therefore, industry expectations for skilled workforce are also dynamic which can only be managed through setting relevant competency standards in collaboration with the leading industries. Being cognizant of this fact, National Vocational & Technical Training Commission (NAVTTTC) developed competency standards for Automobile Mechanic under National Vocational Qualifications Framework (NVQF). These competency standards have been developed by a Qualifications Development Committee (QDC) and validated by the Qualifications Validation Committee (QVC) having representation from the leading auto sector companies of the country.

PURPOSE OF THE QUALIFICATION

The purpose of these qualifications is to set high professional standards for automobile industry. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of the trainees
- Provide opportunities for recognition of skills attained through non-formal or informal pathways
- Improve the quality and effectiveness of training and assessment for automobile industry
- Enable the existing workforce to capacitate themselves in new technologies and methods

DATE OF VALIDATION

These national qualifications have been validated by the Qualifications Validation Committee (QVC) on 13th & 14th February 2018 and they will remain in currency until 13th February 2021.

CODE OF QUALIFICATION

Qualification Title	Code
National Vocational Certificate Level-2 in Automobile Technology (Automobile Mechanic)	0716MSA06
National Vocational Certificate Level-3 in Automobile Technology (Automobile Mechanic)	0716MSA07
National Vocational Certificate Level-4 in Automobile Technology (Automobile Mechanic)	0716MSA08

ENTRY REQUIREMENTS

The entry requirement for National Vocational Certificate Level-2 in Automobile Technology (Automobile Mechanic) is at least Matric or equivalent.

QUALIFICATIONS DEVELOPMENT COMMITTEE

The Qualifications Development Committee consisted of following members:

S.No.	Name	Designation & Organization
1.	Ijaz Hamid	Chief Instructor (Auto & Diesel) GCT, Railway Road, Lahore - PTEVTA
2.	Syed Salman Nasir Ali Shah	Deputy Manager PTEVTA
3.	Mehwish Aisha Ahsan	CBT Expert/Assessor
4.	Adeel Ahmad	Assistant Manager (Tech) Lahore Transport Company, Lahore
5.	Rehman Ali	Assistant Manager Al-Haj Faw Motors (Pvt.) Ltd.
6.	Abdul Basit	Technical Advisor Toyota Garden Motors, Lahore
7.	Aamir Javed	Service Manager Suzuki Khalid Motors, Lahore
8.	Syed Kazim Hussain	Technical Advisor Toyota Township Motors, Lahore
9.	Atif Mahmood	Service Manager Suzuki Mini Motors, Lahore
10.	Muhammad Abdul Wasay	Assistant Manager Al-Haj Faw Motors (Pvt.) Ltd.

QUALIFICATIONS VALIDATION COMMITTEE

The Qualifications Validation Committee consisted of following members:

S.No.	Name	Designation & Organization
1.	Ijaz Hamid	Chief Instructor (Auto & Diesel) GCT, Railway Road, Lahore- PTEVTA
2.	MianAtique	CEO Rehman Motors Workshop, Model Town, Lahore
3.	Syed Aamir Ali Wasti	Director Honda Kizan, Lahore
4.	Muhammad Naveed Malik	CEO Vision Plus, Automotive Equipment Solutions, Lahore
5.	Haji Muhammad Arshad	CEO Honda, Raheem Yar Khan Motors
6.	Abdul Waheed	CEO Honda Pitspot, Johar Town Motors
7.	Muhammad Mumtaz Husain	AM (After Sale Service) Honda Atlas Cars, Lahore
8.	Jawad Haider	Technical Advisor Suzuki, Lahore

