



ELECTRICAL INSTALLATION AND MAINTENANCE

TECHNICAL-PROFESSIONAL

Grade 12

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

**TECHNICAL-PROFESSIONAL
INDUSTRIAL TECHNOLOGIES
Grade 12**

**Three-Term Budget of Work
For Learning Competencies**

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

Elective	Electrical Installation and Maintenance
Prerequisite	None

Performance Standard	The learners perform roughing-in activities for residential/building in accordance with PEC standard.
Content Standard	The learners demonstrate an understanding of roughing-in activities for residential/ building wiring systems.

Week	Learning Competency	Suggested Activities
1	Explain the overview of Electrical System Installation.	Electrical System Walkthrough - Learners explore the basic components and layout of a building's electrical system, including service panels, circuits, switches, and outlets.

Week	Learning Competency	Suggested Activities
		○ Observe a classroom or site demonstration of an electrical system and identify key components and their functions. ● Electrical System Concept Mapping ○ Learners create a concept map showing the flow of electricity from the source to loads, understanding how electrical systems operate. ○ Draw a diagram linking the main components (service panel, circuits, wiring, and devices) and label the flow of power.
	● Discuss the electrical plans, tools and requirements for roughing-in, wiring and cabling works.	● Electrical Plan Analysis ○ Learners examine sample electrical plans to identify circuit layouts, outlets, switches, and equipment requirements. ○ Review the electrical drawing, mark key circuits, and list required tools and materials for roughing-in and wiring.

Week	Learning Competency	Suggested Activities
		• Tools and Materials Demonstration ○ Learners handle and identify tools, conduits, cables, and accessories used in electrical installation. ○ Examine each tool or material, describe its function, and demonstrate safe handling and use.
2-3	• Perform procedures in installing electrical non-metallic and metallic conduits	• Conduit Cutting and Bending Drill ○ Learners practice measuring, cutting, and bending metallic and non-metallic conduits to fit electrical layouts. ○ Measure required conduit lengths, cut accurately, and bend to the specified angles using appropriate tools. • Conduit Installation Exercise ○ Learners install conduits along walls or ceilings according to layout, ensuring proper alignment, support, and spacing. ○ Secure conduits in position using clamps or brackets, following the planned route and spacing requirements.

Week	Learning Competency	Suggested Activities
4	Perform procedures in electrical cable pulling	Cable Pulling Simulation - Learners practice pulling electrical wires through conduits or cable trays without damaging the insulation. - Pull the cable carefully through conduits or trays using pulling tools, ensuring smooth installation without kinks or abrasion. Tension and Support Practice - Learners ensure cables are properly supported and not overly tensioned to prevent damage or future maintenance issues. - Secure cables with clamps or ties at recommended intervals and verify there is no excessive tension.
5	Report completion of work.	Work Completion Checklist - Learners document completed electrical installation tasks, noting deviations, issues, and verification of proper installation. - Fill out a checklist including completed tasks, materials used, and safety compliance notes.

Week	Learning Competency	Suggested Activities
		• Progress Reporting Presentation ○ Learners present a short report on completed work, demonstrating understanding of installation steps, challenges, and solutions ○ Prepare a brief report or oral presentation showing completed tasks, safety checks, and lessons learned.
Suggested Performance Tasks	• Bedroom Lighting and Convenience Outlet Roughing-In ○ The learner independently performs roughing-in installation for a small residential bedroom setup including one lighting outlet, one single-pole switch, and one convenience outlet, ensuring proper conduit routing, wire sizing, box installation, grounding, and compliance with PEC standards. ○ Install the required conduits, utility boxes, and conductors according to the given plan while strictly following PEC rules on sizing, mounting height, grounding, and safety procedures. • Residential Living Area Roughing-In Project ○ In groups, learners plan and execute the complete roughing-in installation of a residential living area with multiple lighting outlets, switches (including three-way), and convenience outlets, including load computation, circuit planning, and proper grounding in accordance to PEC standards. ○ Collaboratively compute loads, plan circuits, and install all required conduits, boxes, and wiring based on the provided layout while ensuring full compliance with PEC standards and safety practices.	

Performance Standard	The learners perform installation and termination of wiring fixtures, as well as the use of protective devices in residential/building wiring systems according to PEC standard.
Content Standard	Demonstrate an understanding of the installation and termination of wiring fixtures, as well as the use of protective devices in residential/building wiring systems.

