



COMPETENCY BASED CURRICULUM (AUTOMOTIVE TECHNOLOGY)

BQF CERTIFICATE-2



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FOREWORD

Bhutan has seen a gradual increase in the requirement of skilled workers in recent years due to growth of industries. However, supply of skilled workforce that are responsive to the needs of the industry has not been able to keep in pace with the industry demand. Since the skilled workers are crucial ingredient for socio-economic development of the country, it is important to have adequate number of trained and certified workers. With growing industries, the “Automotive Technician” are not only the most significant occupation but also have high demand in the labour market. In an effort to meet the skilled human resources requirement in the area of Auto Industry, it is imperative to deliver training based on Competency Based Training system in Automotive Technology BQF Certificate 2 to ensure quality and adequate number of workforces in this sector.

To this end, the Department of Workforce Planning and Skills Development (DWPSD) is pleased to present the revised edition of Competency Based Curriculum for Automotive Technology BQF Certificate 2 course developed based on National Competency Standards (NCS) and using standard curriculum development guidelines. Since it is an outcome of a more participatory process of curriculum development, it is expected to provide training delivery with reformed approaches having its content being directly related to labour market needs, focusing on imparting of skills and assessment based on industry work standards. We believe that the Competency Based Curriculum will help in bridging the skill gap between industry’s needs and training institutes thereby enhance the employability of the technical graduates.

The Department acknowledges the valuable contributions made by institutes, officials, and experts from relevant industries who were involved in the design and development of this curriculum. As it is a dynamic document which may require revision based on the needs of the changing labour market, the Department look forward to receiving valuable feedbacks from the institutes and the industries to further improve and refine the curriculum

The Department hope that this document will help advance Competency Based Learning in most of the TVET Institutions.



(Sangay Dorji)
Director

Department of Workforce Planning and Skills Development

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COMPETENCY PROFILE

Trade: Automotive Technician BQF 2

Competency Area	Sub- Competency Area	Competencies/Tasks 			
A: Service suspension system	A1: Replace rigid suspension components	A1.01 Replace leaf spring assembly	A1.02 Disassemble leaf spring assembly	A1.03 Assemble leaf spring assembly	A1.04 Replace lateral control rod
		A2.01 Replace strut assembly	A2.02 Disassemble strut assembly	A2.03 Assemble strut assembly	A2.04 Replace coil spring
	A2: Replace independent suspension component	A2.05 Replace suspension arm	A2.06 Replace torsion bar	A2.07 Replace stabilizer bar	
		A3.01 Diagnose rigid suspension system faults	A3.02 Diagnose independent suspension system faults	A3.03 Perform suspension system test	
	A3: Troubleshoot suspension system				
B: Service steering system	B1: Service steering components	B1.01 Replace steering wheel	B1.02 Replace steering column	B1.03 Replace tie-rod end	B1.04 Replace rack & pinion assembly (Manual)
		B1.05 Replace rack & pinion steering gearbox (Power steering)	B1.06 Replace re-circulating ball type steering gearbox	B1.07 Disassemble re-circulating ball type steering gearbox	B1.08 Assemble re-circulating ball type steering gearbox
		B1.09 Replace integral power steering gearbox	B1.10 Replace power steering pump	B1.11 Change power steering fluid	B1.12 Troubleshoot steering system
	B2: Service knuckle assembly	B2.01 Replace steering knuckle	B2.02 Replace knuckle bearing	B2.03 Replace knuckle spindle	
	B3: Perform wheel alignment and balancing	B3.01 Perform pre-alignment	B3.02 Adjust toe-angle	B3.03 Adjust camber angle	B3.04 Rectify wheel imbalance

Competency Area	Sub- Competency Area	Competencies/Tasks →			
C: Service brake system	C1: Service brake components	C1.01 Replace brake booster	C1.02 Service master cylinder	C1.03 Service drum brake	C1.04 Replace parking brake cable
		C1.05 Service wheel cylinder	C1.06 Service brake caliper assembly	C1.07 Replace brake disc	C1.08 Replace load sensing device
		C1.09 Replace brake pipeline	C1.10 Change brake fluid	C1.11 Replace wheel speed sensor	C1.12 Replace Anti-lock Brake System (ABS) modulator
	C2: Adjust brake components	C2.01 Adjust brake pedal free play	C2.02 Adjust drum brake	C2.03 Adjust parking brake	
	C3: Troubleshoot brake system	C3.01 Check brake booster operation	C3.02 Perform On-Board Diagnostic (OBD) test	C3.03 Perform brake system test	
D: Overhaul power train	D1: Service axle shaft/drive shaft components	D1.01 Replace propeller shaft	D1.02 Replace cross bearing	D1.03 Service wheel hub assembly	D1.04 Replace axle shaft
		D1.05 Replace drive shaft	D1.06 Troubleshoot axle/drive shaft		
	D2: Service differential components	D2.01 Change differential oil	D2.02 Dismount differential assembly	D2.03 Disassemble differential assembly	D2.04 Adjust tail pinion bearing pre-load
		D2.05 Assemble differential assembly	D2.06 Adjust ring gear backlash	D2.07 Troubleshoot differential assembly	

Competency Area	Sub- Competency Area	Competencies/Tasks 			
	D3: Service transmission components	D3.01 Change transmission oil	D3.02 Replace transmission assembly	D3.03 Disassemble transmission components	D3.04 Inspect transmission components
		D3.05 Adjust backlash/thrust play	D3.06 Assemble transmission components	D3.07 Overhaul transfer case	D3.08 Replace transaxle
		D3.09 Disassemble transaxle components	D3.10 Assemble transaxle components	D3.11 Troubleshoot transmission system	
	D4: Service clutch system	D4.1 Service clutch assembly	D4.02 Service clutch master cylinder	D4.03 Change clutch fluid	D4.04 Replace clutch cable
		D4.05 Adjust clutch pedal free play	D4.06 Troubleshoot clutch system		
E: Service engine auxiliary system	E1: Service cooling system	E1.01 Change coolant	E1.02 Replace thermostat valve	E1.03 Service radiator assembly	E1.04 Replace water pump assembly
		E1.05 Troubleshoot cooling system			
	E2: Service engine lubrication system	E2.01 Change engine oil	E2.02 Change oil pressure switch	E2.03 Troubleshoot engine lubrication system	
	E3: Service fuel system (SI engine)	E3.01 Replace fuel filter	E3.02 Replace Evaporative Emission (EVAP) canister	E3.03 Change accelerator cable	E3.04 Replace fuel rail (fuel delivery pipe and injector)

Competency Area	Sub- Competency Area	Competencies/Tasks →			
		E3.05 Replace Positive Crankcase Ventilation (PCV) valve	E3.06 Service fuel tank	E3.07 Troubleshoot fuel system	
	E4: Service fuel system (CI engine)	E4.01 Replace fuel filter	E4.02 Bleed fuel system	E4.03 Service mechanical fuel injector	E4.04 Replace CRDI fuel injector
		E4.05 Troubleshoot fuel system			
F: Perform basic auto electrical works	F1: Replace basic electrical components	F1.01 Replace fuse	F1.02 Replace relay	F1.03 Repair wires and connectors	F1.04 Replace alternator
		F1.05 Replace self-starter			
	F2: Service battery	F2.01 Check battery condition	F2.02 Charge battery	F2.03 Replace battery	F2.04 Replace battery temperature sensor
		F2.05 Perform jump start			
	F3: Replace sensors	F3.01 Replace oxygen sensor	F3.02 Replace coolant temperature sensor	F3.03 Replace oil actuator sensor	

COURSE INFORMATION

COURSE TITLE	Automotive Technology
LEVEL	BQF Certificate 2
COURSE OBJECTIVE	Upon completion of this training program, the trainees will be able to: • Service suspension system • Service steering system • Service brake system • Overhaul power train • Service engine auxiliary system • Perform basic auto electrical works
COURSE DESCRIPTION	This curriculum is designed to provide knowledge, skills and right attitude of an individual to be a competent automotive technician in accordance with industry standards. This course is based on practical exposure in different areas as required in the real world of work in the industry. Upon completion of the course, graduates will be able to service suspension, steering, brake & engine auxiliary system, overhaul power train and perform basic auto electrical works. In addition, this course will also prepare the graduates to comply with regulatory and organizational requirements for practicing Occupational Health and Safety procedures. This course also includes the soft skills components such as basic computer application, entrepreneurship, numeracy, communication and value education to supplement core competencies and enhance practical skills.
COURSE DURATION	1576.5 Hours
TRAINER AND TRAINEE RATIO	1:12 (Practical) 1:20 (Theory)
ENTRY REQUIREMENT	Completed class X passed
TVET TRAINER REQUIREMENTS	• Must have a minimum qualification of Diploma in Automobile/Mechanical Engineering (OR) Certificate level 3 in Automobile mechanic/Automotive Technology with minimum of five years of work experience in relevant field; • Must have undergone Training of Trainers-Technical Instruction and Andragogy

COURSE OUTLINE

Sl. No	Subject /Module	Duration (Hours)	Content Competencies (Mapped)
1.	Core modules	626.5	CC
2.	OJT	420 (3 months)	CC
3.	Applied Dzongkha	42	SS
4.	ICT	68	SS
5.	Applied Mathematics	60	SS
6.	Technical English	82	SS
7.	Entrepreneurship	70	SS
8.	Occupational Health and Safety (OHS)	34	ES
9.	Sustainable Consumption and Production (SCP)	36	ES
10.	Professional Ethics	68	PD
11.	Assessment	70	
	Total Course Duration	1576.5	

Note: (*) This curriculum contains core modules which cover main competencies of Automotive Technology BQF Certificate 2 and OJT component. There are separate curricula for subjects/modules for delivery of soft skills, professional development & values and environmental concern & safety. In order to achieve the qualification of Automotive Technology BQF Certificate 2, the subjects and modules listed must be accomplished as per the credit hours provided.

Content Competencies:

CC-Core Competencies

SS-Soft Skills

PD-Professional Development and Values

ES-Environmental concern and Safety

COURSE STRUCTURE FOR CORE COMPETENCIES

Training Modality	Module Title	Learning Outcomes	Duration (Hours)
Institute Training	1. Servicing Suspension System	1.01 Replace rigid suspension components 1.02 Replace independent suspension components 1.03 Troubleshoot suspension system	119.5
	2. Servicing Steering System	2.01 Service steering components 2.02 Service knuckle assembly 2.03 Perform wheel alignment and balancing	92
	3. Servicing brake system	3.01 Service brake components 3.02 Adjust brake component 3.03 Troubleshoot brake system	71.5
	4. Overhauling power train	4.01 Service propeller shaft component 4.02 Service axle/drive shaft components 4.03 Service differential components 4.04 Service transmission components 4.05 Service clutch system	184
	5. Servicing engine auxiliary system	5.01 Service cooling system 5.02 Service engine lubrication system 5.03 Service fuel system (SI engine) 5.04 Service fuel system (CI system)	113
	6. Performing basic auto electrical work	6.01 Replace basic electrical components 6.02 Service battery 6.03 Replace sensors	46.5
On the Job training	1. Servicing Suspension System	1.01 Replace rigid suspension components 1.02 Replace independent suspension components 1.03 Troubleshoot suspension system	420 (3 months)
	2. Servicing Steering System	2.01 Service steering components 2.02 Service knuckle assembly 2.03 Perform wheel alignment and balancing	
	3. Servicing brake system	3.01 Service brake components 3.02 Adjust brake component 3.03 Troubleshoot brake system	
	4. Overhauling power train	4.01 Service propeller shaft component 4.02 Service axle/drive shaft components 4.03 Service differential components 4.04 Service transmission components 4.05 Service clutch system	

	5. Servicing engine auxiliary system	5.01 Service cooling system 5.02 Service engine lubrication system 5.03 Service fuel system (SI engine) 5.04 Service fuel system (CI system)	
	6 Performing basic auto electrical work	6.01 Replace basic electrical components 6.02 Service battery 6.03 Replace sensors	

ASSESSMENT AND CERTIFICATION SYSTEM

ASSESSMENT

Diagnostic assessment of each skill will be conducted to identify areas where trainees may require additional support or intervention. This assessment will also evaluate their existing knowledge, skills, and understanding prior to a specific learning experience or unit of study. Methods such as pre-tests, concept mapping, KWL charts, and observations of student work will be utilized.

Formative assessment for every module and learning outcome will be conducted through assignments, project works, continuous assessment, demonstration of practical skills/observations, oral questioning and written test.

Summative assessment after completion of each national certificate level will be conducted by TVET Quality Council, Bhutan Qualifications and Professional Certification Authority (BQPCA), MoESD as per the National Competency Standards and Guidelines for National Assessment and Certification System, provided the course is accredited with TVET Quality Council, Bhutan Qualifications and Professional Certification Authority, MoESD.

CERTIFICATION

On successful completion of every module, the institute will award a certificate of achievement to the trainees. The TVET Quality Council, Bhutan Qualifications and Professional Certification Authority, MoESD will award a BQF Certificate to the trainees upon the successful completion of BQF Certificate level assessment.

