AUTOMOTIVE SERVICING (ELECTRICAL REPAIR)

TECHNICAL-PROFESSIONAL

Grade 12

Three-Term Budget Of Work (BOW)
for Learning Competencies

TECHNICAL-PROFESSIONAL
AUTOMOTIVE AND SMALL ENGINE TECHNOLOGIES
Grade 12

Three-Term Budget Of Work
For Learning Competencies

Please note that each Tech-Pro elective is completed in one term if delivered at Grade 12.

Elective	**Automotive Servicing (Electrical Repair)**
Prerequisite	**Driving and Automotive Servicing**
Content Standard	Demonstrate an understanding of the concepts and principles in diagnosing, repairing ignition system starting system, charging system and body electrical systems"
Performance Standard	The learners perform procedures in diagnosing, troubleshooting, and repairing the ignition system, starting system, charging system, body electrical system and costing of services employing appropriate safety precautions.

Week	Learning Competency	Suggested Activities
1	• Discuss the overview of automotive electrical servicing	• **Introduction to Automotive Electrical Systems** ○ The learner studies the basic components and functions of automotive electrical systems such as the battery, alternator, starter, wiring,

Week	Learning Competency	Suggested Activities
		fuses, and lighting system, and explains how these components work together in vehicle operation. ○ Study the basic automotive electrical components and write a short explanation of their functions and importance. • **Automotive Electrical Servicing Overview Report** ○ The learner researches the scope of automotive electrical servicing, including common electrical problems, servicing procedures, safety practices, and tools used by automotive electricians. ○ Research automotive electrical servicing and prepare a brief report discussing its scope, common issues, tools, and safety practices.
	• Discuss the principles of automotive electrical operating system	• **Principles of Automotive Electrical Operation** ○ The learner studies the basic electrical principles used in automotive systems—such as voltage, current, resistance, Ohm's Law, series and parallel circuits, and grounding—and explains how these principles apply to

Week	Learning Competency	Suggested Activities
		vehicle electrical operation. ○ Study the basic electrical principles used in vehicles and explain how they apply to automotive electrical systems. • **Automotive Electrical System Functional Analysis** ○ The learner analyzes how electrical energy flows through major automotive systems (starting, charging, lighting, and accessory systems) and explains their operation based on electrical principles. ○ Analyze an automotive electrical system and explain how electrical principles enable its operation.
	• Distinguish the required items for servicing the ignition and starting system	• **Ignition and Starting System Tools Identification** ○ The learner identifies and studies the tools, equipment, and materials required for servicing the ignition and starting systems, such as multimeters, test lights, spark plug testers, wrenches, and safety equipment, and explains their specific functions. ○ Identify and list the tools and materials needed for servicing the

Week	Learning Competency	Suggested Activities
		ignition and starting system and explain their uses. • **Servicing Items Matching and Classification Task** ○ The learner classifies servicing items according to their function (testing, removal, installation, safety) and matches them to specific ignition and starting system servicing tasks. ○ Classify and match servicing tools and materials to their proper ignition and starting system tasks.
2	• Perform procedures in diagnosing and troubleshooting the ignition and starting system	• **Ignition and Starting System Diagnostic Practice** ○ The learner follows a step-by-step diagnostic procedure to check common ignition and starting system components (battery, starter motor, ignition switch, wiring, and fuses) using proper tools and safety practices. ○ Diagnose faults in the ignition and starting system by following the correct troubleshooting procedures. • **Troubleshooting Case Analysis** ○ The learner analyzes a simulated or written vehicle problem scenario,

Week	Learning Competency	Suggested Activities
		identifies possible causes of ignition or starting failure, and outlines the correct diagnostic steps and corrective actions. ○ Analyze a given ignition or starting system problem and identify the correct troubleshooting steps and solutions.
3	• Perform procedures in repairing the ignition and starting systems	• **Ignition System Diagnostic Simulation** ○ This activity focuses on identifying common ignition system problems through hands-on inspection and testing. Learners analyze components such as the spark plug, ignition coil, distributor (if applicable), and wiring using actual tools and service manuals. The goal is to develop proper diagnostic skills before repair. ○ Individually inspect and test assigned ignition system components, record the detected fault, and explain the correct repair procedure based on the service manual.

Week	Learning Competency	Suggested Activities
		• **Starting System Repair and Reassembly Task** ○ Learners practice the step-by-step procedure in repairing a faulty starting system, including checking the battery condition, starter motor, solenoid, and related connections. Emphasis is placed on safety, correct tool usage, and proper reassembly following standard procedures. ○ Individually diagnose, repair, and reassemble the starting system following the prescribed safety guidelines and manufacturer's procedures.
4	• Distinguish the required items for servicing the charging system	• **Charging System Tools and Equipment Identification** ○ This activity allows learners to become familiar with the tools, measuring instruments, and equipment needed when servicing a vehicle charging system. Learners examine actual tools such as a multimeter, battery tester, belt tension gauge, and service manuals, and identify their specific functions in charging system servicing.

