Registration form

SCADA 202 CEU Training Course $150.00
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL $50.00

Start and Finish Dates: ___________________________
You will have 90 days from this date in order to complete this course

List number of hours worked on assignment must match State Requirement. ________

Name________________________________Signature___________________________
I have read and understood the disclaimer notice on page 2. Digitally sign XXX

Address: ________________________________________________________________
City_________________________________State___________Zip__________________

Email______________________________ Fax (_____) _________________________

Phone:
Home (_____) ________________________ Work (_____) ________________________

Operator ID# _______________________________________Exp Date____________

Please circle/check which certification you are applying the course CEU’s.
Water Treatment _________     Distribution _______      Collection _________
Wastewater Treatment______    Other ___________________

Technical Learning College   PO Box 3060, Chino Valley, AZ 86323
Primary Fax (928) 272-0747   info@tlch2o.com
Telephone (928) 468-0665      Toll Free (866) 557-1746

If you’ve paid on the Internet, please write your Customer#_________________

Please invoice me, my PO#______________________________________________

Please pay with your credit card on our website under Bookstore or Buy Now. Or call us and provide your credit card information.
DISCLAIMER NOTICE
I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible. I also understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. I will call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

Professional Engineers; Most states will accept our courses for credit but we do not officially list the States or Agencies. Please check your State for approval.

You can obtain a printed version of the course from TLC for an additional $59.95 plus shipping charges.

AFFIDAVIT OF EXAM COMPLETION
I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

Grading Information
In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

Do not solely depend on TLC’s Approval list for it may be outdated.

All downloads are electronically tracked and monitored for security purposes.

Some States and many employers require the final exam to be proctored.

No refunds.

We will stop mailing the certificate of completion we need your e-mail address. We will e-mail the certificate to you, if no e-mail address; we will mail it to you.
SCADA 202 CEU Course Answer Key

Name ______________________________________

Telephone # __________________________

You are solely responsible in ensuring that this course is accepted for credit by your State. No refunds. Did you check with your State agency to ensure this course is accepted for credit?

Method of Course acceptance confirmation. Please fill this section

Website ___ Telephone Call___ Email____ Spoke to____________________________

Do not solely depend on TLC’s Approval list for it may be outdated.

What is the approval number if Applicable? ______________

Please circle, underline, bold or X only one correct answer

16. A B C D 34. A B C D 52. A B C D E F
17. A B C D 35. A B 53. A B C D E F
56. A B C D E F  88. A B C D E F  120. A B C D E F
57. A B C D E F  89. A B C D E F  121. A B C D E F
58. A B C D E F  90. A B C D E F  122. A B C D E F
59. A B C D E F  91. A B C D E F  123. A B C D E F
63. A B C D E F  95. A B C D E F  127. A B C D E F
64. A B C D E F  96. A B C D E F  128. A B C D E F
66. A B C D E F  98. A B C D E F  130. A B C D E F
68. A B C D E F  100. A B C D E F  132. A B C D E F
70. A B C D E F  102. A B C D E F  134. A B C D E F
71. A B C D E F  103. A B C D E F  135. A B C D E F
73. A B C D E F  105. A B C D E F  137. A B C D E F
75. A B C D E F  107. A B C D E F  139. A B C D E F
76. A B C D E F  108. A B C D E F  140. A B C D E F
77. A B C D E F  109. A B C D E F  141. A B C D E F
78. A B C D E F  110. A B C D E F  142. A B C D E F
79. A B C D E F  111. A B C D E F  143. A B C D E F
80. A B C D E F  112. A B C D E F  144. A B C D E F
82. A B C D E F  114. A B C D E F  146. A B C D E F
83. A B C D E F  115. A B C D E F  147. A B C D E F
85. A B C D E F  117. A B C D E F  149. A B C D E F
86. A B C D E F  118. A B C D E F  150. A B C D E F

4
SCADA 202 9/15/2018 © TLC (866) 557-1746
Disclaimer
I understand that this course will cover general laws, regulations, required procedures and work rules relating to SCADA and electrical principles. It should be noted, however, that the federal and state regulations are an ongoing process and subject to change over time. This course is a continuing education course for employees who are learning general electrical principles but are not allowed to work on electrical projects unless qualified or licensed. It is not designed to meet the full requirements of the Department of Labor-Occupational Safety and Health Administration (OSHA) rules and regulations. Only qualified licensed electricians should be allowed to work on any or all electrical installations or components. This course will not qualify you to work on any type of electrical system or component. I will not hold Technical Learning College responsible for any error or responsibility.