REGULATIONS FOR THE QUALIFICATION AND SCHEDULE OF UNITS

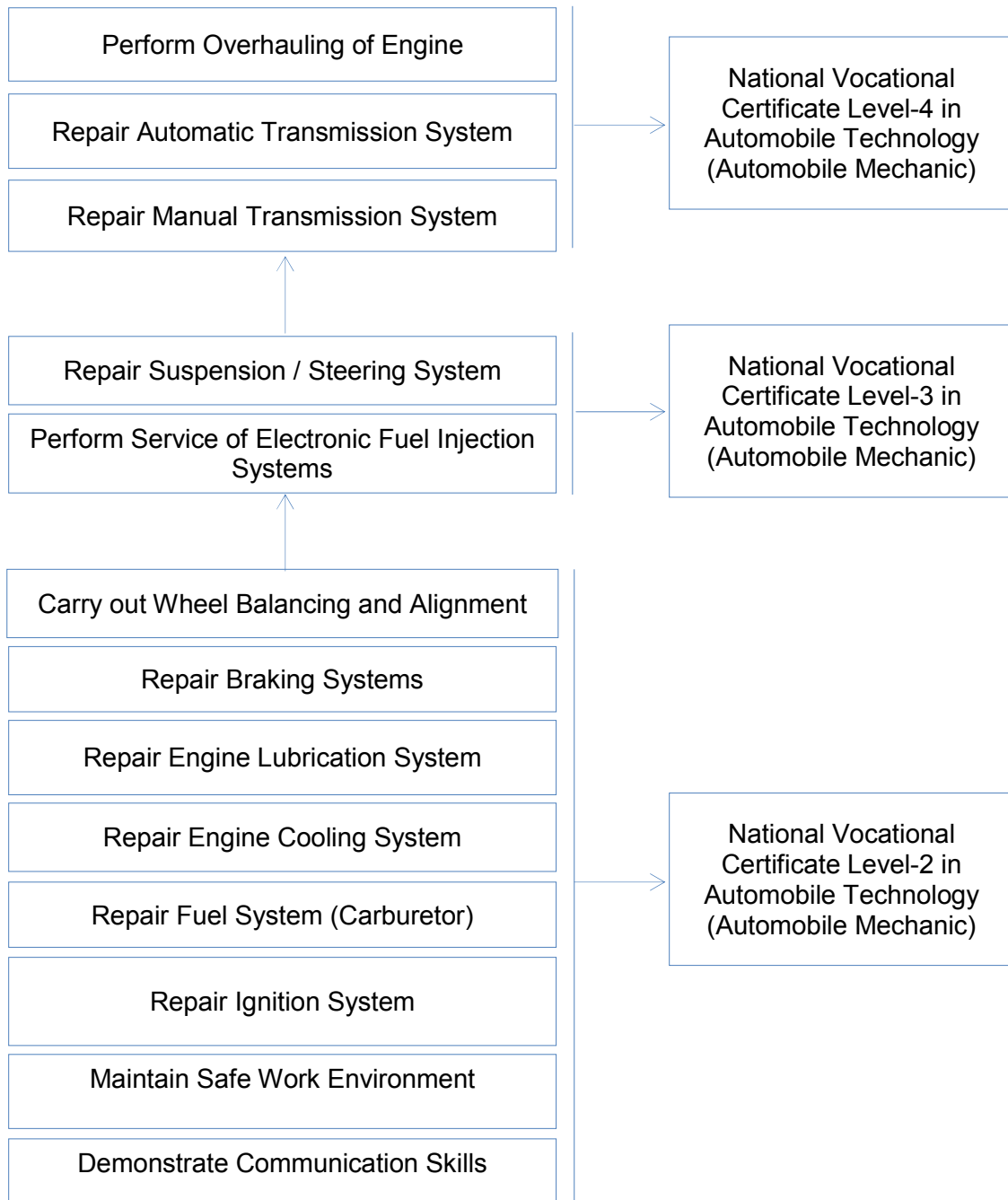
Not Applicable

SUMMARY OF COMPETENCY STANDARDS

Code	Competency Standards	Level	Credits	Category
	Demonstrate Communication Skills	2	03	Generic
	Maintain Safe Work Environment	2	03	Generic
	Repair Ignition System	2	10	Technical
	Repair Fuel System (Carburetor)	2	10	Technical
	Perform Service of Electronic Fuel Injection Systems	3	18	Technical
	Repair Engine Cooling System	2	10	Technical
	Repair Engine Lubrication System	2	12	Technical
	Perform Overhauling of Engine	4	24	Technical
	Repair Manual Transmission System	4	18	Technical
	Repair Automatic Transmission System	4	24	Technical
	Repair Braking Systems	2	10	Technical
	Repair Suspension / Steering System	3	24	Technical
	Carry out Wheel Balancing and Alignment	2	12	Technical

Packaging of Qualifications

The national vocational qualifications are packaged as per following:



Code:

Demonstrate Communication Skills

Overview

These Competency Standards identify the competencies required to apply communication skills at work place in accordance with the organization guidelines and procedures. You are expected to work in a team to achieve common organizational goals and avoid conflicts. This competency standard would also enable you to use basic computer skills to communicate effectively and prepare work related documents.