Week	Learning Competency	Suggested Activities
		○ Individually identify and classify the tools and equipment used in servicing the charging system and state their specific functions. • **Charging System Parts and Materials Sorting Task** ○ Learners focus on recognizing the parts, materials, and consumables required when servicing the charging system, including the alternator, voltage regulator, drive belt, fuses, and electrical connectors. This helps learners distinguish between serviceable parts, replacement parts, and consumable materials. ○ Individually sort and label charging system parts and materials according to their purpose in servicing and maintenance.
	• Perform procedures in diagnosing and troubleshooting the charging system.	• **Charging System Diagnostic Testing Task** ○ In this activity, learners perform systematic diagnostic tests on a vehicle charging system to determine its operating condition. Using appropriate tools such as a multimeter

Week	Learning Competency	Suggested Activities
		and service manual, learners check battery voltage, alternator output, belt condition, and wiring connections to identify possible faults. ○ Individually conduct charging system diagnostic tests, record test results, and identify the source of the problem based on standard procedures. • **Charging System Troubleshooting Flowchart Application** ○ Learners apply a troubleshooting flowchart or guide to analyze charging system problems. They interpret symptoms such as low battery charge, warning lights, or abnormal voltage readings, then follow step-by-step procedures to pinpoint the faulty component. ○ Individually follow a charging system troubleshooting flowchart to diagnose the fault and recommend the appropriate corrective action.
5	• Perform procedures for repairing the charging system.	• **Charging System Component Repair Task** ○ Learners perform repair procedures on a defective charging system

Week	Learning Competency	Suggested Activities
		component such as a loose drive belt, damaged wiring, or worn alternator brushes. The activity highlights correct disassembly, repair or replacement, and reinstallation following manufacturer specifications and safety standards. ○ Individually repair the assigned charging system component and reinstall it following standard safety practices and service procedures. • **Charging System Repair Verification and Testing** ○ After completing the repair, learners verify the effectiveness of their work by conducting post-repair testing. This includes checking alternator output voltage, battery charging rate, and ensuring warning indicators function normally to confirm the charging system operates correctly. ○ Individually perform post-repair testing on the charging system to confirm that the repair was successful and within standard specifications.

Week	Learning Competency	Suggested Activities

6	• Distinguish the required items for servicing the automotive body electrical systems	• **Automotive Body Electrical Tools and Equipment Identification**
		  ○ This activity helps learners identify the tools, testing instruments, and equipment used when servicing automotive body electrical systems such as lighting, wipers, power windows, horns, and dashboard indicators. Learners examine actual tools like test lights, multimeters, wire strippers, crimping tools, and service manuals, and match them with their specific functions.
		  ○ Individually identify and list the tools and equipment used in servicing automotive body electrical systems and state their specific functions.
		• **Body Electrical Parts and Materials Classification Task**
		  ○ Learners distinguish the different parts, materials, and consumables required for servicing automotive body electrical systems. This includes switches, relays, fuses, bulbs, connectors, wiring, and insulating materials, helping learners recognize which items are serviceable, replaceable, or consumable.

Week	Learning Competency	Suggested Activities
		○ Individually classify automotive body electrical parts and materials according to their purpose in servicing and maintenance.
6 - 7	• Perform procedures in diagnosing and troubleshooting the automotive body electrical systems	• **Body Electrical System Diagnostic Testing Task** ○ Learners individually perform diagnostic tests on selected automotive body electrical systems such as lighting circuits, horn, wiper system, or power accessories. Using proper tools like a multimeter or test light and wiring diagrams, learners check voltage, continuity, and grounding to locate electrical faults. ○ Individually conduct diagnostic tests on an assigned body electrical system and record findings to identify the faulty component or circuit. • **Electrical Fault Troubleshooting Using Wiring Diagrams** ○ This activity develops learners' ability to interpret wiring diagrams and apply logical troubleshooting procedures. Learners analyze given symptoms (e.g., inoperative lights or accessories)

