SACA Certified Industry 4.0 Associate IV - IIoT, Networking & Data Analytics (C-104) Practice Exam (Sample)

Study Guide

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Questions

1. Which cloud computing model allows clients to rent software accessed over the internet?

A. Infrastructure as a Service

B. Platform as a Service

C. Software as a Service

D. Network as a Service

2. Standardization in lean manufacturing is improved by standardizing work and which other method?

A. 5S process

B. Inventory management

C. Quality control systems

D. Customer feedback loops

3. A computer or controller tracks a stepper motor's position by monitoring the number of what?

A. Cycles

B. Revolutions

C. Steps

D. Rotations

4. In lean manufacturing, what does 'jidoka' refer to?

A. Continuous improvement

B. Automation with a human touch

C. Just-in-time production

D. Visual management

5. After edits have been made to a Studio 5000 PLC program, what must be done before attempting to download the changes to a PLC?

A. The project must be verified

B. Save the project

C. Run diagnostics

D. Backup the project

6. What is the primary use of industrial Ethernet networks?

- **A. Connecting sensors**
- **B. Transmitting data**
- **C. Power supply management**
- **D. Real-time monitoring**

7. In troubleshooting, what action should be taken immediately after a fault is cleared?

- **A. Restart the PLC**
- **B. Test the input devices**
- **C. Document the findings**
- **D. Observe the system performance**

8. Which of the following is part of troubleshooting PLC discrete outputs and devices?

- **A. Force the inputs of the PLC off**
- **B. Check the voltage of the output terminal**
- **C. Test the wiring of the input device**
- **D. Reset the PLC**

9. What is an example of an operation performed by a SCADA system?

- **A. Employee payroll processing**
- **B. Monitoring temperature of machinery**
- **C. Sales forecasting**
- **D. Schedule management**

10. Which LED indication shows that the IO-Link master port is connected to a photoelectric sensor?

- **A. Flashing red LED**
- **B. Solid green LED**
- **C. Flashing green LED**
- **D. Solid yellow LED**

Answers

1. C
2. A
3. C
4. B
5. A
6. B
7. D
8. B
9. B
10. C

Explanations

1. Which cloud computing model allows clients to rent software accessed over the internet?

A. Infrastructure as a Service

B. Platform as a Service

C. Software as a Service

D. Network as a Service

The model that allows clients to rent software accessed over the internet is Software as a Service (SaaS). This model provides users with access to software applications hosted on a cloud infrastructure, enabling them to use the software via a web browser without the need for local installation or management. Clients benefit from the convenience of subscription-based access, automatic updates, and the ability to scale usage based on their needs. This approach reduces the requirements for physical hardware and IT maintenance, making it an attractive solution for many organizations. Infrastructure as a Service (IaaS) primarily provides virtualized computing resources over the internet, allowing users to rent virtual machines and other fundamental computing infrastructure. Platform as a Service (PaaS) offers a platform allowing customers to develop, run, and manage applications without the complexity of building and maintaining the infrastructure typically associated with developing and launching an app. Network as a Service (NaaS) enables users to manage network services and infrastructure on a subscription basis but does not focus on software applications. Each of these models serves different purposes in the cloud computing ecosystem; however, SaaS specifically addresses the requirement for software access over the internet.

2. Standardization in lean manufacturing is improved by standardizing work and which other method?

A. 5S process

B. Inventory management

C. Quality control systems

D. Customer feedback loops

Standardization in lean manufacturing is significantly improved by employing the 5S process alongside standardizing work. The 5S methodology focuses on organizing and visualizing the workplace to foster efficiency and reduce waste. It encompasses five principles: Sort, Set in order, Shine, Standardize, and Sustain. This structured approach enhances standardization by creating a consistent environment where processes can be executed effectively. When 5S is applied, it ensures that workspaces are tidy and organized, which is crucial for maintaining standardized procedures. By minimizing clutter and providing easy access to tools and materials, employees can adhere to standardized work methods more reliably. This synergy between the 5S process and standardized work helps improve productivity, quality, and safety in lean manufacturing settings. In contrast, while the other methods such as inventory management, quality control systems, and customer feedback loops are important elements of manufacturing processes, they don't specifically focus on the organizational aspect that 5S provides. Hence, they are not as directly related to enhancing standardization in lean manufacturing as the 5S process is.