Signature ________________________________

Additional certificate for another Agency – additional fee $50
Please e-mail or fax this survey along with your final exam

SCADA 202 CEU TRAINING COURSE
CUSTOMER SERVICE RESPONSE CARD

NAME: _________________________________
E-MAIL________________________________ PHONE________________________________

PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE
ANSWER IN THE AREA BELOW.

Please rate the difficulty of your course.
Very Easy   0 1 2 3 4 5     Very Difficult

Please rate the difficulty of the testing process.
Very Easy   0 1 2 3 4 5     Very Difficult

Please rate the subject matter on the exam to your actual field or work.
Very Similar 0 1 2 3 4 5     Very Different

How did you hear about this Course? __________________________________

What would you do to improve the Course?
_________________________________________________________________________
_________________________________________________________________________

How about the price of the course?   Poor __  Fair__   Average__   Good __  Great __

How was your customer service? Poor __  Fair__   Average__   Good __  Great __

Any other concerns or comments.
_________________________________________________________________________
_________________________________________________________________________
Please fax the answer key to TLC
(928) 272-0747

Rush Grading Service
If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of $50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line. Thank you…
SCADA 202 CEU Course Assignment

The Assignment (Exam) is also available in Word on the Internet for your Convenience, please visit www.ABCTLC.com and download the assignment and e-mail it back to TLC.

You will have 90 days from the start of this course to complete in order to receive your Professional Development Hours (PDHs) or Continuing Education Unit (CEU). A score of 70% is necessary to pass this course. We prefer if this exam is proctored. No intentional trick questions. If you should need any assistance, please email all concerns and the completed manual to info@tlch2o.com.

We would prefer that you utilize the enclosed answer sheet in the front, but if you are unable to do so, type out your own answer key. Please include your name and address on your Answer Key and make copy for yourself. You can e-mail or fax your Answer Key along with the Registration Form to TLC. (S) Means answer may be plural or singular. Multiple Choice Section, One answer per question and please use the answer key.

Topic 1 – SCADA Introduction
1. Industrial organizations and companies in the public and private sectors to maintain and control efficiency, distribute data for smarter decisions, and communicate system issues to help mitigate downtime utilize SCADA systems.
   A. True   B. False

2. SCADA systems are critical for industrial organizations (like water and wastewater facilities) since they help to maintain efficiency, process data for smarter decisions, and communicate system issues to help mitigate downtime.
   A. True   B. False

3. The SCADA software will process, distribute, and display important data, helping operators and other employees understand the data and make important decisions.
   A. True   B. False

4. The acronym SCADA refers to the centralized computer systems that control and monitor the entire sites, or they are the complex systems spread out over large areas. Nearly all the control actions are automatically performed by the remote terminal units (RTUs) or by the programmable logic controllers (PLCs).
   A. True   B. False

5. Data acquisition starts at the HMI level, which includes the equipment status reports, and meter readings. Data is then formatted in such way that the operator of the control room can make the supervisory decisions to override or adjust normal HMI controls, by using the PLC.
   A. True   B. False

6. SCADA systems implement the distributed databases known as Excel databases, containing data elements called rows or columns.
   A. True   B. False
7. The key attribute of a SCADA system is its capability to perform a supervisory operation over a variety of other proprietary devices.
A. True    B. False

8. The internet is linked to the SCADA system’s databases, to provide the diagnostic data, management information and trending information such as logistic information, detailed schematics for a certain machine or sensor, maintenance procedures and troubleshooting guides.
A. True    B. False

9. The HMI, or Human Machine Interface, is a device apparatus that gives the processed data to the human operator. A human operator uses HMI to control processes.
A. True    B. False