Week	Learning Competency	Suggested Activities
		and follow step-by-step troubleshooting guides to isolate the cause of the electrical problem. ○ Individually follow the wiring diagram and troubleshooting guide to determine the cause of the body electrical system malfunction and recommend corrective action.
7 - 8	• Perform procedures in repairing the automotive body electrical systems	• **Repair of Faulty Body Electrical Components** ○ Learners practice repairing specific automotive body electrical components such as switches, bulbs, horns, or power window motors. The activity emphasizes correct disassembly, replacement or repair of defective parts, proper reconnection, and adherence to safety procedures. ○ Individually repair a faulty automotive body electrical component following standard procedures and safety guidelines. • **Post-Repair Testing and Verification of Body Electrical Systems** ○ After repairs, learners test the

Week	Learning Competency	Suggested Activities
		repaired electrical systems to ensure proper operation. This includes checking lights, indicators, wipers, power accessories, and other body electrical components using appropriate diagnostic tools to confirm functionality. ○ Individually perform post-repair testing on the body electrical system to verify that the repair was successful and all components function correctly.
8	• Calculate the service cost for automotive electrical services	• **Service Cost Computation for a Single Component** ○ Learners calculate the total cost of servicing a single automotive electrical component (e.g., battery replacement, alternator repair, or headlight replacement). This includes labor charges, cost of parts, and applicable taxes or fees. The activity helps learners practice accuracy in computations and proper documentation. ○ Individually compute the total service cost of a given automotive electrical

Week	Learning Competency	Suggested Activities
		repair using provided part prices, labor rates, and taxes. • **Service Quotation Preparation for Multiple Electrical Services** ○ Learners prepare a service quotation for multiple automotive electrical repairs (e.g., lighting system, horn, wipers). They itemize labor, parts, and additional charges, then calculate the total amount. This activity reinforces accuracy, budgeting skills, and real-world service estimation. ○ Individually prepare a detailed quotation for multiple automotive electrical services by calculating labor, parts, and total cost.

Suggested Performance Tasks	• **Individual Performance Task - Comprehensive Automotive Electrical System Diagnosis and Repair** ○ The learner individually inspects, diagnoses, and repairs a fault in any one of the vehicle systems—ignition, starting, charging, or body electrical. The task also includes calculating the service cost for the repair, using proper tools, safety gear, and following standard procedures. ○ Individually diagnose, troubleshoot, repair, and compute the service cost for an assigned vehicle electrical system fault while following safety precautions.

	• **Group Performance Task - Collaborative Vehicle Electrical Systems Maintenance Project**
	  ○ Learners work in groups to conduct a full inspection of a vehicle's ignition, starting, charging, and body electrical systems. Each member is assigned specific components to diagnose and repair, and the group collaborates to calculate the total service cost and present a maintenance report. The task emphasizes teamwork, safety, and accurate reporting.
	  ○ In groups, collaboratively inspect, diagnose, repair assigned vehicle electrical system components, and prepare a complete service cost report following safety procedures.

Content Standard	Demonstrate an understanding of the concepts and principles in diagnosing, troubleshooting, and repairing manual air-conditioning system
Performance Standard	The learners perform diagnosing, troubleshooting, and repairing of automotive manual air conditioning system and costing of services employing appropriate safety precautions.

Week	Learning Competency	Suggested Activities
8	• Discuss the principles of automotive manual air-conditioning system	• **Component Analysis of Manual Air-Conditioning System** ○ Learners study and identify each component of an automotive manual air-conditioning system—compressor, condenser, evaporator, expansion valve, and refrigerant lines—and describe its role in the cooling process. This helps learners understand how

Week	Learning Competency	Suggested Activities
		the system works as a whole. ○ Individually identify and explain the function of each component in a manual automotive air-conditioning system. • **Principles and Operation Diagram Discussion** ○ Learners analyze a schematic diagram of a manual air-conditioning system to understand the flow of refrigerant, heat exchange, and temperature control. They then discuss the basic thermodynamic principles involved, such as compression, condensation, expansion, and evaporation. ○ Individually study a manual air-conditioning system diagram and explain the principles of its operation step by step.

9	• Distinguish the required items for servicing the automotive manual air-conditioning system	• **Identification of Tools and Equipment for A/C Servicing**
		  ○ Learners examine the tools and equipment required to service a manual air-conditioning system, such as refrigerant gauges, vacuum pumps, manifold sets, leak detectors, wrenches, and protective gear. They identify each item and describe its specific use in servicing.
		  ○ Individually identify and describe the tools and equipment needed for servicing a manual automotive air-conditioning system.
		• **Classification of Consumables and Materials**
		  ○ Learners distinguish between various consumables and materials used in A/C servicing, including refrigerants, lubricants, O-rings, filters, and sealing compounds. The activity helps learners understand which items are replaceable, which are reusable, and their role in proper system maintenance.
		  ○ Individually classify and explain the purpose of consumables and materials required for servicing a manual automotive air-conditioning system.