3. A computer or controller tracks a stepper motor's position by monitoring the number of what?

A. Cycles

B. Revolutions

C. Steps

D. Rotations

The correct answer is that a computer or controller tracks a stepper motor's position by monitoring the number of steps. Stepper motors are specifically designed to move in discrete steps, which means that their movement can be accurately controlled by sending a specific number of electrical pulses to the motor. Each pulse corresponds to one step, allowing precise positioning. Stepper motors typically have a defined number of steps per revolution, which can vary depending on the motor's design. By counting these steps, a controller can determine the exact position of the motor shaft relative to its starting point. This feature makes stepper motors particularly useful in applications requiring high precision and repeatability, such as robotics, CNC machinery, and 3D printers. Cycles, revolutions, and rotations are less precise in this context since they do not reflect the incremental nature of stepper motors. While a complete rotation consists of a certain number of steps, simply counting rotations or cycles does not provide the detailed positional information that counting steps offers.

4. In lean manufacturing, what does 'jidoka' refer to?

A. Continuous improvement

B. Automation with a human touch

C. Just-in-time production

D. Visual management

'Jidoka' in lean manufacturing refers to the concept of automation that includes a human touch, which means that machines are designed to detect anomalies and stop functioning when issues arise, allowing for quality control to be integrated into the production process. This principle ensures that operators can focus on problem-solving and quality improvement rather than merely running machines. The philosophy behind 'jidoka' emphasizes empowering workers and enabling them to halt production when a defect is discovered, thus preventing defects from being passed down the line and ensuring that quality is built into the manufacturing process. This ultimately leads to increased efficiency and a reduction in waste, as it allows for prompt corrective action. In contrast, the other options represent different principles or tools associated with lean manufacturing. Continuous improvement refers to the ongoing effort to enhance products, services, or processes, while just-in-time production focuses on reducing inventory costs by producing exactly what is needed at the right time. Visual management involves using visual signals to monitor processes and performance. However, none of these specifically encapsulate the duality of automation alongside human intervention that defines 'jidoka.'

5. After edits have been made to a Studio 5000 PLC program, what must be done before attempting to download the changes to a PLC?

A. The project must be verified

B. Save the project

C. Run diagnostics

D. Backup the project

Before downloading changes to a PLC after making edits in a Studio 5000 program, it is essential to verify the project. This verification process ensures that the changes made to the program do not contain any errors that could result in unexpected behavior or malfunctions when the program runs on the PLC. The verification step checks for syntax errors, references, and any potential conflicts in the logic that could lead to operational issues. Although saving the project, running diagnostics, or backing up the project are important practices in program management, they do not directly address the need to confirm that the program is free from errors. Saving the project simply preserves your edits, running diagnostics may help identify existing issues unrelated to the current edits, and backing up protects against data loss but does not validate the correctness of the program. Therefore, ensuring the project is verified is a crucial step before proceeding with downloading changes to the PLC.

6. What is the primary use of industrial Ethernet networks?

A. Connecting sensors

B. Transmitting data

C. Power supply management

D. Real-time monitoring

The primary use of industrial Ethernet networks is to facilitate the transmission of data between devices in an industrial setting. Industrial Ethernet provides high-speed communication and ensures reliable data exchange over a network that connects various components like machines, controllers, sensors, and other devices. This communication capability is critical for enabling automated processes and integration of different systems within an Industry 4.0 framework. While options such as connecting sensors, power supply management, and real-time monitoring are important functions within industrial environments, they rely on the underlying infrastructure provided by industrial Ethernet for efficient operation. The network serves as the backbone that allows data to flow seamlessly, making the exchange of information instantaneous and helping businesses make informed decisions based on real-time data analysis. Thus, the focus on transmitting data encapsulates the core purpose of industrial Ethernet networks in enhancing communication and operational efficiency in various applications.