COURSE DELIVERY

1. Modular
2. Demonstration
3. Lecture
4. Industrial training/attachment
5. Project work
6. Problem-based learning
7. Project-based learning

RESOURCES

Materials

- Lateral control rod, lateral control bush, bump stop, shock absorber bush, shock absorber, leaf spring, centre bolt, U-bolt, shackle, shackle pin, nut, clamp/clip, leaf spring seat, leaf spring bush, washer, MP grease, strut, coil spring, bearing, rubber cushion, strut bar, suspension arms, ball joint, torsion bar, stabilizer bush, stabilizer bar, stabilizer bar links, brackets, mounting bolts, inspection checklist, rigid & independent suspension components, fuel, universal joint, tie-rod end, steering wheel, steering shaft, pitman arm, steering damper, drag link, rack & pinion power steering assembly, steering column, gear oil, kerosene/cleaning solvents, re-circulating ball type steering gearbox, worm bearing, oil seal, gasket, shims, EPS gearbox, EPS motor, EPS controller, steering angle sensor, wheel speed sensor, torque sensor, integral power steering gearbox, power steering fluid, marking cloth, power steering drive belt, power steering pump, knuckle assembly, knuckle bearing, check nut, cotter pin, counter weight, tyre, safety valve, tubeless tyre valve, alignment string, steel ruler, wheel rim, tyre tube, brake booster, brake fluid,

master cylinder kits, brake pipes, wheel cylinder kits, wheel cylinder assembly, brake shoes, brake lining, rivet, caliper assembly, brake pads, brake disc, load sensing device, hand brake lever, hub assembly, brake actuator, drive shaft, wheel bearing, O-ring, brazing rod, propane gas and nozzle, hand brake cable, brake components, ABS actuator, ABS sensor, brake drum, vacuum pipe, sandpaper, cleaning solvents, marker, propeller shaft, cross bearing, center bearing, axle shaft, adjusting nut, fender cover, lock nut, wheel hub, water paper/emery paper, CV joint boot, thrust washer, differential oil, ring gear, drive pinion, bearing spacer, oil seals, sealant, differential side bearing, drain plug, filler plug, tail pinion bearing, differential assembly, transmission oil, transaxle components, automated manual transaxle components, transmission components, clutch fluid, clutch master cylinder kit, clutch cable, clutch pipeline, clutch pedal, clutch components, clutch slave cylinder kits, coolant, distilled water, radiator, thermostat, water pump, fan belt, fan shroud, oil cooler, fan, radiator cap, radiator hose, freezer plug, hose clamp, fastener, engine oil, oil filter, oil strainer, oil pump, oil pressure switch, insulation tape, oil sump gasket, rocker arm gasket, protective seat cover, oil pan, fuel filter, petrol, fuel pressure regulator, accelerator cable, fuel gauge, fuel pump, PCV valve, fuel rail, fuel tank, fuel injector, fuel pump relay, EVAP canister, diesel fuel filter, overflow pipe, high pressure pipe, pressure regulator, banjo bolt, banjo washer, hand primer, bleeding screw, CRDI injector, mechanical injector kits, wire, heat shrink tube, starter motor, fuse, crimp terminals, bolts, alternator, relay, battery, connector, alternator belt, battery terminal, petroleum jelly, temperature sensor, rust inhibitor, jumper cable, wire brush, O₂ sensor, TP sensor, IAT sensor, MAP sensor, air flow sensor, camshaft position sensor, clips, 1.5 V battery, crankshaft position sensor, silicon/rubber grease, ice & water, knock sensor, VVT/I-VVT/VTVT sensor and sensor O-ring

Tools

- Automotive technician hand tool set, SST, wrench, wheel wrench, torque wrench, tie-rod end remover, lever, impact wrench, valve key, flaring and cutting tool set, brake bleeding tools, brake adjusting tool, steel ruler, drive shaft remover, axle puller, oil can, drain plug spanner, stethoscope, scrapper, scale or measuring tape, pry bar, oil filter wrench, test lamp, belt remover and installer, crimping tool, wire stripper, brass wire brush, mini socket set, screw driver set and service wire

Instruments

- Dial gauge with magnetic stand, pre-load gauge, belt tension gauge, multi-meter, vernier calliper, micro meter, pressure gauge with adapter, drum brake measuring tool, pre-load gauge, feeler gauge, thermometer, pressure tester, multimeter, injector pressure tester and wire gauge

Equipment

- vehicle, wheel wedge, ramp, on-test plate, grease gun, ramp/jack, safety stand, hydraulic/pneumatic press, bench vice, jack, car lift, coil spring compressor, OBD tool, wheel balancing machine, wheel alignment machine,

air compressor, wooden wedge, riveting tool, magnetic V-block, surface plate, anvil, tray, oil dispenser, V block, engine support fixture, vinyl tube, container, tension gauge, gas/electric stove, hand pump, under hoist stand, OBD tool, fuel injector pressure tester, battery booster charger, charging bench, hand vacuum pump, oil can, and blower.

PPE

- Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest

Learning Materials

- Competency Based Learning Materials (CBLM)
- Reference books
- Hand-outs
- Audio visuals

Infrastructure and training facilities

- Theory classroom size: Minimum of 1.5 m² per trainee;
- Practical Workshop size: Minimum of 3 m² per trainee. Variables must be considered depending upon type of skills being taught and the number of trainees participating at a time

MODULE INFORMATION
AUTOMOTIVE TECHNICIAN
BQF CERTIFICATE 2

MODULE 1
ON
SERVICING SUSPENSION SYSTEM

MODULE INFORMATION

Occupation	Automotive Technician
Competency Area	Service suspension system
Module Title	Servicing suspension system
Module Code	7231-L2-M1
Module Description	This module provides the learner with the knowledge, skills and right attitude required to replace rigid & independent suspension components and troubleshoot suspension system
Nominal Duration	119.5 Hours
Certificate Level	Certificate Level 2
Pre-requisite	Completed class X
Learning Outcome	1. Replace rigid suspension components 2. Replace independent suspension components 3. Troubleshoot suspension system

Module Title	Servicing suspension system		
Module Code	7231-L2-M1		
Learning Outcome 1	Replace rigid suspension components		
Duration	Theory: 5.5 hours	Practical: 75.5 hours	Total: 81 hours
Assessment Criteria	• Leaf spring assembly is replaced as per the job requirement following standard procedure • Leaf spring assembly is disassembled as per the job requirement following standard procedure • Leaf spring assembly is assembled as per the job requirement following standard procedure • Lateral control rod is replaced as per the job requirement following standard procedure		
Content	A1.00 Introductory knowledge • Brief history of automobile • Trends and scope of automotive technician • Overview on automotive technician course • Safety practices of automobile workshop • Introduction to automotive technician tools and equipment • Basic driving skills (2 weeks) A1.01 Replacing leaf spring assembly Knowledge • Definition and function of suspension system • Operation of suspension system • Types of suspension system • Components of suspension system and its function • Types of leaf spring • Operation and function of leaf spring • Types of shock absorber • Operation and function of shock absorber Skills • Using hydraulic jack • Using car lift • Using torque wrench • Using impact wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes		

	• Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to park the vehicle safely • Ensuring to secure nuts and bolts • Ensuring to support chassis and axle by safety stand • Ensuring to lift or jack up the vehicle in correct position A1.02 Disassembling leaf spring assembly Knowledge • Components of leaf spring and its function • Causes of leaf spring defects and its remedies Skills • Using hydraulic/pneumatic press • Using bench vice • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to securely clamp leaf spring assembly on the bench vice A1.03 Assembling leaf spring assembly Knowledge • Importance of leaf spring alignment • Functions of leaf spring bush • Types of leaf spring bush • Types of grease • Application of grease in leaf spring assembly Skills • Using C-clamp • Using hydraulic/pneumatic press • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills Attitude, Safety and Environmental concern • Being time conscious • Being team player
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	• Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to securely clamp leaf spring assembly on the bench vice A1.04 Replacing lateral control rod Knowledge • Functions of lateral control rod • Operation of lateral control rod Skills • Using hydraulic jack/ lift • Observation skills • Analytical skills • Planning skills • Problem solving skills Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to lift or jack up vehicle in correct position
Learning Conditions	Learning materials • CBLM • Hand-outs • Audio-visual • Reference books Learning facilities and infrastructure • Classroom with adequate facilities • Library • IT lab with internet facilities • Workshop Materials • Lateral control rod, lateral control bush, bump stop, shock absorber bush, shock absorber, leaf spring, centre bolt, U-bolt, shackle, shackle pin, nut, clamp/clip, leaf spring seat, leaf spring bush, washer and MP grease Tools • Automotive technician hand tool set (<i>ring spanner set, DE-Spanner set, socket set, mini socket set, screw driver set, combination pliers, circlip plier, long nose plier, ball peen hammer, plastic hammer, chisel, center</i>

	<i>punch, drift punch, brass bar, scrapper, monkey plier, grip plier, side cutting plier, ratchet spanner set, hexagonal Allen key set, star Allen key set, adjustable wrench, copper brush, wire brush, paint brush</i>) (<i>ring spanner set, DE-Spanner set, socket set, mini socket set, screw driver set, combination pliers, circlip plier, long nose plier, ball peen hammer, plastic hammer, chisel, center punch, drift punch, brass bar, scrapper, monkey plier, grip plier, side cutting plier, ratchet spanner set, hexagonal Allen key set, star Allen key set, adjustable wrench, copper brush, wire brush, paint brush</i>), Special Service Tool (SST) and lever Equipment • Vehicle, wheel wedge, car lift, grease gun, ramp/jack, safety stand, hydraulic/pneumatic press and bench vice PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instruction Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method Of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

Module Title	Servicing suspension system		
Module Code	7231-L2-M1		
Learning Outcome 2	Replace independent suspension component		
Duration	Theory: 4.5 hours	Practical: 27 hours	Total: 31.5 hours
Assessment Criteria	• Strut assembly is replaced as per the job requirement following standard procedure • Strut assembly is disassembled as per the job requirement following standard procedure • Strut assembly is assembled as per the job requirement following standard procedure • Coil spring is replaced as per the job requirement following standard procedure • Suspension arm is replaced as per the job requirement following standard procedure • Torsion bar is replaced as per the job requirement following standard procedure • Stabilizer bar is replaced as per the job requirement following standard procedure		
Content	A2.01 Replacing strut assembly Knowledge • Functions of strut assembly • Components of strut assembly and its functions Skills • Using hydraulic jack • Using wrench/impact wrench • Using bench vice • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper position of safety stands A2.02 Disassembling strut assembly Knowledge • Operation of strut assembly Skills • Using coil spring compressor		

	• Using wrench/impact wrench • Using bench vice • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to securely compress coil spring A2.03 Assembling strut assembly <i>Knowledge</i> • Importance of coil spring position <i>Skills</i> • Using coil spring compressor • Using wrench/impact wrench • Using bench vice • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to safely remove coil spring compressor A2.04 Replacing coil spring <i>Knowledge</i> • Function of coil spring • Operation of coil spring <i>Skills</i> • Using car lift/jack • Using wrench/impact wrench
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	• Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to lift or jack up vehicle in correct position A2.05 Replacing suspension arm <i>Knowledge</i> • Functions of suspension arm • Types of suspension arm • Operation of suspension arm <i>Skills</i> • Using wrench/impact wrench • Using hydraulic jack/lift • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to lift or jack up vehicle in correct position A2.06 Replacing torsion bar <i>Knowledge</i> • Operation of torsion bar <i>Skills</i> • Using wrench/impact wrench • Using hydraulic jack/lift • Communication skills • Observation skills
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	- Analytical skills - Planning skills - Problem solving skills <i>Attitude, Safety and Environmental concern</i> - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE - Ensuring to lift or jack up vehicle in correct position A2.07 Replacing stabilizer bar <i>Knowledge</i> - Function of stabilizer bar - Components of stabilizer bar - Operation of stabilizer bar <i>Skills</i> - Using torque wrench - Using wrench/impact wrench - Using hydraulic jack/lift - Communication skills - Observation skills - Analytical skills - Planning skills - Problem solving skills <i>Attitude, Safety and Environmental concern</i> - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE - Ensuring to lift or jack up vehicle in correct position
Learning Conditions	Learning Materials - CBLM - Hand-outs - Audio-visual - Reference books Learning Facilities - Classroom with adequate facilities - Library - IT lab with internet facilities

	• Workshop Materials • Strut, coil spring, bump stop, bearing, rubber cushion, strut bar, suspension arms, ball joint, torsion bar, stabilizer bush, stabilizer bar, stabilizer bar links, brackets and mounting bolts Tools • Automotive technician hand tool set, wrench, impact wrench, torque wrench and lever Equipment • Jack, car lift, safety stand, coil spring compressor and bench vice PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method Of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