Week	Learning Competency	Suggested Activities
9	• Perform procedures in diagnosing and troubleshooting automotive air-conditioner system	• **Air-Conditioner System Fault Diagnosis** ○ Learners perform step-by-step diagnostic procedures on a manual automotive air-conditioning system to identify common problems such as refrigerant leaks, compressor malfunction, clogged filters, or faulty fans. They use tools like manifold gauges, thermometers, and leak detectors to locate the source of the issue. ○ Individually diagnose a given automotive air-conditioner system by performing tests and identifying the faulty component or malfunction. • **Troubleshooting Based on Symptoms and Readings** ○ Learners analyze system performance symptoms such as inadequate cooling, strange noises, or uneven airflow. Using pressure readings, temperature checks, and wiring inspections, they determine probable causes and propose corrective actions according to standard troubleshooting procedures. ○ Individually troubleshoot an

Week	Learning Competency	Suggested Activities
		automotive air-conditioning system using observed symptoms and test readings to recommend corrective actions.
10	• Perform procedures in servicing of automotive manual air conditioning system and components.	• **Servicing of A/C Components (Compressor, Condenser, Evaporator)** ○ Learners perform individual servicing procedures on major components of a manual automotive air-conditioning system, including cleaning, inspection, lubrication, and replacement of worn parts. The activity emphasizes proper handling, safety, and adherence to service guidelines. ○ Individually service assigned A/C components by cleaning, inspecting, and replacing worn parts following standard procedures. • **System Maintenance and Refrigerant Handling** ○ Learners carry out routine maintenance tasks such as checking refrigerant levels, cleaning filters, inspecting hoses, and ensuring proper system operation. This includes safe handling and recovery of refrigerants and verifying that the system

Week	Learning Competency	Suggested Activities
		functions correctly after servicing. ○ Individually perform maintenance on the automotive A/C system, including refrigerant handling, component inspection, and operational testing.
11	• Perform procedures in repairing the automotive air-conditioner system	• **Repair of Faulty Air-Conditioner Components** ○ Learners perform repair procedures on specific faulty components of a manual automotive air-conditioning system, such as the compressor, condenser, evaporator, expansion valve, or blower motor. Emphasis is placed on correct disassembly, replacement or repair of defective parts, proper reassembly, and adherence to safety procedures. ○ Individually repair assigned A/C system components by replacing or fixing faulty parts and reassembling them following standard procedures and safety guidelines. • **Post-Repair Testing and System Verification** ○ After completing repairs, learners test the air-conditioning system to ensure proper operation. This includes

Week	Learning Competency	Suggested Activities
		checking refrigerant pressure, airflow, temperature output, and system noise, confirming that the repaired components function correctly and safely. ○ Individually perform post-repair testing of the automotive A/C system to verify that all components operate correctly and the system functions efficiently.
	• Calculate the service cost for automotive car air-conditioner system	• **Service Cost Computation for a Single A/C Component** ○ Learners calculate the total cost of servicing a specific air-conditioner component, such as a compressor replacement, condenser repair, or refrigerant refill. The computation includes the cost of parts, labor, and applicable taxes or fees. ○ Individually compute the total service cost of a given air-conditioner component using provided parts prices, labor rates, and taxes.

Week	Learning Competency	Suggested Activities
		• **Preparing a Quotation for Multiple A/C Services** ○ Learners prepare a detailed service quotation for multiple air-conditioning services, such as refrigerant refill, filter replacement, and compressor servicing. They itemize parts, labor, and other charges, then calculate the total service cost. ○ Individually prepare a quotation for multiple automotive air-conditioning services by calculating the total cost of parts, labor, and additional fees.

Suggested Performance Tasks	• **Individual Performance Task - Air-Conditioner System Diagnosis and Repair** ○ The learner individually inspects, diagnoses, and repairs faults in a manual automotive air-conditioning system, such as low refrigerant, faulty compressor, or blower motor issues. The task also includes calculating the service cost for the repair and demonstrating safe handling of tools and refrigerants. ○ Individually diagnose, troubleshoot, repair, and compute the service cost of an assigned automotive air-conditioning system fault while following safety precautions. • **Group Performance Task - Collaborative Manual A/C System Servicing Project** ○ Learners work in groups to perform a complete inspection and repair of a vehicle's

	manual air-conditioning system. Each member is assigned specific components (e.g., compressor, condenser, evaporator, blower) to diagnose and repair, and the group calculates the total service cost and prepares a maintenance report. Emphasis is on teamwork, accuracy, and safety. ○ In groups, collaboratively inspect, diagnose, repair assigned A/C system components, and prepare a detailed service cost report while observing safety precautions.