

## CONTENT AREA FOR AUTO MECHANICS

SN	Content Areas	Competencies	Descriptive Statement
1	Workshop Safety and Tools	<ol style="list-style-type: none"> <li>1. Demonstrate safety measures to avoid accidents in the workshop.</li> <li>2. Demonstrate safety methods in the handling of tools and equipment.</li> <li>3. Beware of skills for fire-fighting.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the various workshop safety devices and equipment.</li> <li>2. Identify and describe the use of basic tools and equipment.</li> <li>3. Describe the use of fire extinguishers and their classifications.</li> </ol>
2	Vehicle Layout	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge on the layout of chassis for vehicle.</li> <li>2. Be aware of differences in chassis construction.</li> <li>3. Be aware of the functions of the main components of motor vehicles.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identity types of body, chassis construction and drive arrangements of the motor vehicle.</li> <li>2. Explain the functions of the main components of the motor vehicle</li> <li>3. Describe the main components and their positions on the motor vehicle.</li> </ol>
3	The Engine	<ol style="list-style-type: none"> <li>1. Be aware of the different types of engines.</li> <li>2. Demonstrate knowledge on the working principles of an engine.</li> <li>3. Apply skills in dismantling and reassembling an engine using correct methods.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of an engine.</li> <li>2. Identify the types of engines.</li> <li>3. Describe the main components of the engine.</li> <li>4. Describe the constructional and operational difference of the 2-stroke and 4-stroke petrol and diesel engines.</li> <li>5. Identify the crank arrangements and firing orders.</li> <li>6. Explain crankshaft positions and the functions of valve operating mechanism on an engine.</li> <li>7. Sketch a valve timing diagram of a four-stroke engine showing lead, lag and overlap period.</li> </ol>
4	Fuel Supply Systems	<ol style="list-style-type: none"> <li>1. Be aware of the general layout of fuel supply systems.</li> <li>2. Be aware of the different types of fuel supply system.</li> <li>3. Apply knowledge on the working principles of various units in the fuel system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of the fuel supply system</li> <li>2. Explain the functions of the main components.</li> <li>3. Draw the layout of fuel (petrol/diesel) supply system.</li> <li>4. Describe the operation of fuel (petrol/diesel) supply system.</li> <li>5. Describe the construction and operation of mechanical and electrical fuel pumps, sketch and label the main parts.</li> <li>6. Explain the functions and operation of the simple carburetor.</li> </ol>

			<ol style="list-style-type: none"> <li>7. Explain the need for the electronic fuel injection system.</li> <li>8. Describe the components of the electronic fuel injection system</li> </ol>
5	Ignition System	<ol style="list-style-type: none"> <li>1. Be aware of the ignition system layout.</li> <li>2. Apply skills in detecting and correcting faults in the ignition system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of the ignition system.</li> <li>2. State the types of ignition system (e.g. Coil ignition, transistorized ignition, magneto ignition, electronic)</li> <li>3. Sketch and label the main components of the coil ignition system.</li> <li>4. Differentiate between hot and cold spark plugs</li> <li>5. Examine how to test for the correct spark plug gap in ignition system.</li> </ol>
6	Exhaust System	<ol style="list-style-type: none"> <li>1. Be aware of the exhaust layout on a vehicle.</li> <li>2. Demonstrate knowledge of the functions of the exhaust system.</li> <li>3. Apply skills to rectify faults in the exhaust system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of the exhaust system</li> <li>2. Sketch and label the main components of the exhaust system</li> <li>3. Describe the types of silencers and manifolds.</li> <li>4. State the function of the catalytic converter in the exhaust system.</li> </ol>
7	Lubrication System	<ol style="list-style-type: none"> <li>1. Be aware of the layout and path of oil flow in engine lubrication system.</li> <li>2. Demonstrate knowledge on the various methods of lubrication and lubrication systems.</li> <li>3. Demonstrate knowledge on the general concept of oil pumps and oil filters.</li> <li>4. Be aware of problems in lubrication system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of engine lubrication system.</li> <li>2. Identify types of engine lubrication system.</li> <li>3. Sketch a layout of oil flow in wet and dry sump engine lubrication systems.</li> <li>4. Describe the construction and operation of types of oil pumps.</li> <li>5. Explain the types of oil filters and give examples of each</li> <li>6. Explain the purpose of the crankcase ventilation system.</li> <li>7. Describe the operation of the crankcase ventilation.</li> <li>8. Explain the purpose of safety/warning devices.</li> <li>9. Explain the properties of lubricants.</li> <li>10. Explain the terms used for oil ratings: viscosity, SAE numbers, viscosity index.</li> </ol>
8	Cooling System	<ol style="list-style-type: none"> <li>1. Demonstrate the importance of cooling system.</li> <li>2. Be aware of the characteristics of types of cooling systems.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of cooling system.</li> <li>2. Describe the types of cooling system.</li> <li>3. Identify the components of cooling system and their use.</li> </ol>