Module Title	Servicing suspension system		
Module Code	7231-L2-M1		
Learning Outcome 3	Troubleshoot suspension system		
Duration	Theory: 2 hours	Practical: 5 hours	Total: 7 hours
Assessment Criteria	• Rigid suspension system faults are diagnosed as per the job requirement following standard procedure • Independent suspension system faults are diagnosed as per the job requirement following standard procedure • Workshop test drive is performed as per the job requirement following standard procedure		
Content	A3.01 Diagnosing rigid suspension system faults Knowledge • Symptoms, causes and remedies of rigid suspension system • Types of suspension movements • Methods of diagnosing rigid suspension system faults • Methods of bounce test Skills • Using hydraulic jack/lift • Using wench/impact wrench • Using bench vice • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skills Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper jacking position A3.02 Diagnosing independent suspension system faults Knowledge • Methods of diagnosing independent suspension system faults • Symptoms, causes and remedies of independent suspension system faults Skills • Using coil spring compressor • Using hydraulic jack/lift • Using wrench/impact wrench • Using bench vice • Communication skills		

	• Observation skills • Analytical skills • Planning skills • Problem solving skills <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE A3.03 Performing suspension system test <i>Knowledge</i> • Suspension noises and their probable causes <i>Skills</i> • Basic driving skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skills <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to follow traffic rules and regulation
Conditions	Learning Materials • CBLM • Hand-outs • Audio-visual • Reference books Learning Facilities • Classroom with adequate facilities • Library • IT lab with internet facilities • Workshop

	Materials • Inspection check list, rigid & independent suspension components and fuel Tools • Automotive technician hand tool set, wrench, impact wrench and lever Equipment • Vehicle, ramp, wheel wedge, on-test plate, jack and car lift PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method Of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

MODULE 2
ON
SERVICING STEERING SYSTEM

MODULE INFORMATION

Occupation	Automotive Technician
Competency Area	Service steering system
Module Title	Servicing steering system
Module Code	7231-L2-M2
Module Description	This module provides the learner with the knowledge, skills and right attitude required to service steering components & knuckle assembly and perform wheel alignment & balancing.
Nominal Duration	92 Hours
Certification Level	Certificate Level 2
Prerequisite	Completed class X
Learning Outcomes	1. Service steering components 2. Service knuckle assembly 3. Perform wheel alignment and balancing

Module Title	Servicing steering system		
Module Code	7231-L2-M2		
Learning Outcome 1	Service steering components		
Duration	Theory: 13 hours	Practical: 49 hours	Total: 62 hours
Assessment Criteria	- Steering wheel is replaced as per the job requirement following standard procedure - Steering shaft is replaced as per the job requirement following standard procedure - Tie-rod end is replaced as per the job requirement following the standard procedure - Rack and pinion assembly (Manual) is replaced as per the job requirement following the standard procedure - Rack and pinion steering gearbox (Power steering) is replaced as per the job requirement following standard procedure - Re-circulating ball type steering gearbox is replaced as per the job requirement following standard procedure - Re-circulating ball type steering gearbox is disassembled as per the job requirement following standard procedure - Re-circulating ball type steering gearbox is assembled as per the job requirement following standard procedure - Integral power steering gearbox is replaced as per the job requirement following standard procedure - Power steering pump is replaced as per the job requirement following standard procedure - Power steering fluid is changed as per the job requirement following standard procedure - Steering system is troubleshooted as per the job requirement following standard procedure		
Content	B1.01 Replacing steering wheel Knowledge - Definition of steering system - Functions of steering system - Principle of steering system - Types of steering systems - Components of steering system and its function - Basics of Supplemental Restraint System (SRS) - Purpose of air bag system Skills - Using steering wheel puller - ICT skills - Communication skills - Observation skills - Analytical skills - Planning skills - Problem solving skill		

	<i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper handling of SRS components • Ensuring proper disconnections of wires and connectors B1.02 Replacing steering column <i>Knowledge</i> • Types of steering columns • Construction of steering column <i>Skills</i> • Using steering wheel puller • Using steering wheel lock • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper connections of electrical connectors B1.03 Replacing tie-rod end <i>Knowledge</i> • Construction of tie-rod end • Types of tie-rod end <i>Skills</i> • Using tie-rod end remover • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill
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	<i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper disposal of waste product • Ensure to maintain the wheel alignment B1.04 Replacing rack and pinion assembly (Manual) <i>Knowledge</i> • Definition of steering gear ratio • Calculation of steering gear ratio • Construction of rack and pinion assembly • Operation of rack and pinion steering gear box <i>Skills</i> • Using tie-rod end/ball joint remover • Using steering wheel lock • Using hydraulic jack/lift • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Being patient • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to support vehicle with stands in correct position • Ensure to park the vehicle in straight ahead position B1.05 Replacing rack and pinion steering gearbox (Power steering) <i>Knowledge</i> • Definition of power steering • Function of power steering system • Types of power steering system • Types of rack and pinion power steering
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	• Construction and operation of hydraulic rack and pinion power steering system • Construction and operation of electronic power steering system Skills • Using tie-rod end puller • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper connections of wires and connectors B1.06 Replacing re-circulating ball type steering gear box Knowledge • Components of re-circulating ball type gear box and its function • Construction of re-circulating ball type gear box Skills • Using SST (Special Service Tools) • Using hydraulic jack/lift • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper jacking position B1.07 Disassembling re-circulating ball type steering gear box Knowledge • Operation of re-circulating ball type gear box
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	- Defects of re-circulating ball type gear box components Skills - Using SST - Using bench vice - Communication skills - Observation skills - Analytical skills - Planning skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE - Ensuring to follow 5S housekeeping methods B1.08 Assembling re-circulating ball type steering gear box Knowledge - Definition of backlash - Purpose of backlash Skills - Using SST - Using dial gauge - Using bench vice - Communication skills - Observation skills - Analytical skills - Planning skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE B1.09 Replacing integral power steering gear box Knowledge - Components of integral power steering gear box and its function - Construction and operation of integral power steering gear box - Differences between manual and power steering system
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	Skills • Using hydraulic jack/lift • Using bench vice • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper installation of power steering fluid line B1.10 Replacing power steering pump Knowledge • Functions of power steering pump • Construction of power steering pump • Types of steering pump • Working operation of power steering pump • Functions of power steering drive belt • Types of power steering drive belt • Defects of steering drive belt Skills • Using belt tension gauge • Using torque wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE
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	B1.11 Changing power steering fluid Knowledge • Functions of power steering fluid • Types of power steering fluid • Properties of power steering fluid • Purpose of purging/bleeding hydraulic power steering Skills • Basic driving skills (engine starting) • Using wrench/impact wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to use manufacturer's recommended power steering fluid B1.12 Troubleshooting steering system Knowledge • Symptoms, causes and remedies of steering system failure • Steering system noises and their probable causes Skills • Using hydraulic jack/lift • Using dial gauge • Basic driving skills • Using belt tension gauge • Using tie-rod end remover • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes
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	- Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE
Conditions/ resources	Learning Materials - CBLM - Hand-outs - Audio-visual - Reference books Learning Facilities and Infrastructure - Classroom with adequate facilities - Library - IT lab with internet facilities - Workshop Materials - Universal joint, grease, tie-rod end, steering wheel, steering shaft, pitman arm, steering damper, drag link, rack & pinion power steering assembly, steering column, gear oil, kerosene/cleaning solvents, re-circulating ball type steering gear box, worm bearing, oil seal, gasket, shims, EPS gearbox, EPS motor, EPS controller, steering angle sensor, wheel speed sensor, torque sensor, integral power steering gear box, power steering fluid, markin cloth, power steering drive belt, fuel and power steering pump Tools - Automotive technician hand tool set, SST, wrench, impact wrench, torque wrench and tie-rod end remover Instruments - Dial gauge with magnetic stand and belt tension gauge Equipment - Vehicle, wheel wedge, car lift, jack, safety stand, OBD tool and bench vice PPE - Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: - Lecture - Discussion - Demonstration - Guided practice - Group practice with project-based learning - Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: - Practical observation - Written test - Assignment

Module Title	Servicing steering system		
Module Code	7231-L2-M2		
Learning Outcome 2	Service knuckle assembly		
Duration	Theory: 1.5 hours	Practical:10.5 hours	Total: 12 hours
Assessment Criteria	- Steering knuckle is replaced as per the job requirement following standard procedure - Knuckle bearing is replaced as per the job requirement following standard procedure - Knuckle spindle is replaced as per the job requirement following standard procedure		
Content	B2.01 Replacing steering knuckle - Function of steering knuckle - Types of steering knuckle Skills - Using tie-rod end remover - Using ball joint remover - Communication skills - Observation skills - Analytical skills - Planning skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE B2.02 Replace knuckle bearing Knowledge - Function of steering knuckle bearing - Types of steering knuckle bearing Skills - Using tie-rod end puller - Using hydraulic press - Using OBD tool - Communication skills - Observation skills - Analytical skills - Planning skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player		

	• Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE B2.03 Replace knuckle spindle Knowledge • Function of the knuckle spindle Skills • Using tie-rod end remover • Using hydraulic press • Using hydraulic jack/lift • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE
Conditions/ Resources	Learning Materials • CBLM • Hand-outs • Audio-visual • Reference books Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab with internet facilities • Workshop Materials • Knuckle assembly, knuckle bearing, check nut, washer, cotter pin, grease and kerosene/cleaning solvents Tools • Automotive technician hand tool set and torque wrench Instrument • Pre-load gauge

	Equipment • Jack, wheel wedge, hydraulic press, hydraulic jack/lift, OBD tool and safety stand PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

Module Title	Servicing steering system		
Module Code	7231-L2-M2		
Learning Outcome 3	Perform wheel alignment and balancing		
Duration	Theory: 3 hours	Practical: 15 hours	Total:18 hours
Assessment Criteria	- Pre-alignment is performed as per the job requirement following standard procedure - Toe-angle is adjusted as per the job requirement following standard procedure - Camber angle is adjusted as per the job requirement following standard procedure - Imbalanced wheel is rectified as per the job requirement following standard procedure		
Content	B3.01 Performing pre-alignment knowledge - Definition of wheel alignment - Factors affecting wheel alignment - Specification of tire pressure - Specifications of tyre Skills - Using pressure gauge - Using air compressor - ICT skills - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE - Ensuring to use air compressor for the right job - Ensuring to maintain correct tyre pressure B3.02 Adjusting toe angle Knowledge - Definition of toe-in and toe-out - Purpose of maintaining toe angle - Definition of turning radius - Methods of adjusting toe-angle		

	• Definition of scrub radius Skills • Operating wheel alignment machine • Using toe gauge • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to adjust toe angle as per the service manual • Ensuring to operate wheel alignment machine as per manual B3.03 Adjusting camber angle Knowledge • Definition of camber angle • Purpose of camber angle • Causes of excessive camber • Definition of steering axis inclination • Definition of caster angle • Purpose of caster angle • Causes of excessive caster Skills • Operating wheel alignment machine • Using camber caster gauge • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources
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	• Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to operate wheel alignment machine as per manual B3.04 Rectifying wheel imbalance Knowledge • Purpose of wheel balancing • Purpose of counter weight • Causes and effects of unbalanced wheel Skills • Operating wheel balancing machine • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring to operate wheel balancing machine as per manual
CONDITIONS/ RESOURCES	Learning Materials • CBLM • Hand-outs • Audio-visual • Reference books Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab with internet facilities • Workshop Materials • Counter weight, tyre, safety valve, tubeless tyre valve, tie-rod end, alignment string, steel ruler, wheel rim and tyre tube Tools • Automotive technician hand tool set, valve key and wheel wrench

	Instruments • Pressure gauge with adapter Equipment • Wheel balancing machine, wheel alignment machine, air compressor, car lift, safety stand, wheel wedge and jack PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
INSTRUCTIONAL METHODOLOGIES	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
METHOD OF ASSESSMENT	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

MODULE 3
ON
SERVICING BRAKE SYSTEM

MODULE INFORMATION

Occupation	Automotive Technician
Competency Area	Service brake system
Module Title	Servicing brake system
Module Code	7231-L2-M3
Module Description	This module provides the learner with the knowledge, skills and right attitude required to service brake components, adjust brake components and troubleshoot brake system.
Nominal Duration	71.5 Hours
Level	Certificate Level 2
Prerequisite	Completed class X
Learning Outcomes	1. Service brake components 2. Adjust brake components 3. Troubleshoot brake system

Module Title	Servicing brake system		
Module Code	7231-L2-M3		
Learning Outcome 1	Service brake components		
Duration	Theory: 10 hours	Practical: 41.5 hours	Total: 51.5 hours
Assessment Criteria	• Brake booster is replaced as per the job requirement following standard procedure • Master cylinder is serviced as per the job requirement following standard procedure • Drum brake is serviced as per the job requirement following standard procedure • Parking brake cable is replaced as per the job requirement following standard procedure • Wheel cylinder is serviced as per the job requirement following standard procedure • Brake calliper assembly is serviced as per the job requirement following standard procedure • Brake disc is replaced as per the job requirement following standard procedure • Load sensing device is replaced as per the job requirement following standard procedure • Brake pipeline is replaced as per the job requirement following standard procedure • Brake fluid is changed as per the job requirement following standard procedure • Anti-lock brake speed sensor is replaced as per the job requirement following standard procedure • Anti-lock brake system actuator is replaced as per the job requirement following standard procedure		
Content	C1.01 Replacing brake booster Knowledge • Definition of brake system • Function of brake system • Types of brake system • Principle of brake system • Components of brake system and its function • Types of brake booster • Components of brake booster and its function Skills • Basic driving skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill		