10. The information provided by the HMI to the operating personnel is graphical, in the form of mimic diagrams. This means the schematic representation of the plant that is being controlled is obtainable to the operator.
A. True    B. False

11. Which of the following terms can convert electrical signals coming from the equipment into digital values like the status- open/closed – from a valve or switch, or the measurements like flow, pressure, current or voltage?
A. RTU  C. PLC
B. HMI  D. None of the Above

12. By converting and sending the electrical signals to the equipment, ________________ may control the equipment, like closing or opening a valve or a switch, or setting the speed of the pump.
A. RTU  C. SCADA system
B. HMI  D. None of the Above

13. A ‘supervisory Station’ refers to the software and servers responsible for communication with the field equipment (PLCs, RTUs etc.), and after that, to ________________ software running on the workstations in the control room, or somewhere else.
A. RTU  C. SCADA system
B. HMI  D. None of the Above

14. Which of the following terms can have multiple servers, disaster recovery sites and distributed software applications in larger SCADA systems?
A. Master station  C. SCADA system(s)
B. SCADA implementation(s)  D. None of the Above

15. For increasing the system integrity, ________________ are occasionally configured in hot standby or dual-redundant formation, providing monitoring and continuous control during server failures.
A. Multiple servers  C. Multiple stations
B. Independent systems  D. None of the Above
16. Which of the following terms originally used modem connections or combinations of direct and radio serial to meet communication requirements, even though IP and Ethernet over SONET/SDH can also be used at larger sites like power stations and railways?
A. SCADA systems C. SCADA
B. SCADA implementation(s) D. None of the Above

17. The monitoring function or remote management of the _________________ is referred to as telemetry.
A. SCADA operator C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above

18. An important part of most SCADA implementations is _________________. The system monitors whether certain alarm conditions are satisfied, to determine when an alarm event has occurred.
A. Policies and procedures C. Alarm handling
B. The cyber security team D. None of the Above

19. Once an alarm event has been detected, one or more actions are taken (such as the activation of one or more alarm indicators, and perhaps the generation of email or text messages so that management or _________________ are informed).
A. SCADA operator C. Remote SCADA operators
B. SCADA implementation(s) D. None of the Above

20. In many cases, a _________________ may have to recognize the alarm event; this may deactivate some alarm indicators, whereas other indicators remain active until the alarm conditions are cleared.
A. SCADA operator C. SCADA
B. SCADA implementation(s) D. None of the Above

21. Which of the following terms might automatically monitor whether the value in an analogue point lies outside high and low-limit values associated with that point?
A. SCADA operator C. SCADA system(s)
B. SCADA implementation(s) D. None of the Above

22. Which of the following terms translates the electrical signals from the equipment to digital values such as the open/closed status from a switch or a valve, or measurements such as pressure, flow, voltage or current? By translating and sending these electrical signals out to equipment the RTU can control equipment, such as opening or closing a switch or a valve, or setting the speed of a pump.
A. RTU C. PLCs
B. HMI D. None of the Above

23. In the first production, mainframe systems were used for computing. At the time SCADA was established, networks did not exist. Therefore, the _________________ did not have any connectivity to other systems, meaning they were independent systems.
A. SCADA systems C. Multiple stations
B. Independent systems D. None of the Above
24. The information between multiple stations was shared in real time through ___________ and the processing was distributed between various multiple stations. The cost and size of the stations were reduced in comparison to the ones used in the first generation.

A. RTU   C. LAN
B. HMI   D. None of the Above

25. The interaction between the system and the master station is done through the WAN protocols like the_______________.

A. Internet Protocols (IP)   C. Remote or distant operation
B. Common IT practices   D. None of the Above

26. Since the standard protocols used and the _______________ can be accessed through the internet, the vulnerability of the system is enlarged.

A. Networked SCADA systems   C. SCADA system(s)
B. SCADA implementation(s)   D. None of the Above

27. SCADA systems are now in line with the standard networking technologies. The old proprietary standards are being replaced by the_______________. However, due to certain characteristics of frame-based network communication technology, Ethernet networks have been recognized by the majority of markets for HMI SCADA.