7. In troubleshooting, what action should be taken immediately after a fault is cleared?

A. Restart the PLC

B. Test the input devices

C. Document the findings

D. Observe the system performance

In troubleshooting, observing system performance immediately after a fault is cleared is crucial to ensure that everything is functioning as expected following the resolution of the issue. This step allows technicians to verify that the system has returned to normal operations and to confirm that no additional issues have developed as a result of the initial fault. By closely monitoring how the system performs, you can detect any lingering issues or new problems that may have emerged when the fault was cleared. This observation not only helps in validating the effectiveness of the fix applied but also serves as an important precursor to any further troubleshooting steps, ensuring that all components are operating correctly before proceeding with additional tests or actions. Following this observation, if issues persist, it may lead to further investigation or tests on input devices or other system components. However, the initial focus immediately after fault clearance is to ensure that system performance aligns with expected operational standards to reassure that any corrective measures taken were successful.

8. Which of the following is part of troubleshooting PLC discrete outputs and devices?

A. Force the inputs of the PLC off

B. Check the voltage of the output terminal

C. Test the wiring of the input device

D. Reset the PLC

Checking the voltage of the output terminal is a crucial step in troubleshooting PLC discrete outputs and devices. This process involves verifying that the output terminal is supplying the correct voltage to the connected devices, such as relays, solenoids, or other actuators. When issues arise with these devices not functioning as expected, measuring the voltage confirms whether the PLC output is operating correctly and delivering power to the intended components. If the voltage is absent or incorrect, it indicates a problem either with the PLC's output functionality or with the wiring and connections. This allows technicians to pinpoint the source of the failure and take appropriate corrective actions, such as checking the wiring or replacing faulty components. In contrast, forcing the inputs off involves adjusting the input conditions, which does not directly address output problems. Testing the wiring of the input device focuses on validating the input side of the system rather than the output. Resetting the PLC may temporarily resolve some issues, but it's not a direct diagnostic method for identifying problems specifically related to output functionality. Thus, verifying the output voltage is essential for effective troubleshooting of PLC discrete outputs.

9. What is an example of an operation performed by a SCADA system?

A. Employee payroll processing

B. Monitoring temperature of machinery

C. Sales forecasting

D. Schedule management

A SCADA (Supervisory Control and Data Acquisition) system is primarily designed for monitoring and control of industrial processes and infrastructure. It plays a critical role in the gathering and analysis of real-time data from remote locations to manage various operations, ensuring efficient performance and safety. Monitoring the temperature of machinery aligns perfectly with the purpose of a SCADA system. This function allows operators to observe temperature changes and receive alerts if the machinery operates outside of designated parameters, facilitating timely interventions to prevent equipment malfunction, enhance performance, and ensure safety in industrial environments. Other options, while important in their respective fields, do not fall under the typical function of a SCADA system. For example, employee payroll processing pertains to human resources management rather than industrial control systems. Sales forecasting relates to market analysis and business strategy, whereas schedule management is more about organizing tasks and timelines rather than monitoring real-time industrial processes. Hence, monitoring the temperature of machinery is a clear and relevant example of a SCADA operation.

10. Which LED indication shows that the IO-Link master port is connected to a photoelectric sensor?

A. Flashing red LED

B. Solid green LED

C. Flashing green LED

D. Solid yellow LED

The indication that shows the IO-Link master port is connected to a photoelectric sensor is represented by a flashing green LED. This type of signal typically indicates active communication between the IO-Link master and the connected device, such as a photoelectric sensor. When the LED is flashing green, it generally means that data is being transmitted successfully. This constant data exchange is crucial for the operation of sensors that monitor physical parameters and relay that information back to control systems in real-time, which is essential in an Industry 4.0 context where responsiveness and accuracy are key. A solid green LED would generally indicate that the device is powered and ready but may not necessarily communicate data. Flashing red would indicate an error or malfunction, while solid yellow could signal a warning or an intermediate state, neither of which would confirm a successful connection specifically to a photoelectric sensor. Hence, the flashing green LED is the correct indication in this scenario.