Competency Units	Performance Criteria
1. Work in Team	<p>P1. Treat team members with respect and maintain positive relationship to achieve common organizational goals</p> <p>P2. Listen to instructions carefully and fully comply with them</p> <p>P3. Provide work related information to team members and identify interrelated work activities to avoid confusion</p> <p>P4. Adopt communication skills appropriate to work activities and company procedures</p> <p>P5. Identify problems and resolve them through discussion and mutual agreement</p>
2. Deal with Clients	<p>P1. Collect and confirm work requirements from clients using appropriate communication procedures</p> <p>P2. Provide clear information to clients about work requirements including costs and time needed to accomplish the task</p> <p>P3. Negotiate with clients regarding wages, time, labour requirements etc.</p>
3. Demonstrate Basic IT Skills	<p>P1. Create folders and files and learn major commands of operating system/windows</p> <p>P2. Type text and use major commands such as printing, editing, creating tables, header, footer, footnotes, table of contents and page number etc.</p> <p>P3. Make the document as per work specifications and client requirements</p> <p>P4. Generate reports for clients as required using appropriate computer applications</p> <p>P5. Use internet for sending/receiving emails and connecting through social or other media</p>

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Principles of effective and interactive communication
- 7 C's of communication and their importance
- Cultural and organizational practices for effective communication
- Effective negotiation skills
- Role of team members and functionality of work teams
- Team dynamics and stages of team development
- Conflict resolution strategies
- Negotiation techniques
- Basic architecture of computer system
- Input / output devices of computer and their functions
- Basic computer skills using MS Word, MS Excel, use of internet, sending and receiving emails etc.
- Preparing documents and work related reports

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Communicate effectively with colleagues and clients
- Develop a job completion report for the work using computer technology

Code:

Maintain Safe Work Environment

Overview

This Competency Standard identifies the competencies required to apply Occupational Safety and Health (OSH) at work place in accordance with the organization's approved guidelines and procedures. You will be expected to identify and use Personal Protective Equipment (PPE) according to the job requirement and potential hazards at workplace. The underpinning knowledge regarding OSH will be sufficient to provide the basis for your work

Competency Units	Performance Criteria
1. Identify Hazards at Workplace	<p>P1. Read and interpret work processes and procedures correctly to identify risk of hazards at workplace</p> <p>P2. Recognize engineering processes, tools, equipment and consumable materials that have the potential to cause harm</p> <p>P3. Identify any potential hazards and take appropriate action to minimize the risk</p>
2. Observe Occupational Safety and Health (OSH)	<p>P1. Work safely at all times, complying with health and safety precautions, regulations and other relevant guidelines</p> <p>P2. Identify health and safety hazards at the workplace, so that the potential for personal injury, damage to equipment or the workplace is prevented, and corrective action is taken</p> <p>P3. Deal with problems which are within your control, and report those that cannot be resolved to the safety officer</p> <p>P4. Wear, adjust, and maintain Personal Protective Equipment to ensure correct fit and optimum protection in compliance with company procedures</p> <p>P5. Keep work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is prevented</p>

Knowledge and Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out tasks covered in this competency standard. This includes the knowledge of:

- Types of hazards that are most likely to cause harm to health and safety
- Health and safety precautions
- Health and safety signs and symbols
- Techniques and methods to identify the risks of hazards at workplace
- Dealing with hazards to avoid any accident or injury
- Following 5S and Kaizen Activities
- Safety reporting procedures and documentation
- Use of Personal Protective Equipment
- First aid treatment methods including methods of resuscitation
- Fire-fighting methods
- Safe methods of handling heavy loads

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify possible hazards at workplace
- Use correct Personal Protective Equipment (PPE) for the assigned job

List of Tools and Equipment

S.No.	Items
1.	Health and Safety Manual
2.	Fire Extinguisher
3.	Safety Equipment, Safety Shoes, Safety Gloves, Safety Goggles, Safety Helmet and Ear Plugs
4.	Smoke Detecting Alarm
5.	First Aid Box

Code:

Repair Ignition System

Overview

This competency standard is designed to provide skills and knowledge to Repair ignition system of vehicle by Auto Mechanic, in the light of manufacturer manual. You will be able to diagnose faults related to ignition system of vehicle and repair faulty part/s according to set standards.