A. ICS network   C. TCP/IP and Ethernet protocols
B. LAN to a WAN   D. None of the Above

28. There are many threat vectors to a modern SCADA system. One is the threat of unauthorized access to the control software, whether it is human access or changes induced intentionally or accidentally by ___________________ residing on the control host machine.

A. Policies and procedures   C. Virus infections and other software threats
B. DoS attacks and malware   D. None of the Above

29. In many cases, SCADA users have assumed that having a VPN offered sufficient protection, unaware that security can be _______________ to SCADA-associated network jacks and switches.

A. Different risks and priorities   C. Trivially bypassed with physical access
B. Significantly less isolation   D. None of the Above

30. Industrial control vendors propose approaching SCADA security like _______________ with a defense in depth strategy that leverages common IT practices.

A. Remote control tasks   C. Remote or distant operation
B. Information Security   D. None of the Above

31. A SCADA (or supervisory control and data acquisition) system means a system consisting of a number of remote terminal units (or RTUs) collecting field data connected back to a master station via a_______________.

A. Communications system   C. PLCs, RTUs etc.
B. HMI   D. None of the Above

32. The master station displays the _______________ and also allows the operator to implement remote control tasks.

A. Acquired data   C. Remote or distant operation
B. Common IT practices   D. None of the Above
33. The accurate and timely data (normally real-time) allows for optimization of the operation of the plant and process. A further benefit is more efficient, reliable and most importantly, safer operations. This all results in a lower cost of operation compared to earlier ____________.
   A. Remote control tasks  C. Remote or distant operation
   B. Non-automated systems  D. None of the Above

34. There is a fair degree of misunderstanding between the definition of SCADA systems and process control system. SCADA has the ________________.
   A. Remote control tasks  C. Connotation of remote or distant operation
   B. Non-automated systems  D. None of the Above

**Topic 2 - SCADA, HMI, DCS, and PLCs Section**

35. Field devices regulate local processes such as opening and closing valves and breakers, collecting data from sensor systems, and monitoring the local environment for alarm conditions.
   A. True   B. False

36. PLCs are incorporated as a control architecture containing a supervisory level of control overseeing multiple, integrated subsystems that are responsible for controlling the details of a localized process.
   A. True   B. False

37. Product and process control are typically achieved by deploying feedback or feed forward control loops whereby key product and/or process conditions are automatically maintained around a desired set point.
   A. True   B. False

38. To accomplish the chosen product and/or process tolerance around a specified set point, specific programmable controllers (PLC) are employed in the field and proportional, integral, and/or differential settings on the PLC are tuned to provide the desired tolerance as well as the rate of self-correction during process upsets.
   A. True   B. False

39. PLCs are mechanical-based analog devices that control industrial equipment and processes.
   A. True   B. False

40. While PLCs are control system components used all over SCADA and DCS systems, they are often the primary components in smaller control system configurations used to provide regulatory control of discrete processes such as automobile assembly lines and power plant soot blower controls. PLCs are used extensively in almost all industrial and water treatment processes.
   A. True   B. False

41. PLC processes have distinct processing steps, conducted on a quantity of material. There is no distinct start and end step to a batch process.
   A. True   B. False
42. The discrete-based manufacturing industries typically conduct a series of steps on a single device to create the end-product. Electronic and mechanical parts assembly and parts machining are typical examples of this type of industry.
A. True  B. False

43. DCS and PLC communications are typically carried out using Wi-Fi technologies that are typically more reliable and high speed compared to the short-distance communication systems used by SCADA systems.
A. True  B. False

44. A control loop consists of sensors for measurement, controller hardware such as PLCs, actuators such as control valves, breakers, switches and motors, and the communication of variables.
A. True  B. False

45. Uncontrolled variables are transmitted to the controller from the sensors.
A. True  B. False

46. Which of the following missing terms understands the signals and generates corresponding manipulated variables, based on set points, which it transmits to the actuators?
A. Policies and procedures  D. Cyber security programs
B. The cyber security team  E. The controller
C. Physical impacts  F. None of the Above

47. Process changes from disturbances result in new sensor signals, recognizing the state of the process, to again be transmitted to _________________.
A. The controller  D. PLC(s)
B. HMI  E. Remote Terminal Unit or (RTU)
C. An IED  F. None of the Above