Week	Learning Competency	Suggested Activities
5	Discuss the protective devices for single-phase distribution.	Protective Devices Identification - Learners explore different protective devices (circuit breakers, fuses, RCDs) used in single-phase distribution systems. - Examine sample devices, describe their functions, and discuss where and why each is installed. Fault Scenario Analysis - Learners study common electrical faults and determine which protective devices would prevent damage or hazards. - Review hypothetical fault cases and identify the appropriate protective device to use for each scenario.

Week	Learning Competency	Suggested Activities
6	Perform procedures in installing electrical protective devices.	Circuit Breaker Installation Drill - Learners practice installing circuit breakers in a distribution panel, following safety and manufacturer guidelines. - Mount the breaker, connect wiring according to the diagram, and ensure proper grounding and tight connections. Fuse and RCD Installation Practice - Learners install fuses and residual current devices, ensuring correct ratings and secure connections. - Select the correct device, install it in the panel or circuit, and test functionality with appropriate tools.
	Discuss the wiring devices for floor and wall mount orientation.	Device Orientation Study - Learners examine switches, outlets, and sockets to understand floor- and wall-mount installation standards. - Observe sample devices, note orientation guidelines, and discuss advantages and safety considerations. Wiring Device Identification Game - Learners classify and match various

Week	Learning Competency	Suggested Activities
		wiring devices to their proper mounting locations and functions. Sort devices by type, function, and mounting orientation using provided samples or diagrams.
7	Perform procedures in installing wiring devices for floor and wall mount orientation.	Wall-Mounted Outlet Installation - Learners practice installing switches and sockets in wall-mounted positions according to electrical codes. - Secure the device box, route wiring, connect terminals, and fix the device to the wall safely. Floor-Mounted Device Installation - Learners practice installing floor-mounted outlets or junction boxes safely and according to layout plans. - Position the device box in the floor, route cables, connect wiring, and secure the box to prevent movement.
8	Report completion of work.	Completion Checklist Documentation - Learners document installed protective and wiring devices, verifying correct installation, connections, and safety

Week	Learning Competency	Suggested Activities
		compliance. How : Fill out a checklist noting device types, installation location, and inspection results. • Work Summary Presentation ○ Learners present a short report summarizing all installed protective and wiring devices, highlighting safety checks and observations. ○ Prepare and present a concise report or visual summary of completed work, including compliance with standards.
Suggested Performance	• Installation and Termination of Lighting Fixture with Circuit Breaker Protection ○ The learner individually installs and properly terminates a lighting fixture and a convenience outlet connected to a miniature circuit breaker (MCB), ensuring correct polarity, secure terminations, grounding, and proper selection of protective devices in compliance with PEC standards Install and terminate the lighting fixture and outlet to a properly rated circuit breaker following PEC rules on wiring connections, grounding, polarity, and safety procedures.	

	• Residential Panel Board, Wiring Devices, and Protective Devices Installation Project ○ In groups, learners install and terminate multiple wiring fixtures (lighting fixtures, switches, and convenience outlets) and connect them to a panel board with appropriate protective devices (MCBs), ensuring correct load computation, breaker sizing, grounding, and overall compliance with PEC standards. ○ Collaboratively install and terminate all wiring fixtures and connect them to correctly sized protective devices in the panel board according to the given plan and PEC requirements.
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Performance Standard	The learners perform installation of Fire Detection and Alarm Systems (FDAS) according to PEC standard.
Content Standard	Demonstrate an understanding of the concepts and principles of Fire Detection and Alarm Systems (FDAS).

Week	Learning Competency	Suggested Activities
8	Discuss the devices and wiring diagrams for FDAS.	FDAS Device Identification - Learners study the common devices used in FDAS, such as smoke detectors, heat detectors, alarm bells, and control panels. - Examine sample devices, describe their functions, and explain how each device contributes to the system. FDAS Wiring Diagram Analysis - Learners explore FDAS wiring diagrams to understand the connection of devices, circuits, and panels. - Review sample wiring diagrams and trace the flow of signals from detectors to alarms and control units.