Competency Units	Performance Criteria
1. Diagnose Faults of Ignition System	<p>P1. Check electric power source and charging system of the vehicle for specified functionality and diagnose faults, if any</p> <p>P2. Check ignition switch and ensure specified function and diagnose faults, if any</p> <p>P3. Check ignition circuit continuity, connectivity & installation, and ensure specified functioning and diagnose faults, if any</p> <p>P4. Check Ignition coil and resistor to ensure specified function and diagnose faults, if any</p> <p>P5. Check C.B. point and condenser to diagnose faults</p> <p>P6. Check distributor unit and diagnose faults</p> <p>P7. Check High tension cables for insulation breakdown, continuity, resistance and diagnose faults, if any</p> <p>P8. Check cables for insulation breakdown, continuity & resistance and diagnose faults, if any</p> <p>P9. Check spark plugs for insulation, leakage, plug gap and type and diagnose faults, if any</p>
2. Remove Faults of Ignition System	<p>P1. Replace battery and related auxiliary components, clean and adjust terminals and wire clamps to ensure proper connectivity, if needed</p> <p>P2. Replace/adjust alternator belt or replace alternator</p> <p>P3. Check faulty fuse and replace with new fuse while ensuring correct rating</p> <p>P4. Insulate wires or cables to provide specified current flow</p> <p>P5. Replace ignition coil or resistor to ensure specified function</p> <p>P6. Replace ignition switch according to standard specifications</p> <p>P7. Replace faulty parts of distributor (C.B. point and condenser)</p> <p>P8. Change High tension cables to ensure smooth functioning of ignition system, if needed</p> <p>P9. Replace/clean and adjust spark plugs to required measurements and function</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Use of Manufacturer Repair Manual
- Understanding of Electric Wiring Diagram (EWD)
- Use of general hand tools of mechanic
- Uses of Multi-meters
- Uses of Vehicle Diagnostic Scanner
- Uses of Hydro-meter
- Different types of Batteries and their functionality
- Basic Auto Electricity and Electronics
- Principle of Ignition System
- Identification of components of ignition system
- Cleaning methods and materials
- C.B. Point Gap and adjustment
- Function of spark plug wire and spark plug
- Types of spark plugs
- Function of ignition coil
- Functions of distributor and its adjustment

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Diagnose fault and repair/replace faulty parts of Ignition system according to the SOPs
- Diagnose faults and repair/replace faulty parts of Pneumatic/Mechanical Governor Units
- During engine running, perform Ignition timing adjustments

Code:

Repair Fuel System (Carburetor)

Overview

This competency standard is designed to provide skills and knowledge to repair fuel system (Carburetor) by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to diagnose faults of fuel system and repair the fuel system, carefully applying the tools and equipment according to SOPs.

Competency Units	Performance Criteria
1. Diagnose Faults in Fuel System (Carburetor)	<p>P1. Check fuel, fuel tank, filter and lines and identify fault/s according to set standards</p> <p>P2. Check Fuel pump and identify fault/s in fuel supply to Carburetor according to set standards</p> <p>P3. Check Fuel pump operating function by camshaft</p> <p>P4. Check and identify fault/s to ensure the proper functioning of Carburetor</p>
2. Remove Faults in Fuel System (Carburetor)	<p>P1. Replace faulty fuel tank/filter/ lines to ensure accurate functioning of vehicle</p> <p>P2. Replace faulty Fuel Pump to ensure the proper functioning of fuel supply to Carburetor</p> <p>P3. Repair and adjust fault/s in Carburetor to ensure the proper air fuel mixture supply to engine for smooth functioning of engine</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Understanding of Manufacturer Repair Manual
- Carburetor circuits and Ancillary System
- Octane Numbering of fuel
- Use of measuring tools and equipment
- Use of tachometer
- Use of engine exhaust CO Analyzer
- Use of cleaning material
- Functionality of fuel tank, fuel filter, fuel gauge, fuel pump etc.

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify and repair fault/s in Carburetor fuel system ensuring the proper functioning of engine
- Performing adjustments in a carburetor system using proper tools and equipment

Code:

Perform Service of Electronic Fuel Injection Systems

Overview

This competency standard is developed to provide skills and knowledge to service the Electronic Fuel Injection (EFI) System by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to diagnose fuel system problems of vehicle and service fuel metering.

Competency Units	Performance Criteria
1. Diagnose Faults in EFI System	<p>P1. Diagnose component fault/s through specified vehicle diagnostic tool/scanner</p> <p>P2. Check fuel pressure with the help of fuel pressure gauge to verify the functioning as per given standards</p> <p>P3. Check wiring circuit and fuel injector with the help of multi-meter to ensure standard operation</p>
2. Perform Service of the EFI System	<p>P1. Replace clogged/contaminated Fuel Filter, Fuel Tank or Fuel Pump Strainer</p> <p>P2. Ensure fuel pump pressure according to Standard specifications</p> <p>P3. Clean clogged/ contaminated Fuel Injector, if needed</p>
3. Perform Service of the Common Rail Diesel Fuel Injection System	<p>P1. Replace clogged/ contaminated diesel fuel filter and diesel fuel pump strainer, if needed</p> <p>P2. Ensure diesel fuel pump pressure according to Standard specifications; replace, if needed</p> <p>P3. Replace clogged/ contaminated diesel fuel injector</p>

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Understanding of Manufacturer Repair Manual
- Use of vehicle scanner
- Types fuels
- Use of multi-meter
- Use of measurement gauges (Pressure Gauge)

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify and fix Fuel Injection System faults as per set standards

Code:

Repair Engine Cooling System

Overview

This competency standard is developed to provide skills and knowledge to service and repair air and water cooled engine cooling systems, in accordance with the Manufacturer Manual. You will be able to diagnose fault/s and other maintenance issues of automobile engines while ensuring safe use of tools, equipment and materials.