48. Operators and engineers use ________________ to construct set points, control algorithms, and adjust and establish parameters in the controller.
A. Controller  D. Remote Terminal Unit or (RTU)
B. HMI(s)  E. PLC(s)
C. SCADA Server  F. None of the Above

49. Which of the following missing terms also displays process status information and historical information?
A. Controller  D. Remote Terminal Unit or (RTU)
B. HMI(s)  E. PLC(s)
C. SCADA Server  F. None of the Above

50. Which of the following missing terms contains a proliferation of control loops, HMIs, and remote diagnostics and maintenance tools built using an array of network protocols on layered network architectures.
A. Data historian  D. PLC(s)
B. HMI  E. ICS
C. An IED  F. None of the Above
51. Which of the following missing terms is the device that performs as the master in a SCADA system? Remote terminal units and PLC devices located at remote field sites typically act as slaves.
   A. Controller  D. Remote Terminal Unit or (RTU)
   B. HMI(s)  E. PLC(s)
   C. SCADA Server  F. None of the Above

52. Which of the following missing terms also called a remote telemetry unit, is special purpose data acquisition and control unit designed to support SCADA remote stations?
   A. Data historian  D. PLC(s)
   B. HMI  E. Remote Terminal Unit or (RTU)
   C. An IED  F. None of the Above

53. Which of the following missing terms are field devices often equipped with wireless radio interfaces to support remote situations where wire-based communications are unobtainable?
   A. Controller  D. RTU
   B. HMI(s)  E. PLC(s)
   C. SCADA Server  F. None of the Above

54. Which of the following missing terms is a small industrial computer originally designed to implement the logic functions executed by electrical hardware (relays, drum switches, and mechanical timer/counters)?
   A. Data historian  D. PLC
   B. HMI  E. Remote Terminal Unit or (RTU)
   C. An IED  F. None of the Above

55. In SCADA environments, PLCs are often used as field devices because they are more economical, versatile, flexible, and configurable than ________________________.
   A. Controller  D. Special-purpose RTUs
   B. HMI(s)  E. PLC(s)
   C. SCADA Server  F. None of the Above

56. Which of the following missing terms is a “smart” sensor/actuator containing the intelligence required to acquire data, communicate to other devices, and implement local processing and control?
   A. Data historian  D. PLC(s)
   B. HMI  E. Remote Terminal Unit or (RTU)
   C. An IED  F. None of the Above

57. Which of the following missing terms in SCADA and DCS systems allows for automatic control at the local level?
   A. Controller  D. Remote Terminal Unit or (RTU)
   B. HMI(s)  E. An IED
   C. SCADA Server  F. None of the Above

58. Which of the following missing terms is software and hardware that allows human operators to monitor the state of a process under control, modify control settings to change the control objective, and manually override automatic control operations?
   A. Data historian  D. PLC(s)
   B. HMI  E. Remote Terminal Unit or (RTU)
   C. An IED  F. None of the Above
59. The HMI also displays___________________, historical information, reports, and other information to operators, administrators, managers, business partners, and other authorized users. The location, platform, and interface may vary a great deal.
A. Remote diagnostics   D. Process status information
B. Direct instructions   E. Centralized monitoring
C. Control dispersed assets F. None of the Above

60. The data historian is a centralized database for logging all process information within an ICS. Information stored in this database can be accessed to support various analyses, from statistical process control to___________________.
A. Policies and procedures D. Cyber security programs
B. Enterprise level planning E. DoS attacks and malware
C. Physical impacts F. None of the Above

61. The IO server is a control component responsible for collecting, buffering and providing access to process information from control sub-components such as _____________.
A. ICS network   D. Router
B. LAN to a WAN   E. PLCs, RTUs and IEDs
C. Between two networks F. None of the Above

62. Which of the following missing terms can reside on the control server or on a separate computer platform?
A. An IO server   D. Fieldbus technologies
B. Network   E. Supervisory control level
C. Data historian   F. None of the Above