Week	Learning Competency	Suggested Activities
9	Perform installation procedures for FDAS.	Device Mounting Practice - Learners install smoke and heat detectors, alarm bells, and other devices according to layout and manufacturer specifications. - Position the devices at designated locations, secure them properly, and connect wiring according to the diagram. Control Panel and Circuit Wiring Drill - Learners install and connect the FDAS control panel, ensuring all detectors and alarms are wired correctly. - Mount the control panel, route and connect circuits, and verify continuity and proper connections.
	Report completion of work.	FDAS Installation Checklist - Learners document all installed devices, wiring connections, and testing results for proper system functionality. - Complete a checklist noting each device installed, wiring verified, and system tested for operation.

Week	Learning Competency	Suggested Activities
		• FDAS Work Presentation ○ Learners summarize and present the FDAS installation process, highlighting key steps, safety precautions, and system verification. ○ Prepare a short report or oral presentation showing completed work, verified wiring, and functioning devices.

Suggested Performance Tasks	• Installation of a Basic Conventional Smoke Detector Circuit ○ The learner individually installs and connects a basic FDAS setup consisting of one smoke detector, one manual pull station, and one alarm bell/buzzer to a control panel trainer, ensuring correct wiring, proper termination, circuit supervision, and compliance with PEC requirements for fire alarm systems. ○ Install and properly terminate the smoke detector, manual station, and alarm device to the control panel following PEC standards on FDAS wiring, device placement, and safety procedures. • Classroom FDAS Layout and Installation Project ○ In groups, learners design the layout and perform the installation of a simulated FDAS for a classroom or small building floor plan, including multiple smoke detectors, manual pull stations, alarm notification devices, and control panel connections, ensuring correct zoning, wiring configuration, and compliance with PEC standards. ○ Collaboratively plan the FDAS layout and install all detection and alarm devices according to the given floor plan while ensuring proper wiring, zoning, and PEC compliance.
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Performance Standard	The learners perform installation of Closed-Circuit Television (CCTV) according to PEC standard.
Content Standard	The learners demonstrate an understanding of the concepts and principles of Closed-Circuit Television (CCTV).

Week	Learning Competency	Suggested Activities
10	Discuss the devices and wiring diagrams for CCTV.	CCTV Device Exploration - Learners study common CCTV components such as cameras, DVR/NVR units, monitors, cables, and power supplies. - Examine sample CCTV devices, identify each component, and explain its function in the surveillance system. CCTV Wiring Diagram Analysis - Learners explore CCTV wiring diagrams to understand connections between cameras, recorders, and monitors. - Trace sample wiring diagrams, identifying the signal path, power connections, and device layout.
	Perform installation procedures for CCTV.	Camera Mounting Practice - Learners practice installing CCTV

		cameras in designated locations, ensuring correct angle, coverage, and secure mounting. ○ Position the camera, mount it securely, and adjust the viewing angle according to the plan. ● Wiring and System Connection Drill ○ Learners connect CCTV cameras to DVR/NVR units and power sources, following wiring diagrams and safety procedures. ○ Route and connect cables from cameras to the recorder, ensure proper power connection, and verify signal transmission.
	● Report completion of work	● CCTV Installation Checklist ○ Learners document all installed cameras, wiring routes, and system functionality checks. ○ Complete a checklist showing camera locations, wiring connections, and system testing results. ● CCTV Work Demonstration ○ Learners present a short report or demonstration summarizing the installation process and confirming system operation.

		○ Show the installed system, describe the installation steps, and verify that all cameras and recording devices are functioning correctly.
Suggested Performance Tasks	● Installation and Termination of a Single CCTV Camera System ○ The learner individually installs and terminates a single CCTV camera connected to a DVR/NVR and monitor, including proper mounting, cable routing (UTP or coaxial), power supply connection, and grounding, ensuring compliance with PEC standards on wiring methods, cable protection, and safety. ○ Mount and connect the CCTV camera to the recording system using proper wiring methods, terminations, grounding, and safety practices in accordance with PEC standards. ● Multi-Camera CCTV System Installation for a Simulated Building Layout ● In groups, learners design the layout and perform the installation of a multi-camera CCTV system for a simulated residential or school floor plan, including camera placement, cable management, DVR/NVR setup, power distribution, and system testing, ensuring compliance with PEC standards for low-voltage and auxiliary systems installation. ● Collaboratively plan, install, wire, and test a complete multi-camera CCTV system based on the given layout while ensuring proper mounting, cable routing, termination, grounding, and PEC compliance.	