Competency Units	Performance Criteria
1. Diagnose Fault in Engine Cooling System	<p>P1. Carry out inspection of radiator, cooling fan/ motor to diagnose fault/s, if any</p> <p>P2. Check Coolant for contamination and diagnose fault/s, if any</p> <p>P3. Carry out inspection to check Water temperature gauge, and sensor and diagnose fault/s, if any</p> <p>P4. Carry out inspection to check V belt/ condition and its tension to verify smooth functionality of water pump belt and diagnose fault/s, if any</p> <p>P5. Carry out inspection to check Vacuum/pressure valve in radiator cap with appropriate tool, to verify recommended pressure</p> <p>P6. Carry out inspection to check heat units and accessories of Passenger compartment, to verify leakage</p>
2. Repair or Replace radiator and Auxiliary Components	<p>P1. Adjust water pump belt tension to verify proper functioning of coolant system according to requirement</p> <p>P2. Replace faulty radiator pressure cap according to set standards</p> <p>P3. Replace faulty radiator reservoir to maintain recommended coolant level in the cooling</p> <p>P4. Replace faulty thermostat valve to maintain the temperature of coolant at 90° C to 97° C</p> <p>P5. Perform Flushing of contamination from clogged radiator without damaging the radiator core</p> <p>P6. Remove faulty water circulating pump to verify proper circulation of coolant in cooling system</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS)
- Repair Manual

- Mechanism of engine cooling system
- Types of radiators
- Heat transfer methods
- Types of engine cooling systems
- Radiator cap valves
- Coolant Flow Circuit
- Temperature and system pressures
- Sensors in engine cooling system

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify faults in engine cooling system of vehicle engine and repair or replace faulty parts/components according to SOPs
- State advantages and disadvantages of water and air cooling systems in engine

Code:

Repair Engine Lubrication System Overview

This competency standard is developed to provide skills and knowledge to service and repair different types of engine lubricating systems, in accordance with the Manufacturer Manual. You will be able to diagnose fault/s and other maintenance issues of automobile engines while ensuring safe use of tools, equipment and materials.

Competency Units	Performance Criteria
1. Diagnose Faults in Lubrication System	P1. Check engine oil level and condition P2. Inspect oil pressure warning lamp/gauge according to manufacturer specifications P3. Inspect oil/sump/combustion chambers/ cooling system for oil leakage and find dents or damages, if any
2. Repair or Service Engine Lubrication System	P1. Replace Engine Oil and Oil Filter to verify smooth functioning of engine P2. Replace engine oil pressure switch to maintain standard engine oil pressure in the system P3. Dismantle oil sump, repair or replace oil pump to remove any damage according to manufacturer specifications

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS)
- Repair Manual
- Positive Crankcase Ventilation System (PCV)
- Types of lubricants (characteristics, viscosity and grades)
- Oil Flow circuit in engine
- Oil pressure
- Oil pumps, coolers, filters, relief valve, pressure and level indicator etc.
- Electrical controls and switches

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify faults in Oil Lubricating System of engine and repair or replace faulty parts/components according to SOPs
- Identify Points and places for oil leakage

Code:

Perform Overhauling of Engine Overview

This competency standard is developed to provide skills and knowledge to Overhaul Engine (Petrol and Diesel), in accordance with the Manufacturer Manual. You will be able to diagnose fault/s and other maintenance issues of automobile engines while ensuring safe use of tools equipment and materials.

Competency Units	Performance Criteria
1. Inspect Engine of the Vehicle	P1. Carryout compression test to check the engine performance according to standards P2. Identify leakages in engine for oil/coolant by following standard procedure P3. Drain engine oil and coolant as per standard procedure
2. Remove Engine from the Vehicle	P1. Disconnect relevant electrical connections of engine as per standard procedure P2. Remove ancillary components of engine as per standard procedure P3. Remove engine from the vehicle for overhauling according to standard procedure
3. Dismantle the Components of the Engine	P1. Mount engine on engine overhauling trolley as per standards P2. Dismantle engine components to identify faults as per Manufacturer Repair Manual P3. Mark engine components and identify their fixing order or the place P4. Clean all parts of engine for repair as per standard procedure
4. Repair the Engine	P1. Check engine cylinder head (Cam Shaft, Valve Set and Valve Seat) to repair/replace, if required P2. Take measurements for machining of engine components (Crank Shaft, Cam Shaft and Engine Block) as per standards P3. Reassemble engine with specified torque as per standard procedures
5. Re-fit Engine in the Vehicle	P1. Refit engine on vehicle, fill engine oil and radiator coolant to required level P2. Check supply lines from fuel, air, and coolant etc. P3. Reconnect relevant engine electrical connections of battery and wire harness P4. Vehicle test run as per SOPs and final adjustments if necessary; ensure proper working condition