	<i>Attitude, Safety and Environmental concern</i> • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE • Ensuring proper removal of vacuum hose C1.02 Servicing master cylinder <i>Knowledge</i> • Function of master cylinder • Types of master cylinder • Construction and working operation of master cylinder <i>Skills</i> • Brake bleeding skills • Basic driving skills • Using snap-ring pliers • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Ensuring that brake fluid doesn't get in contact with skin and eyes • Ensuring that brake fluid is not spilled over the body paint • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.03 Servicing drum brake <i>Knowledge</i> • Types of brake shoes • Construction and operation of drum brake <i>Skills</i> • Using Vernier caliper • Using OBD tools • Communication skills • Observation skills • Analytical skills
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	• Planning skills • Numeracy skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Ensuring to wear mask while blowing asbestos dust • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.04 Replacing parking brake cable <i>Knowledge</i> • Function of parking brake cable • Types of parking brake • Types of parking brake lever • Operation of parking brake <i>Skills</i> • Using OBD tools • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Ensure not to damage dust boot while turning piston • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.05 Servicing wheel cylinder <i>Knowledge</i> • Function of wheel cylinder • Types of wheel cylinder • Construction and operation of wheel cylinder <i>Skills</i> • Brake bleeding skills • Basic driving skills
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	• Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Ensuring precaution while fitting brake shoe • Ensuring to avoid driving with leaking wheel cylinder • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.06 Servicing brake caliper assembly <i>Knowledge</i> • Types of brake caliper • Construction and operation of brake caliper assembly • Functions of brake pad and its wear indicator • Composition of brake pad <i>Skills</i> • Using SST • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, Safety and Environmental concern</i> • Ensuring to pump the brake before driving • Ensuring to tighten the caliper bolt to the required torque • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.07 Replacing brake disc <i>Knowledge</i> • Function of brake disc • Types of brake disc
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	• Defects of brake disc Skills • Using vernier caliper • Using SST • Using dial gauge • Using micrometre • Communication skills • Analytical skills • Numeracy skills • Planning skills Attitude, Safety and Environmental concern • Ensure to secure brake caliper assembly after removal • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.08 Replacing load sensing device Knowledge • Function of load sensing device • Operation of load sensing device Skills • Using OBD tools • Brake bleeding skills • Basic driving skills • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Ensuring to tighten the joints to avoid brake fluid leakages • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE
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	C1.09 Replacing brake pipeline Knowledge • Function of brake pipeline • Layout of brake pipeline • Types of brake pipe Skills • Using flaring tool • Using tube cutter • Brazing skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Ensuring secured installation of brake pipe to avoid wear and tear • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.10 Changing brake fluid Knowledge • Function of brake fluid • Purpose of changing brake fluid • Properties of brake fluid • Types of brake fluid • Intervals of changing brake fluid • Purpose of brake bleeding Skills • Using brake bleeding tools • Basic driving skills • Brake bleeding skills • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Ensuring to avoid spillage of brake fluid on body paint • Being time conscious
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	• Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.11 Replacing wheel speed sensor Knowledge • Definition of Anti-lock Brake System (ABS) • Types of Anti-lock Brake System (ABS) • Components of Anti-lock Brake System (ABS) and its function • Operation of Anti-lock Brake System (ABS) Skills • Using OBD tool • Basic driving skills (starting engine) • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, Safety and Environmental concern • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C1.12 Replacing Anti-lock Brake System (ABS) modulator Knowledge • Function of ABS modulator • Function of actuator • Construction of Anti-lock Brake System (ABS) actuator • Operation of Anti-lock Brake System (ABS) actuator Skills • Using OBD tool • Using multi-meter • ICT skills • Communication skills • Observation skills • Analytical skills • Planning skills
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	- Numeracy skills - Problem solving skill Attitude, Safety and Environmental concern - Ensure to replace O-ring while replacing ABS actuator - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE
Learning Conditions	Learning Materials - CBLM - Hand-outs - Audio-visual - Reference books Learning Facilities and Infrastructure - Classroom with adequate facilities - Library - IT lab with internet facilities - Workshop Materials - Brake booster, brake fluid, master cylinder kits, markin cloth, brake pipes, wheel cylinder kits, wheel cylinder assembly, brake shoes, brake lining, rivet, caliper assembly, brake pads, brake disc, load sensing device, hand brake lever, hub assembly, wheel speed sensor, brake actuator, drive shaft, wheel bearing, O-ring, brazing rod, propane gas and nozzle and hand brake cable Tools - Automotive technician hand tool set, flaring and cutting tool set and brake bleeding tools Instruments - Dial gauge with magnetic stand, multi-meter, vernier calliper and micro meter Equipment - Jack, car lift, safety stand, wooden wedge, OBD tool and riveting tool PPE - Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: - Lecture - Discussion - Demonstration - Guided practice

	• Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

Module Title	Servicing brake system		
Module Code	7231-L2-M3		
Learning Outcome 2	Adjust brake components		
Duration	Theory: 2 hours	Practical: 9 hours	Total: 11 hours
Assessment Criteria	- Brake pedal free play is adjusted as per the job requirement following standard procedure - Drum brake is adjusted as per the job requirement following standard procedure - Parking brake is adjusted as per the job requirement following standard procedure		
Content	C2.01 Adjusting brake pedal free play Knowledge - Definition and purpose of brake pedal free play - Definition of pedal height - Definition of reserve distance Skills - Using vernier caliper - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE C2.02 Adjusting drum brake Knowledge - Purpose of brake adjustment - Types of automatic drum brake adjuster Skills - Using brake adjuster tools - Using drum brake measuring tool - Using vernier caliper - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill		

	<i>Attitude, Safety and Environmental concern</i> • Ensure to adjust brake as per the service manual specifications • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C2.03 Adjusting parking brake <i>Knowledge</i> • Purpose of parking brake adjustment <i>Skills</i> • Using vernier caliper • Communication skills • Analytical skills • Numeracy skills • Planning skills • Negotiating skills <i>Attitude, Safety and Environmental concern</i> • Ensure to adjust brake as per the service manual specifications • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE
Learning Condition	Learning Materials • CBLM • Hand-outs • Audio-visual • Reference books Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab with internet facilities • Workshop Materials • Brake components Tools • Automotive technician hand tools, brake adjusting tool and steel ruler

	Instrument • Vernier caliper and drum brake measuring tool Equipment • Vehicle, lift, ramp and wheel wedge PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

Module Title	Servicing brake system		
Module Code	7231-L2-M3		
Learning Outcome 3	Troubleshoot brake system		
Duration	Theory: 2 hours	Practical: 7 hours	Total: 9 hours
Assessment Criteria	- Brake booster operation is checked as per the job requirement following standard procedure - On-Board Diagnostic (OBD) test is performed as per the job requirement following standard procedure - Brake system test is performed as per the job requirement following standard procedure		
Content	C3.01 Checking brake booster operation Knowledge - Construction and operation of brake booster Skills - Basic driving skills - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, Safety and Environmental concern - Being time conscious - Being team player - Having integrity and work ethics - Being efficient in using resources - Proper handling and storage of tools and equipment - Ensuring proper disposal of wastes - Ensuring to follow OHS rules and regulations - Ensuring proper use of PPE C3.02 Performing On-Board Diagnostic (OBD) test Knowledge - Symbols of ABS malfunction indicator lamp - Causes and symptoms of ABS faults Skills - Using OBD OBD tool - ICT skills - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, Safety and Environmental concern - Ensure to clear the fault codes (DTC) after the rectification - Being time conscious		

	• Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE C3.03 Performing brake system test Knowledge • Symptoms, causes and remedies of brake faults Skills • Using OBD OBD tool • Basic driving skills • Communication skills • Analytical skills • Numeracy skills • Planning skills Attitude, Safety and Environmental concern • Ensuring to follow traffic rules and regulation during test driving • Ensure to display on-test plate • Being time conscious • Being team player • Having integrity and work ethics • Being efficient in using resources • Proper handling and storage of tools and equipment • Ensuring proper disposal of wastes • Ensuring to follow OHS rules and regulations • Ensuring proper use of PPE
Learning Condition	Learning Materials • CBLM/reference materials • Hand-outs • Audio-visual • Reference books Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab with internet facilities • Workshop Materials • Brake booster, brake pad, brake master cylinder, brake shoe, ABS actuator, ABS sensor, wheel cylinder, caliper assembly, caliper pin, brake disc, brake drum, brake pipe, hand brake cable, vacuum pipe, brake fluid, sand paper, cleaning solvents, fuel and markin cloth Tools • Automotive technician hand tool set

	Instruments • Vernier calliper and dial gauge with stand Equipment • Car lift, ramp, on-test plate, wheel wedge, safety stand, OBD tool and jack PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Discussion • Demonstration • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment

MODULE 4
ON
OVERHAULING POWER TRAIN

MODULE INFORMATION

Occupation	Automotive Technician
Competency Area	Overhaul power train
Module Title	Overhauling power train
Module Code	7231-L2-M4
Module Description	This module is structured to provide learners with the knowledge, skills and right attitude required to service propeller shaft components, axle/drive shaft component, differential components, transmission components and clutch system.
Nominal Duration	184 Hours
Certificate Level	Certificate Level 2
Pre-requisite	Completed class X
Learning Outcome	1. Service axle/drive shaft components 2. Service differential components 3. Service transmission components 4. Service clutch system

Module Title	Overhauling power train		
Module Code	7231-L2-M4		
Learning Outcome 1	Service axle/drive shaft components		
Duration	Theory: 6.5 hours	Practical: 27 hours	Total: 33.5 hours
Assessment Criteria	• Propeller shaft is replaced as per the job requirement following standard procedure • Cross bearing is replaced as per the job requirement following standard procedure • Wheel hub assembly is serviced as per the job requirement following standard procedure • Axle shaft is replaced as per the job requirement following standard procedure • Drive shaft is changed as per the job requirement following standard replaced • Axle/drive shaft is troubleshoot as per the job requirement following standard procedure		
Content	D1.01 Replacing propeller shaft Knowledge • Definition of power train • Components of power train • Engine power flow mechanism in power train • Function of propeller shaft • Types of propeller shaft • Components of propeller shaft and their function • Purpose of checking propeller shaft run out • Function of counterweight on propeller shaft • Construction of center bearing Skills • Interpreting service manual • Using grease gun • Using dial gauge • Using bearing puller • Using car lift • Basic driving skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to install the propeller shaft as per correct phasing • Effective time management • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity		

	• Being a team player • Proper handling of tools, materials and equipment • Having sense of ownership and accountability • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D1.02 Replacing cross bearing Knowledge • Function of cross bearing • Types of universal joint • Parts of cross bearing Skills • Interpreting service manual • Using hydraulic press • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring proper installation of circlip lock • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensure to follow environmental rules and regulations • Ensuring to follow OHS rules and regulation D1.03 Servicing wheel hub assembly Knowledge • Function of wheel hub assembly • Components of wheel hub assembly and their functions • Types of wheel bearing • Construction of wheel bearing • Purpose of hub greasing • Purpose of bearing pre-load Skills • Interpreting service manual • Using pre-load gauge • Using bearing puller • Communication skills • Observation skills
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	- Analytical skills - Planning skills - Numeracy skills - Problem solving skill <i>Attitude, safety and environmental concern</i> - Ensuring proper installation of oil seal - Ensuring to use Wheel bearing (WB) grease - Ensure to secure the lock washer after installing check nut - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation D1.04 Replacing axle shaft <i>Knowledge</i> - Types of axles - Types of axle shafts - Function of axle shaft - Construction of axle shaft <i>Skills</i> - Interpreting service manual - Using dial gauge - Using axle puller - Using oil seal installer - Using oil seal puller - Using angle cutter - ICT skills - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill <i>Attitude, safety and environmental concern</i> - Ensuring proper installation of oil seal and bearing - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste
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	- Ensuring to follow OHS rules and regulation D1.05 Replacing drive shaft Knowledge - Function of drive shaft - Function of dynamic/torsional damper - Function of CV joint and CV joint boot - Types of CV joint - Construction and operation of CV joint Skills - Interpreting service manual - Using SST - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensure to drain out the gear oil prior to removal of CV joint - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensure to follow environmental rules and regulations - Ensuring to follow OHS rules and regulation D1.06 Troubleshooting axle/drive shaft components Knowledge - Causes, symptoms and remedies of wheel hub assembly faults - Causes, symptoms and remedies of drive or axle shaft faults Skills - Interpreting service manual - Basic driving skills - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Being time conscious - Being a team player - Being efficient in using resources
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	• Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • Competency Based Learning Materials (CBLM) • Hand-outs • Audio Visuals • Reference books • Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop Materials • Grease, marker, propeller shaft, cross bearing, center bearing, markin cloths, kerosene/cleaning solvents, gear oil, wheel bearing, oil seal, axle shaft, adjusting nut/check nut, drive shaft, fender cover, clamp, lock nut, wheel hub, water paper/emery paper, CV joint boot, thrust washer and lock washer Tools • Automotive technician hand tools set, SST, drive shaft remover and axle puller Instruments • Dial gauge with magnetic stand, pre-load gauge and vernier caliper Equipment • Car lift, grease gun, bench vice, hydraulic press, wheel wedge, magnetic V-block, surface plate, anvil, tray, hydraulic jack and work bench PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning

Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work
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Module Title	Overhauling power train		
Module Code	7231-L2-M4		
Learning Outcome 2	Service differential components		
Duration	Theory: 5.5 hours	Practical: 29 hours	Total: 34.5 hours
Assessment Criteria	- Differential oil is changed as per the job requirement following standard procedure - Differential assembly is dismantled as per the job requirement following standard procedure - Differential assembly is disassembled as per the job requirement following standard procedure - Tail pinion bearing pre-load is adjusted as per the job requirement following standard procedure - Differential assembly is assembled per the job requirement following standard procedure - Ring gear backlash is adjusted as per the job requirement following standard procedure - Differential components are troubleshooted as per job requirement following standard procedure		
Content	D2.01 Changing differential oil Knowledge - Function of differential oil - Properties of differential oil - Specification of differential oil - Interval of changing differential oil Skills - Interpreting service manual - Using oil dispenser - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensuring appropriate selection of differential oil - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation		

	D2.02 Dismounting differential assembly Knowledge • Definition of differential assembly • Function of differential assembly • Types of differential assembly Skills • Using car lift/ hydraulic jack • Interpreting service manual • Using axle puller • Using transmission jack • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, safety and environmental concern • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D2.03 Disassembling differential assembly Knowledge • Component of differential assembly and its function • Types of final drive gear • Defects of differential components Skills • Interpreting service manual • Using universal puller • Using hydraulic press • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to match mark bearing cap before disassembling • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity
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	• Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensure to follow environmental rules and regulations • Ensuring to follow OHS rules and regulation D2.04 Adjusting tail pinion bearing pre-load <i>Knowledge</i> • Definition of bearing pre-load • Purpose of bearing pre-load <i>Skills</i> • Interpreting service manual • Using pre-load gauge • Using torque wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual for specification • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D2.05 Assembling differential assembly <i>Knowledge</i> • Types of differential assembly and its operation <i>Skills</i> • Using car lift/ hydraulic jack • Interpreting service manual • Using hydraulic press • Using dial gauge • Using pre-load gauge • Using torque wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill
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	<i>Attitude, safety and environmental concern</i> • Ensuring to assemble the components as per the match mark • Ensuring to refer service manual for the specifications • Effective time management • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Being a team player • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D2.06 Adjusting ring gear backlash <i>Knowledge</i> • Definition of backlash • Purpose of backlash • Nomenclature of gear tooth • Gear contact pattern • Final drive gear ratio <i>Skills</i> • Interpreting service manual • Using dial gauge • Using torque wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual for specification • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D2.07 Troubleshooting differential components <i>Knowledge</i> • Symptoms, causes and remedies of final drive and differential faults <i>Skills</i> • Basic driving skills • Using car lift/ hydraulic jack
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	• Interpreting service manual • Using pre-load gauge • Using torque wrench • Using dial gauge • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to refer service manual for specification • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • Competency Based Learning Materials (CBLM) • Hand-outs • Audio Visuals • Reference books • Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop Materials • Differential oil, ring gear, drive pinion, bearing spacer, check nut, oil seals, markin cloth, paint brush, paint, grease, shim/thrust washer, sealant, differential side bearing, drain plug, filler plug, tail pinion bearing, cleaning solvent/kerosene and differential assembly Tools • Automotive technician hand tool set, SST, Allen key set, flange holder, torque wrench and axle puller Instruments • Dial gauge and pre-load gauge

	Equipment • Tray, car lift, jack, ramp, transmission jack, safety stand, bench vice, oil can and oil dispenser PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Overhauling power train		
Module Code	7231-L2-M4		
Learning Outcome 3	Service transmission components		
Duration	Theory: 14.5 hours	Practical: 72 hours	Total: 86.5 hours
Assessment Criteria	• Transmission oil is changed as per the job requirement following standard procedure • Transmission assembly is replaced as per the job requirement following standard procedure • Transmission components are disassembled as per the job requirement following standard procedure • Transmission components are inspected as per the job requirement following standard procedure • Backlash/thrust play is adjusted as per the job requirement following standard procedure • Transmission components are assembled as per the job requirement following standard procedure • Transfer case is overhauled as per the job requirement following standard procedure • Transaxle is replaced as per the job requirement following standard procedure • Transaxle components are disassembled as per the job requirement following standard procedure • Transaxle components are assembled as per the job requirement following standard procedure • Transmission system is troubleshooted as per the job requirement following standard procedure		
Content	D3.01 Changing transmission oil Knowledge • Function of transmission oil • Properties of transmission oil • Specification of transmission oil • Classification of transmission oil • Interval of changing transmission oil Skills • Interpreting service manual • Using oil dispenser • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to tighten drain plug as per specified torque • Being time conscious • Being efficient in using resources		

	• Being vigilant and patient • Having work ethics and integrity • Being a team player • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.02 Replacing transmission assembly <i>Knowledge</i> • Definition of transmission system • Function of transmission system • Types of transmission system • Types of manual transmission • Definition of Automated Manual Transmission (AMT) • Components of AMT and its functions • Operation of AMT <i>Skills</i> • Using transmission jack • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring proper jacking position • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.03 Disassembling transmission components <i>Knowledge</i> • Components of manual transmission and its function • Construction and operation of synchronizing unit • Power flow in transmission • Types of gears used in manual transmission • Calculation of gear ratio • Types of bearing used in manual transmission • Gear shifting mechanism
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	<i>Skills</i> • Interpreting service manual • Using hydraulic press • Using universal puller • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Being a team player • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensure to follow environmental rules and regulations • Ensuring to follow OHS rules and regulation D3.04 Inspecting transmission components <i>Knowledge</i> • Defects of manual transmission components • Defects of automated manual transmission components <i>Skills</i> • Interpreting service manual • Using micrometer • Using vernier caliper • Using dial gauge with magnetic stand • Using feeler gauge • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual for specifications • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment
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	• Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.05 Adjusting thrust play Knowledge • Definition of thrust play • Purpose of adjusting thrust play Skills • Interpreting service manual • Using SST • Using dial gauge • Using feeler gauge • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to refer service manual for specifications • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.06 Assembling transmission components Knowledge • Function and types of sealants Skills • Using hydraulic press • Using oil seal installer • Using feeler gauge • Using dial gauge • Using micrometer • Using OBD tools • Using torque wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill
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	<i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual for specifications • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.07 Overhauling transfer case <i>Knowledge</i> • Purpose of transfer case • Construction of transfer case • 4-wheel drive gear shift mechanism • Types of transfer case • Operation of part-time and full-time transfer case <i>Skills</i> • Interpreting service manual • Using feeler gauge • Using dial gauge • Using universal puller • Using oil seal installer • Using torque wrench • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.08 Replacing transaxle <i>Knowledge</i> • Definition of transaxle • Types of transaxle layout
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	• Definition of automated manual transaxle • Components of automated manual transaxle • Operation of automated manual transaxle Skills • Interpreting service manual • Using transmission jack • Using OBD tool • Using universal puller • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring proper jacking position • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D3.09 Disassembling transaxle components Knowledge • Components of transaxle and its function • Operation of manual transaxle • Defects of manual transaxle components Skills • Interpreting service manual • Using universal puller • Using hydraulic press • Using SST • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to refer service manual • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient
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- Having work ethics and integrity
- Proper handling of tools, materials and equipment
- Ensuring appropriate use of PPE
- Ensuring proper disposal of waste
- Ensuring to follow OHS rules and regulation

D3.10 Assembling transaxle components

Knowledge

- Power flow of transaxle

Skills

- Interpreting service manual
- Using feeler gauge
- Using dial gauge
- Using torque wrench
- Using Vernier caliper
- Using transmission jack
- Using OBD tools
- Communication skills
- Observation skills
- Analytical skills
- Planning skills
- Numeracy skills
- Problem solving skill

Attitude, safety and environmental concern

- Ensuring to refer service manual
- Being time conscious
- Being a team player
- Being vigilant and patient
- Having work ethics and integrity
- Being a team player
- Proper handling of tools, materials and equipment
- Ensuring appropriate use of PPE
- Ensuring proper disposal of waste
- Ensuring to follow OHS rules and regulation

D3.11 Troubleshooting transmission system

Knowledge

- Symptoms, causes and remedies of transmission failure
- Symptoms, causes and remedies of transaxle failure

Skills

- Interpreting service manual
- Using transmission jack
- Using stethoscope
- Using OBD tools
- Communication skills
- Observation skills
- Analytical skills
- Planning skills

	• Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to refer service manual • Being time conscious • Being a team player • Being vigilant and patient • Having work ethics and integrity • Being a team player • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • Competency Based Learning Materials (CBLM) • Hand-outs • Audio Visuals • Reference books • Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop Materials • Markin cloth, transmission oil, transaxle components, automated manual transaxle components, transmission components, transfer case components, sealant, cleaning solvent/kerosene and water paper Tools • Automotive technician hand tool set, oil can, drain plug spanner, SST, power tools/impact wrench, torque wrench, stethoscope and scraper Instruments • Feeler gauge, micrometer and dial gauge with magnetic stand Equipment • Lever, car lift, OBD tools, transmission jack, work bench, bench vice, tray, ramp, safety stand, surface plate, oil dispenser, V block and engine support fixture PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion

	• Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Overhauling power train		
Module Code	7231-L2-M4		
Learning Outcome 4	Service clutch system		
Duration	Theory: 5.5 hours	Practical: 24 hours	Total: 29.5 hours
Assessment Criteria	- Clutch assembly is serviced as per the job requirement following standard procedure - Clutch master cylinder is serviced as per the job requirement following standard procedure - Clutch fluid is changed as per the job requirement following standard procedure - Clutch cable is replaced as per the job requirement following standard procedure - Clutch pedal free play is adjusted as per the job requirement following standard procedure - Clutch system is troubleshooted as per the job requirement following standard procedure		
Content	D4.01 Servicing clutch assembly Knowledge - Definition of clutch system - Function of clutch system - Components of clutch system and its function - Classification of clutch system - Construction of clutch system - Operation of clutch system - Types of fly wheel Skills - Interpreting service manual - Using transmission jack - Using vernier caliper - Using OBD tool - Using torque wrench - Using SST - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensuring to align input shaft with fly wheel - Ensure to wear mask while cleaning clutch housing - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity		

	• Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D4.02 Servicing clutch master cylinder <i>Knowledge</i> • Function of clutch master cylinder • Components of clutch master cylinder and its function • Operation of clutch master cylinder • Function of clutch slave cylinder • Types of slave cylinder • Components of clutch slave cylinder and its function • Operation of clutch slave cylinder <i>Skills</i> • Basic driving skills • Interpreting service manual • Clutch bleeding skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring safe disposal of used clutch fluid • Ensuring to follow OHS rules and regulation D4.03 Changing clutch fluid <i>Knowledge</i> • Purpose of changing clutch fluid • Interval of changing clutch fluid <i>Skills</i> • Interpreting service manual • Clutch bleeding skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills
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	• Problem solving skill <i>Attitude, safety and environmental concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring proper disposal of used clutch fluid • Ensuring to follow OHS rules and regulation D4.04 Replacing clutch cable <i>Knowledge</i> • Function of clutch cable • Operation of mechanical clutch <i>Skills</i> • Interpreting service manual • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environment concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation D4.05 Adjusting clutch pedal free play <i>Knowledge</i> • Definition of clutch pedal free play • Purpose of adjusting clutch pedal free play <i>Skills</i> • Interpreting service manual • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill
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	<i>Attitude, safety and environmental concern</i> • Ensuring to refer service manual for specification • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring to follow OHS rules and regulation • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensure to follow environmental rules and regulations D4.06 Troubleshooting clutch system <i>Knowledge</i> • Symptoms, causes and remedies of clutch failure <i>Skills</i> • Interpreting service manual • Basic driving skills • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Effective time management • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Being a team player • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • Competency Based Learning Materials (CBLM) • Hand-outs • Audio Visuals • Reference books • Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop

	Materials - Clutch fluid, clutch master cylinder kit, clutch cable, clutch pipeline, clutch pedal, clutch components, clutch slave cylinder kits and cleaning solvents Tools - Automotive technician hand tool set, SST and torque wrench Instruments - Vernier caliper and scale/measuring tape Equipment - Vehicle, ramp/lift, wedge, transmission jack, vinyl tube and container PPE - Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: - Lecture - Interactive discussion - Demonstration - Industrial visit/training - Guided practice - Group practice with project-based learning - Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: - Practical observation - Written test - Assignment - Project work