		<ol style="list-style-type: none"> <li>3. Apply knowledge to detect and correct fault in cooling system.</li> </ol>	<ol style="list-style-type: none"> <li>4. State the advantages and disadvantages of the types of cooling system.</li> <li>5. Identify the two types of Thermostats and describe their mode of operation construction.</li> <li>6. Sketch the types of water-cooling system and label the main parts.</li> </ol>
9	Transmission System	<ol style="list-style-type: none"> <li>1. Be aware of the layout of components in the transmission system and their names</li> <li>2. Demonstrate knowledge of the functions of various components in the transmission system.</li> <li>3. Apply skills in detecting and rectifying faults in the transmission system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of the transmission system.</li> <li>2. Identify the types of transmission</li> <li>3. Sketch the layout and label the main components of the various types of transmission system.</li> <li>4. Identify types of clutches.</li> <li>5. Describe the functions and operation of the clutch.</li> <li>6. Identify the purpose of fluid fly wheel and torque converter.</li> <li>7. Explain the advantages and disadvantages of the fluid flywheel.</li> <li>8. Describe the construction and operation of the fluid flywheel.</li> <li>9. Compare the fluid Flywheel to Torque converter.</li> <li>10. Describe the construction and operations of the various types of Gear boxes.</li> <li>11. Identify the various types of selector and interlock mechanisms.</li> <li>12. Explain the operating principles of the selector and the interlock mechanisms.</li> <li>13. Explain the purpose of the Propeller shaft and universal joint.</li> <li>14. Explain the purpose and operation of the rear axle.</li> <li>15. Sketch and label the main components of the rear axle.</li> <li>16. Examine the three methods of supporting axle shafts.</li> <li>17. Explain the advantages and disadvantages of axle shaft.</li> </ol>
10	Wheels and Tyres	<ol style="list-style-type: none"> <li>1. Demonstrate awareness of different types of wheels and tyres.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the various types of wheel rims and explain their purposes.</li> <li>2. Differentiate between radial and cross-ply tyres.</li> </ol>

		<ol style="list-style-type: none"> <li>2. Demonstrate the constructional difference between radial and cross ply tyres.</li> <li>3. Apply skills in tyre servicing.</li> </ol>	<ol style="list-style-type: none"> <li>3. Describe the constructional difference between tubed and tubeless tyre assemblies.</li> <li>4. Interpret the markings on a car tyre.</li> <li>5. Explain the purpose and processes of tyre balancing.</li> <li>6. State the safety precautions to be observed when changing wheels or tyres and inflating pressure.</li> </ol>
11	Braking System	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge of the principles of the braking system.</li> <li>2. Demonstrate the layout of components in the braking system.</li> <li>3. Demonstrate knowledge on brake lining materials and methods of attachment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of the braking system.</li> <li>2. Identify the types of braking system and their methods of operation (mechanical, hydraulic and pneumatic).</li> <li>3. Outline the main components of the braking system</li> <li>4. Explain the advantages and disadvantages of the various types of the brakes.</li> <li>5. Compare the drum brake and disc brake.</li> <li>6. Explain the purpose, construction and operation</li> <li>7. of the servo unit.</li> <li>8. Analyze the composition of brake lining material and methods of attachment.</li> <li>9. Outline the properties of brake fluid.</li> </ol>
12	Steering System	<ol style="list-style-type: none"> <li>1. Be aware of the layout of suspension system on a motor vehicle.</li> <li>2. Demonstrate knowledge on the working principles of the different types of suspension system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of the steering system.</li> <li>2. State the functions of the various parts of the steering system.</li> <li>3. Explain the Ackerman principle.</li> <li>4. Explain with the aid of line diagrams; castor, camber K.P.I and Toe in/Toe out and their effect on the steering system.</li> <li>5. Differentiate between over and under steering.</li> <li>6. Describe the characteristics the various types of steering gear boxes.</li> </ol>
13	Suspension System	<ol style="list-style-type: none"> <li>1. Be aware of the layout of suspension system on a motor vehicle.</li> <li>2. Demonstrate knowledge on the working principles of the suspension system.</li> </ol>	<ol style="list-style-type: none"> <li>1. State the purpose of the suspension system.</li> <li>2. Identify types of suspension system (independent suspension and dependent/rigid axle suspension</li> <li>3. Outline the components of the suspension system.</li> </ol>