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS)
- Repair Manual
- Mechanism of Engine
- Use of hand tools, torque wrench, special service tools for removal/adjustment
- Measuring tools and equipment (Pressure Gauges, Micrometer, Vernier Caliper, Multi-meters and scanners)
- Lifting equipment
- Engine components
- Measurement of wear in Crank Shaft, and in Cam Shaft, Engine Bore, Piston, Bearings, Bushes and Shims

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify faults of automatic transmission system and repair or replace faulty parts/components according to SOPs

Code:

Repair Manual Transmission System

Overview

This competency standard is designed to provide skills and knowledge to repair manual transmission of vehicle by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to diagnose faults related to transmission system of vehicle and repair faulty part/s according to set standards.

Competency Units	Performance Criteria
1. Diagnose Faults in Manual Transmission System	<p>P1. Check clutch mechanism (paddle, linkage etc.), hydraulic clutch fluid conditions and leakage, according to specified standards, and diagnose faults, if any</p> <p>P2. Check gear mechanism (linkage bushes and bearings, shafts of gears, differential etc.), oil level and leakage according to the specified standards, and diagnose faults, if any</p> <p>P3. Check Gear box mounts and diagnose faults, if any</p> <p>P4. Disassemble transmission to diagnose faults, if any</p>
2. Repair Manual Transmission System	<p>P1. Maintain or change hydraulic clutch paddle fluid of clutch according to specified level</p> <p>P2. Repair or replace any defected part/according to specified standards, after performing vehicle test on road for checking slipping, abnormal noise, vibrations etc.</p> <p>P3. Replace clutch set (clutch and pressure plate, clutch release bearing) and repair related components according to specified standards, if required</p> <p>P4. Repair or replace faulty part/s of transmission gearbox according to specified standards</p>
3. Repair auxiliary transmission components	<p>P1. Repair or replace faulty part/s of propeller shafts according to specified standards</p> <p>P2. Repair or replace faulty components of differential according to specified standards</p> <p>P3. Repair or replace faulty axle according to specified standards</p> <p>P4. Repair or replace faulty seals and washers according to specified standards</p> <p>P5. Reassemble and install a transmission gearbox in a vehicle according to Manufacturer Manual</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS)
- Manufacturer Repair Manual
- Uses of measuring tools (Vernier Caliper, Micro-meter, Feeler Gauge etc.)
- Gear Ratio
- Torque Wrench
- Lubricants
- Sealing Materials

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify faults of manual transmission system and repair or replace faulty parts/ components according to SOPs

Code:

Repair Automatic Transmission System

Overview

This competency standard is developed to provide skills and knowledge to repair Automatic Transmission System and ancillary components by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to diagnose faults in Automatic Transmission System of the vehicle and repair the same while using standard procedures.

Competency Units	Performance Criteria
1. Diagnose Faults in Automatic Transmission System	<p>P1. Carry out road test at different speeds for smooth operations of torque converter and gear shifting according to Manufacturer standard</p> <p>P2. Check automatic transmission mounts for faults if any</p> <p>P3. Check automatic transmission fluid (ATF) level, according to standard specification and identify leaks if any</p> <p>P4. Check automatic transmission solenoid by using automotive scanner and identify faults if any</p> <p>P5. Check electrical controls and Hydraulic pressure of automatic transmission for faults if any</p>
2. Disassemble Automatic Transmission System and Ancillary Components	<p>P1. Remove automatic transmission and disassemble it to check for worn-out/ faulty part/s and replace them as per Manufacturer Repair Manual</p> <p>P2. Check automatic transmission performance by ensuring proper linkages and controls as per standards</p> <p>P3. Reassemble automatic transmission and refit to the vehicle according to standards</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Manufacturer Repair Manual
- Fluid types of automatic transmission
- Use of hand tools, torque wrench, special service tools for removal/adjustment
- Use of measuring tools and equipment (Pressure Gauges, Multi-meters, Scanners)
- Use of lifting equipment

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify faults of Automatic Transmission System and repair or replace faulty parts/components according to SOPs

Code:

Repair Braking Systems

Overview

This competency standard is designed to provide skills and knowledge to repair brake system of vehicle by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to perform inspection and diagnosis of faults of the brake system of vehicle, and perform road test to verify the performance of the vehicle.