MODULE 5
ON
SERVICING ENGINE AUXILIARY SYSTEM

MODULE INFORMATION

Occupation	Automotive Technician
Competency Area	Service engine auxiliary system
Module Title	Servicing engine auxiliary system
Module Code	7231-L2-M5
Module Description	This module is structured to provide learners with the knowledge, skills and right attitude required to service cooling system, engine lubrication system, SI engine fuel system and CI engine fuel system.
Nominal Duration	113 Hours
Certificate Level	Certificate Level 2
Pre-requisite	Completed class X
Learning Outcome	1. Service cooling system 2. Service engine lubrication system 3. Service fuel system (SI engine) 4. Service fuel system (CI engine)

Module Title	Servicing engine auxiliary system		
Module Code	7231-L2-M5		
Learning Outcome 1	Service cooling system		
Duration	Theory: 7 hours	Practical: 25.5 hours	Total: 32.5 hours
Assessment Criteria	- Coolant is changed as per the job requirement following standard procedure - Thermostat valve is replaced as per the job requirement following standard procedure - Radiator assembly is serviced as per the job requirement following standard procedure - Water pump assembly is replaced as per the job requirement following standard procedure - Cooling system is troubleshooted as per the job requirement following standard procedure		
Content	E1.01 Changing coolant Knowledge - Definition of cooling system - Components of cooling system and its function - Classification of cooling system and their operation - Definition of coolant - Function of coolant - Properties of coolant - Types of coolant - Purpose of bleeding air from cooling system - Importance of using distilled water - Interval of changing coolant - Definition of stray current and its values Skills - Interpreting service manual - Using multimeter - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensuring proper connection to avoid leakages - Ensuring to avoid opening of radiator cap when it is hot - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE		

	• Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E1.02 Replacing thermostat valve Knowledge • Function of thermostat valve • Types of thermostat valve • Construction and operation of thermostat valve • Purpose of jiggle valve Skills • Interpreting service manual • Using temperature gauge/ thermometer • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring proper tightening of thermostat housing fasteners • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E1.03 Servicing radiator assembly Knowledge • Function of radiator • Types of radiator • Construction of radiator • Types of radiator fan • Function of fan shroud • Functions of fan belt or drive belt • Types of adjusting the fan belt tension or drive belt • Types of leakages in cooling system • Operation of radiator pressure cap Skills • Using pressure tester • Using fan belt tension gauge • Communication skills • Observation skills • Analytical skills • Planning skills
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	- Numeracy skills - Problem solving skill <i>Attitude, safety and environmental concern</i> - Ensuring to avoid opening of radiator cap when it is hot - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation E1.04 Replacing water pump assembly <i>Knowledge</i> - Functions of water pump - Types of water pump - Components of water pump and its function - Operation of water pump - Purpose of weep port <i>Skills</i> - Interpreting service manual - Using pressure tester - Using fan belt tension gauge - Using torque wrench - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill <i>Attitude, safety and environment concern</i> - Ensuring proper connection to avoid leakages - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation E1.05 Troubleshooting cooling system <i>Knowledge</i> - Symptoms, causes and remedies of cooling system failure
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	Skills • Using pressure tester • Using tension gauge • Using multimeter • Using torque wrench • Using OBD tool • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • CBLM • Hand-outs • Audio-visuals • Reference books • Manuals Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab • Workshop Materials • Coolant, distilled water, fender cover, gasket, radiator, thermostat, water pump, fan belt, fan shroud, oil cooler, fan, radiator cap, radiator hose, freezer plug, hose clamp, fastener, sealant and markin cloth Tools • Automotive technician hand tool set, steel ruler and pry bar Instruments • Thermometer, pressure tester and multimeter Equipment • Tension gauge, gas/electric stove, safety stand, car lift, ramp, jack, OBD tool and tray

	PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Servicing engine auxiliary system		
Module Code	7231-L2-M5		
Learning Outcome 2	Service engine lubrication system		
Duration	Theory: 3.5 hours	Practical: 7 hours	Total: 10.5 hours
Assessment Criteria	- Engine oil is changed as per the job requirement following standard procedure - Oil pressure switch is replaced as per the job requirement following standard procedure - Engine lubrication system is troubleshoot as per the job requirement following standard procedure		
Content	E2.01 Changing engine oil Knowledge - Definition of engine lubrication system - Types of engine lubrication system - Components of engine lubrication system and its function - Operation of engine lubrication system - Purpose of engine oil - Properties of engine oil - Classification of engine oil - Interval of changing engine oil Skills - Using filter wrench - Using OBD tool - Using oil dispenser - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensuring proper tightening of oil filters - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation E2.02 Replacing oil pressure switch Knowledge - Functions of oil pressure switch - Operation of oil pressure switch - Function of oil pressure warning lamp		

	<i>Skills</i> • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring proper installation of oil pressure switch • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E2.03 Troubleshooting engine lubrication system <i>Knowledge</i> • Symptoms, causes and remedies of lubrication system failure <i>Skills</i> • Interpreting service manual • Using filter wrench • Using multimeter • Using OBD tool • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environment concern</i> • Ensuring to refer service manual • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
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Learning Conditions	Learning Materials • Competency Based Learning Materials (CBLM) • Hand-outs • Audio Visuals • Reference book • Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop Materials • Engine oil, oil filter, oil stainer, oil pump, oil pressure switch, insulation tape, oil sump gasket, drain plug, O-ring, rocker arm gasket, sealant, fender cover, protective seat cover, oil pan and markin cloth Tools • Automotive technician hand tool set, oil filter wrench and test lamp Instruments • Multimeter Equipment • Car lift, jack, safety stand, OBD tool, wheel wedge and oil dispenser PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Servicing engine auxiliary system		
Module Code	7231- L2-M5		
Learning Outcome 3	Service fuel system (SI engine)		
Duration	Theory: 8 hours	Practical: 29 hours	Total: 37 hours
Assessment Criteria	- Fuel filter is replaced as per the job requirement following standard procedure - EVAP canister is replaced as per the job requirement following standard procedure - Accelerator cable is changed as per the job requirement following standard procedure - Fuel rail (fuel delivery pipe and injector) is replaced as per the job requirement following standard procedure - Positive Crankcase Ventilation (PCV) valve is replaced as per the job requirement following standard procedure - Fuel tank is serviced as per the job requirement following standard procedure - Fuel system is troubleshot as per the job requirement following standard procedure		
Content	E3.01 Replacing fuel filter Knowledge - Definition of fuel system - Types of fuel system - Components of fuel system and its function - Construction of fuel filter - Types of petrol fuel filter - Interval for changing fuel filter Skills - Interpreting service manual - Using SST - Using OBD tool - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation		

	E3.02 Replacing Evaporative Emission (EVAP) canister Knowledge • Types of emission control system • Purpose of Evaporative Emission Control System (EVAP) canister • Purpose of purge valve • Operation of EVAP canister Skills • Interpreting service manual • Using OBD tool • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring proper removal of canister components • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E3.03 Changing accelerator cable Knowledge • Function of accelerator cable • Types of accelerator and its functions Skills • Using OBD tool • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to refer service manual • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE
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	• Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E3.04 Replacing fuel rail (fuel delivery and injector) Knowledge • Definition of Electronic Fuel Injection (EFI) system • Types of EFI system • Components of EFI and its function • Construction of EFI system (EFI sub-system) • Function of fuel injector • Types of fuel injector • Construction and operation of fuel injector • Difference between conventional fuel system and EFI system Skills • Interpreting service manual • Using multimeter • Using OBD tool • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to release fuel pressure before removal of fuel injector and rail • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulations E3.05 Replacing Positive Crankcase Ventilation (PCV) valve Knowledge • Functions of PCV valve • Operation of PCV system Skills • Interpreting service manual • Using vacuum pump • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills
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	• Problem solving skill <i>Attitude, safety and environmental concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulations E3.06 Servicing fuel tank <i>Knowledge</i> • Function of fuel tank • Components of fuel tank and its function • Construction of fuel tank <i>Skills</i> • Interpreting service manual • Using SST • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to keep away any igniters from fuel tank • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulations E3.07 Troubleshooting fuel system <i>Knowledge</i> • Symptoms, causes and remedies for fuel system failure <i>Skills</i> • Basic driving skills • Interpreting service manual • Using multi-meter • Using OBD tool • Communication skills • Observation skills
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	- Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulations
Learning Conditions	Learning Materials - Competency Based Learning Materials (CBLM) - Hand-outs - Audio Visuals - Reference books - Manuals Learning facilities and infrastructure - Classroom with adequate facilities - Information Technology (IT) lab - Library - Workshop Materials - Fuel filter, petrol, fuel pressure regulator, accelerator cable, clamps, sensors, fuel pipeline, fuel gauge, fuel pump, PCV valve, fuel rail, fuel tank, fuel injector, fuel pump relay, EVAP canister and markin cloth Tools - Automotive technician hand tool set and SST Instrument - Multi-meter Equipment - Hand pump, car lift, vehicle, under hoist stand, hydraulic jack, wheel wedge, air compressor, OBD tool, tray and fuel injector pressure tester PPE - Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest

Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Servicing engine auxiliary system		
Module Code	7231-L2-M5		
Learning Outcome 4	Service fuel system (CI engine)		
Duration	Theory: 8.5 hours	Practical: 24.5 hours	Total: 33 hours
Assessment Criteria	- Fuel filter is replaced as per the job requirement following standard procedure - Fuel system is bled as per the job requirement following standard procedure - Mechanical fuel injector is serviced as per the job requirement following standard procedure - CRDI fuel injector is serviced as per the job requirement following standard procedure - Fuel system fault is troubleshot as per the job requirement following standard procedure		
Content	E4.01 Replacing fuel filter Knowledge - Definition of diesel fuel system - Function of fuel injection system - Components of diesel fuel system and its function - Types of diesel fuel injection system - Operation of fuel injection system (Conventional and CRDI) - Types of diesel fuel filter - Construction of diesel fuel filter - Purpose of hand primer pump - Components of hand primer pump Skills - Interpreting service manual - Using filter wrench - Using SST - Using OBD tool - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow environmental rules and regulations		

	- Ensuring to follow OHS rules and regulation E4.02 Bleeding fuel system Knowledge - Construction of diesel fuel system - Properties of diesel fuel - Purpose of bleeding Skills - Interpreting service manual - Using OBD tools - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensuring to avoid over tightening of banjo bolts - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation E4.03 Servicing mechanical fuel injector Knowledge - Function of fuel injector - Types of fuel injector - Construction and operation of fuel injector Skills - Using injector pressure tester - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment
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	• Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E4.04 Replacing CRDI fuel injector Knowledge • Types of CRDI fuel injector • Operation of CRDI fuel injector Skills • Using injector pressure tester • Using OBD tools • Using multi-meter • Interpreting service manual • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring to avoid diesel leakages • Ensuring to mark injectors while removing • Being time conscious • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation E4.05 Troubleshooting fuel system Knowledge • Symptoms, causes and remedies of conventional diesel fuel system failure • Symptoms, causes and remedies of Common Rail Direct Injection (CRDI) system Skills • Interpreting service manual • Using OBD tool • Using SST • Using injector pressure tester • Using multimeter • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills
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	• Problem solving skill Attitude, safety and environmental concern • Ensuring to refer service manual • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • Competency Based Learning Materials (CBLM) • Hand-outs • Audio Visuals • Reference books • Manuals Learning facilities and infrastructure • Classroom with adequate facilities • Information Technology (IT) lab • Library • Workshop Materials • Diesel fuel filter, fuel pipeline, overflow pipe, high pressure pipe, pressure regulator, banjo bolt, diesel, markin cloth, hand primer, banjo washer, bleeding screw, CRDI injector, clamps and mechanical injector kits. Tools • Automotive technician hand tool set, flare wrench and SST. Instruments • Injector pressure tester and multi-meter Equipment • Bench vice, OBD tool, tray and wheel wedge PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning

Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work
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MODULE 6
ON
PERFORMING BASIC AUTO ELECTRICAL WORKS

MODULE INFORMATION

Occupation	Automotive Technician
Competency Area	Perform basic auto electrical works
Module Title	Performing basic auto electrical works
Module Code	7231-L2-M6
Module Description	This module is structured to provide learners with the knowledge, skills and right attitude required to replace basic electrical components, service battery and replace sensors
Nominal Duration	46.5 Hours
Certificate Level	Certificate Level 2
Pre-requisite	Completed class X
Learning Outcome	1. Replace basic electrical components 2. Service battery 3. Replace sensors

Module Title	Performing basic auto electrical works		
Module Code	7231-L2-M6		
Learning Outcome 1	Replace basic electrical components		
Duration	Theory: 4 hours	Practical: 21 hours	Total: 25 hours
Assessment Criteria	- Fuse is replaced as per the job requirement following standard procedure - Relay is replaced as per the job requirement following standard procedure - Wires and connectors are repaired as per the job requirement following standard procedure - Alternator is replaced as per the job requirement following standard procedure - Self-starter is replaced as per the job requirement following standard procedure		
Content	F1.01 Replacing fuse Knowledge - Introduction to ohms law - Functions of fuse - Types of fuse - Fuse rating and color coding Skills - Using multimeter - Using test lamp - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Ensuring proper connection to avoid short circuit - Ensuring to use correct rating of fuse - Being time conscious - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation F1.02 Replacing relay Knowledge - Definition of relay - Function of relay - Types of relay - Operation of relay		

