

Total Questions: 20 | Level: All | Category: All

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Fundamentals

What is a PLC and what are its main components?

Answer:

A Programmable Logic Controller (PLC) is an industrial digital computer designed for automation. Main components include: CPU (processor), Input modules (digital/analog), Output modules (digital/analog), Power supply, Programming device, and Communication interfaces.

2

Fundamentals

Explain the difference between PLC and microcontroller.

Answer:

PLCs are ruggedized for industrial environments with modular I/O, easier programming (ladder logic), and built-in diagnostics. Microcontrollers are general-purpose chips requiring additional circuitry, programmed in C/assembly, and less robust for harsh environments.

3

Programming

What is Ladder Logic and why is it used?

Answer:

Ladder Logic is a graphical programming language that resembles electrical relay logic diagrams. It uses symbols like contacts (inputs) and coils (outputs). It's popular because it's intuitive for electricians and easy to troubleshoot.

4

Programming

Explain the PLC scan cycle.

Answer:

The scan cycle consists of: 1) Input scan - read all inputs, 2) Program execution - execute logic from top to bottom, 3) Output scan - update all outputs, 4) Housekeeping/diagnostics. This repeats continuously.

5

Hardware

What is the difference between sinking and sourcing I/O?

Answer:

Sinking I/O: Current flows into the module (common positive). Sourcing I/O: Current flows out of the module (common negative). Choice depends on sensor/actuator wiring convention.

6

Hardware

What are digital and analog signals?

Answer:

Digital signals have two states (ON/OFF, 0/1, typically 0V/24V). Analog signals vary continuously over a range (e.g., 0-10V, 4-20mA) to represent variable quantities like temperature, pressure, speed.

7

Programming

Explain timers in PLC - TON, TOF, and TP.

Answer:

TON (Timer On-Delay): Output turns ON after preset time. TOF (Timer Off-Delay): Output turns OFF after preset time. TP (Timer Pulse): Generates a pulse of preset duration regardless of input duration.

8

Programming

What is the difference between latching and non-latching outputs?

Answer:

Non-latching outputs change state only when input conditions are true. Latching outputs retain their state even after input conditions change, requiring explicit reset command (typically using SET/RESET or SR/RS instructions).

9**Communication****What is Modbus protocol and its types?**

Answer:

Modbus is a serial communication protocol for connecting industrial devices. Types: Modbus RTU (binary, serial RS-232/RS-485), Modbus ASCII (text-based, serial), Modbus TCP (Ethernet-based). Uses master-slave architecture.

10**Communication****Explain PROFIBUS and PROFINET.**

Answer:

PROFIBUS: Serial fieldbus protocol (RS-485), used for process automation, up to 12 Mbps. PROFINET: Ethernet-based industrial protocol, faster (100 Mbps+), supports real-time communication, more flexible topology, successor to PROFIBUS.

11**Troubleshooting****How do you troubleshoot a PLC system not responding?**

Answer:

Check: 1) Power supply voltage, 2) CPU status LEDs, 3) Communication cable connections, 4) PLC mode (RUN/STOP/PROGRAM), 5) Firmware compatibility, 6) Network settings, 7) Error logs in diagnostics buffer.

12**Hardware****What is a VFD and how does PLC control it?**

Answer:

Variable Frequency Drive controls motor speed by varying frequency/voltage. PLC controls VFD via: Analog signals (0-10V, 4-20mA for speed reference), Digital I/O (start/stop, forward/reverse), or Fieldbus communication (PROFINET, EtherNet/IP) for advanced control.

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Programming

Explain Function Blocks (FB) vs Functions (FC) in Siemens PLCs.

Answer:

Function Blocks (FB) have instance data blocks, retain data between calls, suitable for reusable code with memory (motors, valves). Functions (FC) don't have memory, parameters passed each call, used for calculations and conversions. FBs are instantiated, FCs are called directly.

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Programming

What is the purpose of OB (Organization Blocks) in Siemens?

Answer:

OBs define program structure and execution: OB1 (main cyclic program), OB100 (startup/warm restart), OB82 (diagnostic interrupt), OB35 (cyclic interrupt - precise timing), OB40-47 (hardware interrupts), OB80-87 (error handling). They control when and how program parts execute.

15

Safety

Explain Safety PLC and SIL ratings.

Answer:

Safety PLCs are certified for safety-critical applications (emergency stops, safety doors). SIL (Safety Integrity Level) rates risk reduction: SIL 1 (10^{-2} failure probability) to SIL 4 (10^{-5}). Requirements per IEC 61508/61511. Safety PLCs use redundant processors, watchdog timers, and fail-safe design.

16

Safety

What is an Emergency Shutdown System (ESD)?

Answer:

ESD automatically shuts down processes during dangerous conditions. Uses safety PLCs/DCS, typically SIL 2/3 rated. Includes: Sensors (pressure, temperature, gas detection), Logic solver (safety PLC), Final elements (shutdown valves, circuit breakers). Common in oil & gas.

17**Communication****Explain OPC and its role in industrial automation.**

Answer:

OPC (Open Platform Communications) is a standardized interface for data exchange between automation devices and software. OPC DA (Data Access) for real-time data, OPC UA (Unified Architecture) - platform-independent, secure, supports pub-sub. Enables SCADA/MES/ERP integration.

18**Motion Control****What is the difference between servo and stepper motors in PLC applications?**

Answer:

Servo motors: Closed-loop control with encoder feedback, high torque at high speeds, precise positioning, expensive. Stepper motors: Open-loop, moves in discrete steps, holding torque at standstill, simpler control, cheaper. Servos for high-speed/high-precision applications, steppers for simpler positioning.

19**Optimization****How do you optimize PLC scan time?**

Answer:

Methods: 1) Minimize program execution (remove unnecessary instructions), 2) Use interrupt-driven programming for critical tasks, 3) Optimize data types (use appropriate sizes), 4) Reduce communication overhead, 5) Use hardware interrupts vs polling, 6) Partition code into cyclic/interrupt OBs efficiently.

20**Integration****Explain the role of PLC in MES and Industry 4.0.****Answer:**

PLCs collect real-time production data for MES (Manufacturing Execution System) via OPC UA, MQTT, or REST APIs. In Industry 4.0: PLCs enable IoT integration, predictive maintenance (sending machine health data), cloud connectivity, digital twin synchronization, and edge computing for localized AI/ML processing.

Interview Tips:

- Always relate answers to practical experience and real projects
- Mention specific PLC brands you've worked with (Siemens, Allen-Bradley, etc.)
- Be prepared to draw ladder logic diagrams on paper/whiteboard
- Emphasize troubleshooting experience and problem-solving approach
- Know the industry standards relevant to the sector (IEC 61131, ISA-88, etc.)