Competency Units	Performance Criteria
1. Diagnose Faults of Braking System	P1. Check brake indicator switches to identify fault P2. Perform road test to verify the faults of Brake System,unusual wear, noise and operation according to SOPs P3. Check standard brake fluid level and quality/aging P4. Check brake lines and hoses to check brake fluid leaks P5. Check and identify Parking Brake and Master Cylinder, Wheel Cylinder, Vacuum Booster Units, Air Booster Parking Brake System, Brake Indicator Switches, Cable Faults etc. as per set standards P6. Identify faulty components of Anti-Lock Braking System (ABS) (sensors, pump, controller, valves etc.) to identify faults
2. Perform Repair of the Braking System	P1. Dismantle brake system components of building layout as per Manufacturer Specifications P2. Repair faults of Brake Lines and Hoses according to set standards P3. Inspect and repair/replace/adjust Brake Shoe / Drum, Calliper Washers, Dust Boots, Wheel Cylinder Washers, and Master Cylinder Washers according to the requirement of respective parts to ensure proper functioning of Brake System P4. Replace or repair Brake Disc Rotor and Brake Drum according to set standards P5. RefillBrake Fluid level according to set standards P6. Replace brake stop light switch according to set standards P7. Perform road test to ensure the proper working of brake system
3. Diagnose faults ofAnti-Lock Braking System (ABS)	P1. Perform road test to ensure proper working of ABS P2. Identify faults of ABS Brake using vehicle scanner P3. Visually check brake lines and hoses, blockage or crimping P4. Inspect wheel speed sensor (proper mounting, connection or broken teeth)

	P5. Visually inspect ABS controller for any damages
4. Perform Repair of Anti-Lock Braking System (ABS)	P1. Raise vehicle via car jack / lift and place safety support if required P2. Clear malfunctioning unit with the help of vehicle scanner P3. Disconnect impulse sensor, electrical connector and check sensor for continuity P4. Clean hoses connections thoroughly for blockage or crimping P5. Replace faulty components of Anti-Lock Braking System (ABS) as per Manufacturer specifications P6. After repair, ensure that warning lights on the instrument panel operate properly

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Understanding of Manufacturer Repair Manual
- Fluid pressure
- Use of Measuring Tools
- Types and specifications of pneumatic tyres
- Types of rims
- Tyre rotation
- Basic electrical/Electronics
- Functions of Electronic Brake Force Distribution (EBD) System
- Functions and working of ABS System
- ABS air bleeding

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Diagnose faults in Brake System and replace/ repair faulty part/s confirming the smooth functioning of the vehicle

Code:

Repair Suspension / Steering System

Overview

This competency standard is developed to provide skills and knowledge to repair suspension system and ancillary components of vehicle by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to perform inspection and diagnosis of faults in Suspension System of vehicle and perform road test to verify performance of the vehicle.

Competency Units	Performance Criteria
1. Diagnose Faults in Suspension System	<p>P1. Perform road tests on different types of roads to verify abnormal noise/stability and vibrations</p> <p>P2. Lift-up and perform physical inspection (Shock Absorber Leakage, Bushes, Coil Springs, Leaf Springs, Tension and Torsion Bars, Stabilizer Bars, Spring Seat etc.) to identify abnormal wear/tear and movements</p> <p>P3. Perform ground clearance according to manufacturer specifications</p>
2. Repair or Service Suspension System	<p>P1. Replace Ball Joints, Lower Control Arms, Z-links and Stabiliser Bar to avoid wear and tear of suspension, if required</p> <p>P2. Replace front and rear Shock Absorbers to verify smooth operation of Shock Absorber as per set standards</p> <p>P3. Fix or replace front and rear spring, height and tension of springs as per set standards</p>
3. Diagnose Steering System	<p>P1. Perform road tests on different types of roads to verify abnormal noise/stability and vibrations</p> <p>P2. Check steering rack assembly to identify fault, if any</p> <p>P3. Check power steering pump, pipe, connection, belt, steering rack and fluid level of hydraulic power steering gearbox including leakage, if any.</p> <p>P4. Check wiring, steering assembly, EPS module and electrical connection of Electronic Power Steering (EPS).</p> <p>P5. Check EPS sensor light in instrument panel</p> <p>P6. Check all mounting nuts and bolts to ensure safety</p>
4. Repair of Steering System	<p>P1. Repair/ replace faulty components of steering system according to set standards</p> <p>P2. Replace/ repair electrical components of EPS, if required</p> <p>P3. Perform steering calibration, if required</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Understanding of Repair Manual
- Functionality of Shock Absorber
- Types of lubricants (characteristics, viscosity and grades)
- Maintaining the oil pressure
- Oil pumps, coolers, filters, relief valve, pressure and level indicator etc.
- Electrical controls and switches

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify faults in Suspension System of vehicle and repair or replace faulty parts/components according to SOPs

Code:

Carry out Wheel Balancing and Alignment Overview

This competency standard is designed to provide skills and knowledge related to wheel balancing and steering alignment of vehicle by Auto Mechanic, in accordance with the Manufacturer Manual. You will be able to perform wheel and steering alignment and balance and repair faulty part/s according to set standards.