	<i>Skills</i> • Using multi-meter • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring to use correct rating of relay • Ensuring proper connection to avoid short circuit • Being time conscious • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation F1.03 Repairing wires and connectors <i>Knowledge</i> • Types of terminals and connectors • Types of wire joints • Purpose of color coding and wire size <i>Skills</i> • Using multi-meter • Using wire crimping tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Ensuring secure connections to avoid short circuit • Being time conscious • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation F1.04 Replacing alternator <i>Knowledge</i> • Definition of automobile charging system
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	• Function of alternator • Identification of alternator terminals Skills • Using belt tension gauge • Using multi-meter • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, safety and environment concern • Ensuring proper tightening of thru bolt • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation F1.05 Replacing self-starter Knowledge • Introduction to starting system • Function of starter motor • Identification of starter motor terminals Skills • Using multi-meter • Communication skills • Observation skills • Analytical skills • Planning skills • Problem solving skill Attitude, safety and environment concern • Ensuring proper connection to avoid short circuit • Being time conscious • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • CBLM • Hand-outs • Audio-visuals

	• Reference books • Manuals Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab • Workshop Materials • Wire, heat shrink tube, starter motor, fuse, crimp terminals, markin cloth, nuts & thru bolts, alternator, relay, battery, connector, alternator belt and insulation tape Tools • Automotive technician hand tool set, belt remover and installer, crimping tool, test lamp and wire stripper Instruments • Multimeter, wire gauge and belt tension gauge PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Performing basic auto electrical works		
Module Code	7231-L2-M6		
Learning Outcome 2	Service battery		
Duration	Theory: 3 hours	Practical: 11 hours	Total: 14 hours
Assessment Criteria	- Battery condition is checked as per the job requirement following standard procedure - Battery is charged as per the job requirement following standard procedure - Battery is replaced as per the job requirement following standard procedure - Battery temperature sensor is replaced as per the job requirement following standard procedure - Jump start is performed as per the job requirement following standard procedure		
Content	F2.01 Checking battery condition Knowledge - Function of battery - Components of battery and its function - Specification of battery - Electrolyte and its specific gravity - Symptoms and causes of battery failure Skills - Using multimeter - Using hydrometer - Communication skills - Observation skills - Analytical skills - Planning skills - Numeracy skills - Problem solving skill Attitude, safety and environmental concern - Being time conscious - Being a team player - Being efficient in using resources - Being vigilant and patient - Having work ethics and integrity - Proper handling of tools, materials and equipment - Ensuring appropriate use of PPE - Ensuring proper disposal of waste - Ensuring to follow OHS rules and regulation - Ensuring to use correct battery rating F2.02 Charging battery Knowledge - Importance of charging battery - Methods of battery charging - Effects of overcharging and undercharging battery		

	<i>Skills</i> • Using multimeter • Using battery charger • Using hydrometer • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation • Ensuring to refer the service manual • Ensuring proper connection to avoid short circuit • Ensuring to charge battery in well-ventilated area • Ensuring to check electrolyte before charging F2.03 Replacing battery <i>Knowledge</i> • Purpose of disconnecting negative battery terminal prior to positive terminal • Purpose of connecting positive terminal prior to negative terminal <i>Skills</i> • Using multimeter • Using OBD tool • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environmental concern</i> • Being time conscious • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Being a team player • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE
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	• Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation • Ensuring to disconnect negative terminal prior positive terminal F2.04 Replacing battery temperature sensor <i>Knowledge</i> • Function of temperature sensor <i>Skills</i> • Using multimeter • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environment concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation F2.05 Performing jump start <i>Knowledge</i> • Purpose of jump starting a battery • Methods of jump start <i>Skills</i> • Using multimeter • Using battery booster charger • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environment concern</i> • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE
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	• Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation • Ensuring proper connection to avoid short circuit • Ensuring proper use of jumper cable
Learning Conditions	Learning Materials • CBLM • Hand-outs • Audio-visuals • Reference books • Manuals Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab • Workshop Materials • Battery, distilled water, warm water, battery terminal, petroleum jelly, emery paper, nuts & bolts, markin cloth, temperature sensor, rust inhibitor, jumper cable, wire brush and fender cover Tools • Automotive technician hand tools and brass wire brush Instruments • Multimeter and hydrometer Equipment • Battery booster charger, charging bench, OBD tool, work bench and wheel wedge PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

Module Title	Performing basic auto electrical works		
Module Code	7231-L2-M6		
Learning Outcome 3	Replace sensors		
Duration	Theory: 1.5 hours	Practical: 6 hours	Total: 7.5 hours
Assessment Criteria	• Oxygen sensor is replaced as per the job requirement following standard procedure • Coolant temperature sensor is replaced as per the job requirement following standard procedure • Oil actuator sensor is replaced as per the job requirement following standard procedure		
Content	F3.01 Replacing oxygen sensor Knowledge • Function of oxygen sensor • Types of oxygen sensor Skills • Using OBD tools • Using multimeter • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill Attitude, safety and environmental concern • Ensuring proper removal and installation of oxygen sensor • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation F3.02 Replacing coolant temperature sensor Knowledge • Function of coolant temperature sensor Skills • Using multimeter • Using OBD tools • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill		

	• Coaching skills • Negotiating skills <i>Attitude, safety and environment concern</i> • Ensuring proper installation of sensor • Being time conscious • Being a team player • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation F3.03 Replacing oil actuator sensor (VVT/I-VVT/VTVT) <i>Knowledge</i> • Definition of Variable Valve Timing (VVT), Intelligent- Variable Valve Timing (I-VVT) and Variable Timing Valve Train (VTVT) • Function of oil actuator sensor <i>Skills</i> • Using multimeter • Using OBD tools • Using SST • Communication skills • Observation skills • Analytical skills • Planning skills • Numeracy skills • Problem solving skill <i>Attitude, safety and environment concern</i> • Ensuring proper installation of sensor • Ensuring proper handling of sensor • Being time conscious • Being efficient in using resources • Being vigilant and patient • Having work ethics and integrity • Proper handling of tools, materials and equipment • Ensuring appropriate use of PPE • Ensuring proper disposal of waste • Ensuring to follow OHS rules and regulation
Learning Conditions	Learning Materials • CBLM • Hand-outs • Audio-visuals • Reference books • Manuals

	Learning Facilities and Infrastructure • Classroom with adequate facilities • Library • IT lab • Workshop Materials • O₂ sensor, TP sensor, IAT sensor, MAP sensor, air flow sensor, coolant temperature sensor, camshaft position sensor, clips, 1.5V battery, crankshaft position sensor, engine oil, coolant, silicon/rubber grease, ice & water, rust inhibitor, wires, connectors, knock sensor, VVT/I-VVT/VTVT sensor and sensor O-ring Tools • Automotive technician hand tool set, sensor remover (SST), mini socket set, screw driver set and service wire Instruments • Multimeter and thermometer Equipment • Electric stove, hand vacuum pump, blower, car lift, ramp, OBD tool and tray PPE • Workshop dress, safety gloves, safety boots, safety helmet, safety goggles, face mask and reflective vest
Instructional Methodologies	The trainer shall use <i>inter alia</i>, the following instructional methods: • Lecture • Interactive discussion • Demonstration • Industrial visit/training • Guided practice • Group practice with project-based learning • Individual practice with problem-based learning
Method of Assessment	The trainer shall use <i>inter alia</i>, the following assessment methods: • Practical observation • Written test • Assignment • Project work

ANNEXURE

Annex I: Time distribution

Time Distribution (Regular course)					
Automotive Technology BQF C2					
Module Title	Learning outcomes	Tasks	Theory (Hours)	Practical (Hours)	Total (hours)
A: Service suspension system	A1: Replace rigid suspension components	A1.00 Introductory knowledge + driving skills	3	60	63
		A1.01 Replace leaf spring assembly	1	6	7
		A1.02 Disassemble leaf spring assembly	0.5	4	4.5
		A1.03 Assemble leaf spring assembly	0.5	4	4.5
		A1.04 Replace lateral control rod	0.5	1.5	2
	Sub Total Duration		5.5	75.5	81
	A2: Replace independent suspension components	A2.01 Replace strut assembly	1	4	5
		A2.02 Disassemble strut and coil spring	0.5	4	4.5
		A2.03 Assemble strut and coil spring	0.5	4	4.5
		A2.04 Replace coil spring	0.5	2	2.5
		A2.05 Replace suspension arm	1	5	6
		A2.06 Replace torsion bar	0.5	4	4.5
		A2.07 Replace stablizer bar	0.5	4	4.5
	Sub Total Duration		4.5	27	31.5
	A3: Troubleshoot suspension system	A3.01 Diagnose rigid suspension system faults	1	2	3
		A3.02 Diagnose independent suspension system faults	0.5	2	2.5
		A3.03 Perform suspension system test	0.5	1	1.5
	Sub Total Duration		2	5	7
	Total Duration (A)		12	107.5	119.5
B. Service steering system	B1: Service steering components	B1.01 Replace steering wheel	2	3	5
		B1.02 Replace steering column	0.5	3	3.5
		B1.03 Replace tie-rod end	1	2	3
		B1.04 Replace rack & pinion assembly (Manual)	1	5	6
		B1.05 Replace rack & pinion steering gearbox (Power steering)	3	8	11
		B1.06 Replace re-circulating ball type steering gearbox	0.5	4	4.5
		B1.07 Disassemble the re-circulating ball type steering gearbox	0.5	4	4.5
		B1.08 Assemble the re-structuring ball type steering gearbox	0.5	4	4.5
		B1.09 Replace integral power steering gearbox	1	5	6

		B1.08 Adjust steering gear backlash	0.5	2	2.5
		B1.10 Replace power steering pump	1	5	6
		B1.11 Change power steering fluid	0.5	1.5	2
		B1.12 Troubleshoot steering system	1	2.5	3.5
	Sub Total Duration		13	49	62
	B2: Service knuckle assembly	B2.01 Replace steering knuckle	0.5	5.5	6
		B2.02 Replace knuckle bearing	0.5	2.5	3
		B2.03 Replace knuckle spindle	0.5	2.5	3
	Sub Total Duration		1.5	10.5	12
	B3: Perform wheel alignment and balancing	B3.01 Perform pre-alignment	0.5	2	2.5
		B3.02 Adjust toe-angle	1	5	6
		B3.03 Adjust camber angle	1	2	3
		B3.04 Rectify wheel imbalance	0.5	6	6.5
	Sub Total Duration		3	15	18
	Total Duration (B)		17.5	74.5	92
C: Service brake system	C1: Service brake components	C1.01 Replace brake booster	1.5	4.5	6
		C1.02 Service master cylinder	1	5	6
		C1.03 Service drum brake	1	6	7
		C1.04 Replace parking brake cable	0.5	2	2.5
		C1.05 Service wheel cylinder	0.5	3	3.5
		C1.06 Replace brake caliper assembly	1	3	4
		C1.07 Service brake disc	0.5	3	3.5
		C1.08 Replace load sensing device	0.5	2	2.5
		C1.09 Replace brake pipeline	0.5	4	4.5
		C1.10 Change brake fluid	1	2	3
		C1.11 Replace wheel speed sensor	1	2	3
		C1.12 Replace Anti-lock Brake System (ABS) modulator	1	5	6
	Sub Total Duration		10	41.5	51.5
	C2: Adjust brake components	C2.01 Adjust brake pedal free play	1	3	4
		C2.02 Adjust drum brake	0.5	3	3.5
		C2.03 Adjust parking brake	0.5	3	3.5
	Sub Total Duration		2	9	11
	C3: Troubleshoot brake system	C3.01 Check brake booster operation	0.5	1	1.5
		C3.02 Perform On-Board Diagnostic (OBD) test	1	5	6
		C3.03 Perform brake system test	0.5	1	1.5
	Sub Total Duration		2	7	9
	Total Duration (C)		14	57.5	71.5
D: Overhaul power train	D1: Service axle shaft/drive shaft components	D1.01 Replace propeller shaft	1.5	4.5	6
		D1.02 Replace cross bearing	1	5	6
		D1.03 Service wheel hub assembly	1	5	6
		D1.04 Replace axle shaft	1	5	6
		D1.05 Replace drive shaft	1	5	6
		D1.06 Troubleshoot axle/drive shaft	1	2.5	3.5
	Sub Total Duration		6.5	27	33.5

