Performance Based Objectives – Siemens PLC

Sub-Topic	PBO No.	Performance Based Objective
Siemens Level 1	SP-1	Match the features of the following hardware to a given list. - Processor module - Communications module (ProfiNet / ProfiBus) - Signal Board - Signal Module - Chassis - Power supply

	SP-2	Match the description of the installation and configuration steps with a list of the specific steps required to install and configure a new system incorporating a S7-1200 controller.
		a. Installation
		  - Install CPU on the DIN Rail
		  - Install Signal Modules (SM) on the DIN Rail
		  - Slide Buss Connection Switches to the left on all Signal Modules to make both a mechanical and electrical connection between the modules on the DIN Rail
		  - Install the SIM Card
		b. Wiring
		  - Land wires from input devices to the corresponding removable terminal blocks on the Signal Modules
		  - Land wires going to the output devices to the corresponding removable terminal blocks on the Signal Modules.
		c. Commissioning
		  - Verify each hardware device is receiving power and functioning properly.
		  - Download the configuration to the CPU
		  - Establish and set-up communications (ProfiBus / ProfiNet)

	SP-3	Switch between Project and Portal Views within the TIA Portal software.
	SP-4	Using TIA Portal software, assign an IP Address to a new CPU's MAC Address or change an existing IP Address on the CPU.
	SP-5	Match the description of the CPU's operating modes to a given list. - STOP, the CPU does not execute the program, and you can load a project - STARTUP, the CPU performs internal diagnostic checks associated with a startup. - RUN, the program is executed cyclically.
	SP-6	Using TIA Portal software, establish communications between a PC and CPU.
	SP-7	Create a new Step 7 Project and configure all module properties using the "Hardware Catalog".

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	SP-8	Create a new Step 7 Project and use the "Detect" option to automatically populate the associated hardware properties.
	SP-9	Match the description of specific types of Blocks a Step 7 Project to a given list: - Organization Block (OB): called by the operating system and are the interface between the user program and the CPU's operating system. These blocks act as a scheduling mechanism of the program segments - Function (FC): contains sections of the program that pertain to a particular function within the manufacturing process. These blocks are called by OB's or other blocks. They do not have an assigned memory area to hold data – local data is lost after the block is processed. - Function Block (FB): contains sections of the program that pertain to a particular function within the manufacturing process and are called by other blocks. These blocks included an assigned area of memory (a Data Block, for example) that can be accessed using variables. - Data Block (DB): provides memory for data variables. i. Two types of data blocks: - Global DBs - where all OBs, FBs and FCs can read the stored data - Instance DBs – assigned to a certain FB
	SP-10	Match the description of specific types of Organizational Blocks to a given list. - Startup: This organization block will be executed when the CPU is reset. - Cyclical (running the process): (OB1): Cyclically executes the main logic used to control the process - Time of Day: These organization blocks can be used to execute specific sections of programming based upon the time of day. - Alarms / Error Handling: These Organization Blocks contain logic elements that are executed based on specific alarms or error signals.
	SP-11	Add and delete Networks (rungs) within an existing Organization Block.
	SP-12	Add Instructions to an existing Network.
	SP-13	Download and Upload programs to/from a CPU.
	SP-14	Display specific module properties using the TIA Portal software.
	SP-15	Assign Global PLC Tags to I/O Addresses using the TIA Portal software. Demonstrate using both keyboard entry and "Drag & Drop."

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	SP-16	Create and save simple PLC programs (Simple Start (N.O.-PB) - stop circuit (N/C-PB) using storage bit tags and one output lamp.
	SP-17	Monitor I/O or using a Watch Table.
	SP-18	Control I/O using a Force Table, including Start and Stop of the Forces.
	SP-19	Perform minor edits on-line to the ladder logic to include relay, timer, and counter instructions.
	SP-20	Add storage bits to Network, cross-reference their location throughout the Project. Add software jumpers & rung output blocker bits.
	SP-21	Demonstrate the use of the Cross-Reference tab from within the Info tab to trace a specific bit through a program.
	SP-24	Demonstrate searching a ladder diagram by Tag or Address using Find (Find/Replace).
	SP-25	Change the processor's mode of operation.
	SP-26	Perform Find and Cross-references exercises.
	SP-27	Using the S7-1200 reference material, identify all indicators on a CPU module, determine whether the indicator represents normal or a faulted condition and identify the recommended recovery action for each possible condition.
	SP-28	Using the Tia Portal reference material, identify all indicators on Signal modules, determine whether the indicator represents normal or a faulted condition and identify the recommended recovery action for each possible condition.
	SP-29	Construct a simple clamp and drill circuit, program and debug. This will be completed on pneumatic actuated lab stations. (Note the program will be given to the students with one logic error in the program. The students are to debug the program. The circuit will demonstrate anti-tie down and pinch point control).
	SP-30	Given a ladder listing and input conditions, predict the output status. This ladder listing will include basic relay-type instructions as well as timers and counters.
	SP-31	While viewing the Networks of an operating program, search for the output that the simulated machine is waiting for and identify the inhibitors to machine operation. Trace these inhibitors back to real world inputs.
	SP-32	Given the TIA Portal ladder logic display, input and output module indicator conditions, and the associated voltage measurements that would be measured in the control panel, determine whether a failed input or output condition is due to a processor error "or" the input/output interfaces "or" a real world device/wiring issue.

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Sub-Topic	PBO No.	Performance Based Objective
	SP-33	Perform the replacement procedure of the following modules: - Processor module - Signal Board - ProfiBus Communications module - ProfiNet Communications module - Signal module – Input - Signal module - Output
	SP-34	Using the TIA Portal Software, insert a new Function Block into an existing Network. Define 3 inputs and 1 output
	SP-35	Using the TIA Portal Software, demonstrate Adding An Input to an existing Function Block.
	SP-36	Using Tia Portal Software, demonstrate using Drag And Drop to Assign Interface Signals to an existing Function Block.
	SP-37	Provided a screen shot from the Device Configuration Properties Dialog Box, Match the Module Properties for an Analog Module to a given list. - Output Type (Voltage / Current) - Output Range - Smoothing (weak, medium, strong) - Substitute value for channel on a change from Run to Stop (output)
	SP-38	Demonstrate the following in a lab exercise: - Create a PLC Tag for an analog input - Create a PLC Tag for an analog output - Create a program that displays the voltage of an analog input on an analog output device (display).
Siemens Level 2	**SP-39**	Using the Tia Portal software, review an example plant standard Project. Evaluate the logic and create Comments that would describe the action of selected rungs.
	SP-40	Using TIA Portal Software, switch the Language display of OB1 between LAD, FBD and STL.
	SP-41	Given three example sections of logic, match each to the associated programming language (LAD, FBD and STL).
	SP-42	Given an I/O chassis, Input module, Output module, sensor & actuator, wire the proper I/O field wiring and create Networks necessary to exercise the I/O devices.
	SP-43	Troubleshoot faulty machine operation on training simulator with instructor induced faults.
	SP-44	Demonstrate the ability to program in LAD, FBD, and STL to control a clamp and drill simulation.
	SP-45	Demonstrate the ability to wire and write a program to utilize the analog I/O capabilities.

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Sub-Topic	PBO No.	Performance Based Objective
	SP-46	Create a User interface (HMI) that contains push-buttons, output indicators and display registers.
	SP-22	Install and configure a ProfiBus Communications Module. Interpret diagnostic indicators status related to the modules functionality.
	SP-23	Install and configure a ProfiNet Communications Module. Interpret diagnostic indicators status related to the modules functionality.

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