Competency Units	Performance Criteria
1. Perform Wheel Balancing	<p>P1. Perform road test to verify the balance of wheels according to set standards</p> <p>P2. Check Wheel rim and tyre condition according to set standards</p> <p>P3. Carry out wheel balancing using appropriate wheel balancing equipment and fix weight/s as per requirement</p> <p>P4. Re-test vehicle on road to verify correction of wheels balancing according to set standards</p>
2. Perform Wheel Alignment	<p>P1. Perform road test to verify alignment of wheels according to set standards</p> <p>P2. Check functionality of suspension, steering and adjust camber, caster, toe-in-and toe-out according to set standards</p> <p>P3. Re-test vehicle on road to verify alignment of wheels according to set standards</p>

Knowledge and Understanding

This competency standard will provide knowledge related to:

- Occupational Health & Safety (OHS) precautions
- Manufacturer Repair Manual
- Different types of Tyres
- Vehicle lifting and support procedures
- Wheel balancing Weight
- Run out
- Torque measurement process
- Basic Geometrical Angles
- Camber, caster, toe-in-and toe out
- Method of Wheel Balancing
- Static and dynamic

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify and fix wheel alignment and balancing faults as per set standards

LIST OF TOOLS AND EQUIPMENT

Sr. No.	Description
1.	Allen Key Set (Hexagonal, Torks)
2.	Ampere Meter
3.	Battery Tester
4.	Bench Vice
5.	Brake Bleeding Equipment
6.	Brake Efficiency Tester
7.	Brushes Different Types
8.	Carburetor Service Kit (Special Service Tools)
9.	Cleaning Equipment with Detergent
10.	Coil Spring Compressor
11.	Compressed Air with Leaks Testing Gauges/ Equipment for Engine and Radiator
12.	Computer Lead Box/Diagnosis System/Interface Box
13.	Condenser Tester
14.	Db Meter
15.	Dial Gauge with Magnetic Stand
16.	Drill Bits Set (Mason, Metal)
17.	Dual TachoTester
18.	Dust Blower
19.	Electric Connector Remover
20.	Engine Exhaust CO Analyzer
21.	Feeler Gauge
22.	Files Set for Contact Points Facing
23.	Fuel Pressure Gauge
24.	General Mechanic's Hand Tools

Sr. No.	Description
25.	Hammer-Different Size and Types
26.	Hand Drilling Machine
27.	Hand Operated Vacuum Pump
28.	Heat Gun
29.	Hydraulic Pressure Measuring Gauge/ Instrument
30.	Hydrometer(Gravity Meter)
31.	Injector Tester
32.	Insulation Tester
33.	Jack Hoist/ Stands
34.	Jack Telescopic with Weight Lifting Capacity 1.5 Tons
35.	Jack Trolley Type with Weight Lifting Capacity 5 Tons
36.	Lifting Equipment (Service Pit)
37.	Lock Pliers
38.	Magnifying Glass
39.	Marking Tools
40.	Measuring Precision Tools/ Instruments
41.	Measuring Tape
42.	Multi Scanner Tools for Vehicle
43.	Multi-Meter (AVO Meter)
44.	Oil Draining Machine
45.	Oil Filter Wrench
46.	Oil Funnel
47.	Oil Pressure Gauge with Different Types of Attachments
48.	Oscilloscope
49.	Pedestal Drilling Machine

Sr. No.	Description
50.	Pliers Set
51.	Power Tools
52.	Pullers Different Types
53.	Radiator Cap Tester (Pressure and Vacuum Tester)
54.	Radiator Pressure Leakage Testers
55.	Safety Clothing, Equipment and Kit
56.	Scraper
57.	Screw Driver Kit
58.	Soldering Iron
59.	Spark Plug Deep Sockets
60.	Spark Plug Tester
61.	Special Service Tools Recommended by the Manufacturer
62.	Special Tools for Removal/Adjustment of Brake System
63.	Special Tools for Removal/Adjustment of Manual Transmission
64.	Spirit Level
65.	Spring Compressor
66.	Star Key Set
67.	Stroboscope
68.	Table Drilling Machine
69.	Tachometer
70.	Temperature Gauge
71.	Test Lamp
72.	Testing Board
73.	Toque Wrench
74.	Tweezers Kit

Sr. No.	Description
75.	V Blocks
76.	Wheel Alignment Equipment
77.	Wheel Balancer Machine
78.	Work Bench