	D2: Service differential components	D2.01 Change differential oil	1	2	3
		D2.02 Dismount differential assembly	0.5	5.5	6
		D2.03 Disassemble differential assembly	0.5	5.5	6
		D2.04 Adjust tail pinion bearing pre-load	0.5	2	2.5
		D2.05 Adjust ring gear backlash	0.5	2	2.5
		D2.06 Assemble differential assembly	2	10	12
		D2.07 Troubleshoot differential component	0.5	2	2.5
	Sub Total Duration		5.5	29	34.5
	D3: Service transmission components	D3.01 Change transmission oil	1	2	3
		D3.02 Replace transmission assembly	2	4	6
		D3.03 Disassemble transmission components	2	4	6
		D3.04 Inspect transmission components	0.5	2	2.5
		D3.05 Adjust thrust play	0.5	2	2.5
		D3.06 Assemble transmission components	0.5	11.5	12
		D3.07 Overhaul transfer case	1	11	12
		D3.08 Replace transaxle	2	10	12
		D3.09 Disassemble transaxle components	1.5	11	12.5
		D3.10 Assemble transaxle components	1.5	10.5	12
		D3.11 Troubleshoot transmission system	2	4	6
	Sub Total Duration		14.5	72	86.5
	D4: Service clutch assembly	D4.01 Service clutch assembly	2	10	12
		D4.02 Service clutch master cylinder	1	5	6
		D4.03 Change clutch fluid	0.5	2	2.5
		D4.04 Replace clutch cable	0.5	3	3.5
		D4.05 Adjust clutch pedal free play	0.5	2	2.5
		D4.06 Troubleshoot clutch system	1	2	3
	Sub Total Duration		5.5	24	29.5
	Total Duration (D)		32	152	184
E: Service Engine Auxilliary System	E1: Service cooling system	E1.01 Change coolant	1.5	4	5.5
		E1.02 Replace thermostat valve	0.5	5.5	6
		E1.03 Service radiator assembly	2	4	6
		E1.04 Replace water pump assembly	2	10	12
		E1.05 Troubleshoot cooling system	1	2	3
	Sub Total Duration		7	25.5	32.5
	E2: Service engine lubrication system	E2.01 Change engine oil	2	3	5
		E2.02 Replace oil pressure switch	0.5	2	2.5
		E2.03 Troubleshoot engine lubrication system	1	2	3
	Sub Total Duration		3.5	7	10.5
	E3: Service fuel system (SI engine)	E3.01 Replace fuel filter	2	4	6
		E3.02 Replace Evaporative Emission (EVAP) canister	1	3	4

		E3.03 Replace accelerator cable	0.5	3	3.5
		E3.04 Replace fuel rail (fuel delivery pipe & injector)	2	10	12
		E3.05 Replace Positive Crankcase Ventilation (PCV) valve	0.5	2	2.5
		E3.06 Service fuel tank	1	5	6
		E3.07 Troubleshoot fuel system	1	2	3
	Sub Total Duration		8	29	37
	E4: Service fuel system (CI engine)	E4.01 Replace fuel filter	2	4	6
		E4.02 Bleed fuel system	1	2	3
		E4.03 Service mechanical fuel injector	2	4	6
		E4.04 Replace CRDI injector	2	10	12
		E4.05 Troubleshoot fuel system	1.5	4.5	6
	Sub Total Duration		8.5	24.5	33
	Total Duration (E)		27	86	113
F: Perform basic auto electrical works	F1: Replace basic electrical components	F1.01 Replace fuse	1	1	2
		F1.02 Replace relay	0.5	4	4.5
		F1.03 Repair wires & connectors	0.5	4	4.5
		F1.04 Replace alternator	1	6	7
		F1.05 Replace self-starter	1	6	7
	Sub Total Duration		4	21	25
	F2: Service battery	F2.01 Check battery condition	1	3	4
		F2.02 Charge battery	0.5	2.5	3
		F2.03 Replace battery	0.5	2	2.5
		F2.04 Replace battery temperature sensor	0.5	1	1.5
		F2.05 Perform jump start	0.5	2.5	3
	Sub Total Duration		3	11	14
	F3: Replace engine management sensors	F3.01 Replace oxygen sensor	0.5	2	2.5
		F3.02 Replace coolant temperature sensor	0.5	2	2.5
		F3.03 Replace oil actuator sensor	0.5	2	2.5
	Sub Total Duration		1.5	6	7.5
	Total Duration (F)		8.5	38	46.5
Grand Total Duration (Hours)			111	515.5	626.5

Annex II: Assessment Sample

Unit of competency	Drive Light Vehicle
Unit Code	8322-U4-L2
Module Title	Driving Light Vehicle
Module Code	8322-U4-L2-M1
Time Duration	45 min *
Problem or Project: Drive Light Vehicle	
Introduction: Perform pre-operating procedures before starting the vehicle. Drive light vehicle under different environment conditions following standard traffic rules and defensive driving techniques. Perform post operating procedures after parking the vehicle.	
Observation: (How will you be assessed as Competent?) Your performance will be assessed based on the following criteria: • Performance of pre and post operating procedures as per standard practices; • Application of standard procedures while starting the LMV; • Demonstrating the driving skills in different road condition using the system of vehicle control (SOVC); • Demonstrating your adherence to RSTA Rules, Defensive Driving; • The final outcome of your driving skills	
Note: For Assessor/Institute for preparation for assessment. Materials and Equipment for 1 candidate • LMV in good running condition with all necessary vehicle documents Roles and responsibilities of assessors (before/during and after assessment) • Identify in advance the different road environment (rough road, town, simulated night and poor light condition, highway) • During assessment let the candidate demonstrate moving off, reversing, overtaking, and parking.	

Assessor/ Observation Check List

Unit of competency	Drive Light Vehicle		
Unit Code	8322-U4-L2		
Module Title	Driving Light Vehicle		
Module Code	8322-U4-L2-M1		
Problem/Project: Drive Light Vehicle	Psychomotor (Practical) domain level: P2		
Candidate's Name:			
Place of Assessment:		Date of Assessment:	
A. During the demonstration of skills did the candidate do following:	Marks allocated	Marks received	Remarks
1. Check mirror settings, fluid level, tire pressure and required documents.	4		
2. Start LMV according to the procedure of standard starting procedure (Cockpit Drill)	2		
3. Move off and steer LMV wearing seat belts and without stalling the engine*	3		
4. Reverse LMV safely without stalling the engine*	3		
5. Park LMV safely in the centre of given parking area following standard parking procedure	2		
6. Drive LMV on the highway according to the road conditions following the road safety signs.	2		
7. Drive LMV in towns according to the traffic signs and signals.	2		
8. Drive LMV on 4WD safely (if necessary and available)	1		
9. Giving pass and overtake the vehicle safely according to the road and weather condition *	3		
10. Stop LMV safely in a given area according to standard stopping procedure	1		
B. Is the job outcome correct in the following areas?			
Caused no accidents and damages to the vehicle.*	5		
Total marks obtained	28		
The Candidate's performance	Satisfactory:		
	Not Satisfactory:		

Note: The questions marked with * are the critical questions which the trainees must be able to answer. Otherwise, they will be rated unsuccessful even if they perform well in the practical exam. The mark **P** is for the psychomotor domain level (P1- Simple Routine Assignment; P2- Questions related to Simple Routine Assignment and P3- Questions not related to Simple Routine Assignment)

Oral Questions checklist:

Unit of competency	Drive Light Vehicle			
Unit Code	8322-U4-L2			
Module Title	Driving Light Vehicle			
Module Code	8322-U4-L2-M1			
Problem/Project: Drive Light Vehicle				
Candidate's Name:				
Place of Assessment:		Date of Assessment:		
Questions (and its domain level) to be answered by the trainee / candidate:	Key Answer	Marks allocated	Marks obtained	Remarks
Why do you keep the vehicle in start mode for a few minutes before moving? (Verifying observations) (C1)				
In case of accidents who will you contact first? (contingency questions) (C2)				
While entering intersection, before how many seconds do you have to give signal? (verifying observations) (C3)				
Total Marks Obtained				
The candidate's performance was:		Satisfactory:		
		Not Satisfactory:		
Assessor's Name:		Signature:		

Note: The questions marked with C describes the cognitive level of the questions. C1- Remembering; C2- Functional Understanding and C3- Problem Solving.

Written questions checklist:

Unit of competency	Drive Light Vehicle		
Unit Code	8322-U4-L2		
Module Title	Driving Light Vehicle		
Module Code	8322-U4-L2-M1		
Problem/Project: Drive Light Vehicle			
Candidate's Name:			
Place of Assessment:		Date of Assessment:	
Questions (and its domain level) to be answered by the trainee/ candidate:	Key Answer	Marks Allocated	Marks Obtained
1. List down three types of parking. (Short Answer Question) (C1)	Angle, Straight and Parallel Parking	1	

2. All of the following are honking prohibited places EXCEPT: (C2) a. pedestrian crossing c. traffic jam b. public procession d. curves and bends (Multiple Choice Question)	D	2	
3. According to RSTA Regulations how much is the penalty for drunk driving? (C1)	Nu. 1750	1	
4. Match the following signs in column A with the indications in column B. (Matching Type) (C2) Column A 1.  2.  3.  Column B a. Give way b. Restriction End c. Compulsory Ahead d. Pedestrian Prohibited	1-c, 2-a, 3-d	3	
Total marks obtained			
The Candidate's performance was:	Satisfactory:		
	Not Satisfactory:		
Assessor's Name:		Signature:	
The Candidate's overall result:	Competent:		
	Not Yet Competent:		
Feedback to Candidate: (Provide feedback to the candidate on how they could improve – especially if they are not competent)			
I am satisfied with the way assessment was conducted: (Please include reasons if not satisfied)		YES	NO
Candidate Name: Signature: Date:			

Assessor Name:

Signature:

Training Provider:

Date:

Annex III: Module Recognition

This is to verify that

Mr/Ms.....

has completed module on

.....

Covering following learning outcomes:

1.
2.
3.

Instructor:

Head of the Department:

.....

.....

Signature:

Signature:

Date: / / (dd/mm/yyyy)
.....(dd/mm/yyyy)

Date: / /

Head of the Institute:

Trained Assessor (Institute)/Exam OC:

.....

.....

Signature:

Signature:

Date: / ... / (dd/mm/yyyy)

Date: / /(dd/mm/yyyy)

Annex IV: Lesson Plan

Lesson Plan

Course Title:		NC Level:
Module Code:		Duration:
Module Title:		
Learning Outcome:		
Skill/Task/Topic:		
Terminal Performance Objective: <i>(Note: Write narrative statement extracted from TPO of Task Sheet)</i>		
Enabling Objectives (Related knowledge): <i>By the end of the lesson learners will be able to:</i> - i) - ii) - iii)		
What (Content/Activity)	Who (T/L)	How (Methods/ Media) Duration (Min.) Questions
<i>Introduction:</i> <i>Main body</i> <i>Conclusion</i>		
Projects/Problems:		

Instructional Resources Plan				
Skills/Task/Topic:				
No. of Trainees:				
Sl. No.:	Instructional materials/resources	Specifications	Qty.	Remarks
Prepared by :		Signature	Date:	
Revised by:		Signature	Date:	
Approved by:		Signature	Date:	

Task sheet

TS-1/4: Practical Plan			
Course Title:		N C Level:	
Module code:		Duration:	
Module Title			
Learning outcome			
Skills/Task Title:		Task no:	
Terminal Performance Objective: <i>Given:</i> <i>Cue:</i> <i>Who:</i> <i>What:</i> <i>Within:</i> <i>How well:</i> - - -			
Enabling Objectives (Related Skills): <i>By the end of a lesson, the learners will be able to:</i> i) ii) iii) iv)			
Activities	Who (T/L)	How (methods/ media)	Duration
Project/Assignment: 			

TS-2/4: Tool and Equipment required:							
Sl no.	Particulars	Specifications	Qty.	Remarks			
Training Materials required:							
Sl no.	Particulars	Specifications	Qty.	Rate	Amount	Remarks	
TS-3/4: Performance Guide							
Skill/Task:					Date:		
Directions: Use the following performances criteria to rate the learner. Check YES/NO to indicate whether the learner performed each step as indicated or not?							
Sl. No:	Steps					Yes	No
Note: Critical steps: All * marked steps should be carried out very carefully. For a quality performance guide, all items should be checked "YES"							

TS-4/4: Instruction and Drawing***General Instructions for Trainees***

- i)
- ii)
- iii)
- iv)

Drawing (if any)**Safety Precaution**

- i)
- ii)
- iii)

Prepared by:**Signature****Date:****Revised By:****Signature****Date:****Approved by:****Signature****Date:**

Annex V: Course Plan
Institutes letter head and Logo

(Trade)YEAR PLAN- _____Semester _____ (Year)

Trade: NC Level:			Schedule																																								Total Hours																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Module Code	Module Title	Learning Outcome	Feb.				March				April				May				June				July				Aug.				Sept				Oct.				Nov.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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Prepared by:

Verified & Approved by:

Date:

Monthly/Weekly Plan

Month:

Trade:

Trainer:

Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Week 01							
Week 02							
Week 03							
Week 04							
Week 05							

Developed by:

Approved by:

Date



For more information please contact:

Technical Trainers Training and Resource Center (TTTRC), DWPSD

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