			<ol style="list-style-type: none"> <li>4. Explain the advantages and disadvantages of independent suspension and dependent/rigid axle suspension.</li> <li>5. Explain the purpose of shock absorbers.</li> <li>6. Identify the types of shock absorbers.</li> <li>7. Describe the construction and operation of leaf and coil springs and state their comparative advantages</li> </ol>
14	Auto Electricals and Electronics System	<ol style="list-style-type: none"> <li>1. Demonstrate knowledge of the general working principles of electrical and electronics used on motor vehicles.</li> <li>2. Apply skills in wiring motor vehicle.</li> <li>3. Apply knowledge and skills in caring and maintaining vehicle batteries and charging system.</li> <li>4. Be aware of the functions of the main components of starting a vehicle.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the basic electrical terminologies: e.g. current, voltage, resistance, conductor and insulator.</li> <li>2. Discuss the difference between series and parallel circuits.</li> <li>3. Draw simple electrical circuit to explain Ohm's law. Use the Ohm's law to solve problems in electrical circuits.</li> <li>4. Describe the functions of basic electrical components e.g., lamp, switches, fuse, capacitor, diodes, rectifiers.</li> <li>5. Sketch and describe the construction and functions of lead acid battery.</li> <li>6. Check the strength of a battery using basic</li> <li>7. equipment e.g., hydrometre, high-rate discharge tester</li> <li>8. Prepare electrolyte and check its strength</li> <li>9. Explain the purpose of the starting system and give the functions of the main components.</li> <li>10. Explain the purpose of the charging system.</li> <li>11. Describe the construction and operation of the main components of the charging system.</li> <li>12. Identify the wiring systems used on motor vehicles</li> <li>13. Explain the reasons for colour coding of wires.</li> <li>14. Explain the purpose of the lighting system.</li> <li>15. Identify common electrical symbols.</li> </ol>
15	Auto Air-Conditioning	<ol style="list-style-type: none"> <li>1. Demonstrate the importance of air conditioning system used on motor vehicles.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the purpose of vehicle air conditioning system.</li> <li>2. Sketch the layout of an air conditioning system used on motor vehicles and label the main parts.</li> </ol>

		2. Demonstrate knowledge on the components and operation of the cooling system used on motor vehicles.	3. Give the functions of the basic components of the air conditioning system e.g., compressor, condenser, receiver drier, orifices/restrictor, evaporator
16	Safe Motoring	<ol style="list-style-type: none"> <li>1. Demonstrate the importance of safety on the road.</li> <li>2. Be conversant with the highway code for safe motoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Explain the importance of safety devices on vehicles to the driver and other road users (e.g., seatbelt, safety restraint system (SRS), Speedometre, horn, hand brake)</li> <li>2. Explain the importance of highway code and some of the major regulations for driving in Ghana</li> <li>3. Explain the causes of road accidents and suggest</li> <li>4. possible solutions for their prevention</li> <li>5. Interpret the various road signs.</li> </ol>

## Auto Mechanics

### Test Blueprint/Specification

SN	Content Areas	Course Objective/Outcomes (DoK)				Total
		Level 1 (Recall)	Level 2 (Skill/ Concept)	Level 3 (Strategic Thinking)	Level 4 (Extended Thinking)	
1	Workshop Safety and Tools	1	2	-	3	6
2	Vehicle Layout	1	2	1	2	6
3	The Engine	2	2	3	4	11
4	Fuel Supply Systems	-	1	2	2	5
5	Ignition System	2	1	2	1	6
6	Exhaust System	1	1	1	1	4
7	Lubrication System	1	1	2	2	6
8	Cooling System	1	1	3	1	6
9	Transmission System	1	4	3	4	12
10	Wheels and Tyres	1	1	1	1	4
11	Braking System	1	1	2	1	5
12	Steering System	1	2	1	1	5

13	Suspension System	-	1	1	2	4
14	Auto Electricals and Electronics System	1	2	4	3	10
15	Auto Air-Conditioning	1	2	2	1	6
16	Safe Motoring	-	1	2	1	4
	<b>Total</b>	<b>15%</b>	<b>25%</b>	<b>30%</b>	<b>30%</b>	<b>100%</b>