63. The fieldbus network links sensors and other devices to a _____________ or other controller.
A. ICS network   D. Router
B. LAN to a WAN   E. PLC
C. Between two networks F. None of the Above

64. Which of the following missing terms eliminates the need for point-to-point wiring between the controller and each device?
A. An IO server   D. Fieldbus technologies
B. Network   E. Supervisory control level
C. Data historian   F. None of the Above

65. The sensors communicate with the fieldbus controller using a_________________. The messages sent between the sensors and the controller uniquely identify each of the sensors.
A. ICS network   D. Router
B. LAN to a WAN   E. PLCs, RTUs and IEDs
C. Specific protocol F. None of the Above

66. Which of the following missing terms connects the supervisory control level to lower-level control modules?
A. The control network   D. Fieldbus technologies
B. Network   E. Supervisory control level
C. Data historian   F. None of the Above
67. Which of the following missing terms is a communications device that transfers messages between two networks?
A. ICS network  
B. LAN to a WAN  
C. Between two networks  
D. Router  
E. PLCs, RTUs and IEDs  
F. None of the Above

68. Common uses for routers include connecting a ______________, and connecting MTUs and RTUs to a long-distance network medium for SCADA communication.
A. ICS network  
B. LAN to a WAN  
C. Between two networks  
D. Router  
E. PLCs, RTUs and IEDs  
F. None of the Above

69. Which of the following missing terms protects devices on a network by monitoring and controlling communication packets using predefined filtering policies?
A. An IO server  
B. A firewall  
C. Data historian  
D. Fieldbus technologies  
E. Supervisory control level  
F. None of the Above

70. Firewalls are also useful in managing_________________.
A. ICS network  
B. LAN to a WAN  
C. Between two networks  
D. Router  
E. ICS network segregation strategies  
F. None of the Above

71. Which of the following missing terms are distinct devices, areas and locations of a control network for remotely configuring control systems and accessing process data?
A. Remote access points  
B. Network  
C. Data historian  
D. Fieldbus technologies  
E. Supervisory control level  
F. None of the Above

72. SCADA systems are used to control ___________ where centralized data acquisition is as important as control.
A. Dispersed assets  
B. The cyber security team  
C. Physical impacts  
D. Cyber security programs  
E. DoS attacks and malware  
F. None of the Above

73. SCADA systems integrate data acquisition systems with data transmission systems and HMI software to provide a ___________ for numerous process inputs and outputs.
A. Remote diagnostics  
B. Direct instructions  
C. Control dispersed assets  
D. Centralized monitoring and control system  
E. Centralized monitoring  
F. None of the Above

74. SCADA systems are designed to collect field information, transfer it to a central computer facility, and display the information to the operator graphically or textually, thereby allowing the operator to ______________ an entire system from a central location in real time.
A. Send new set points  
B. Radio telemetry  
C. Channel sharing  
D. Monitor or control  
E. Communicate directly  
F. None of the Above
75. The MTU stores and processes the information from RTU inputs and outputs, while the RTU or PLC________________________.
A. Controls the local process  D. Processes the information
B. Direct instructions  E. Centralizes monitoring
C. Control dispersed assets  F. None of the Above

76. An IED, such as a protective relay, may communicate directly to the SCADA master station, or a local RTU may poll the IEDs to collect the data and________________________.
A. Send new set points  D. Pass it to the SCADA master station
B. Radio telemetry  E. Communicate directly
C. Channel sharing  F. None of the Above

77. IEDs provide a ____________to control and monitor equipment and sensors. IEDs may be directly polled and controlled by the SCADA master station and in most cases have local programming that allows for the IED to act without direct instructions from the SCADA control center.
A. Direct interface  D. Processes the information
B. Direct instructions  E. Centralized monitoring
C. Control dispersed interface  F. None of the Above

78. SCADA systems are typically designed to be fault-tolerant systems with ____________into the system architecture.
A. Sending new set points  D. Significant redundancy built
B. Radio telemetry  E. Communicate directly
C. Channel sharing  F. None of the Above

79. Field sites are often equipped with a ____________to allow field operators to implement remote diagnostics and repairs typically over a separate dial up or WAN connection.
A. Remote diagnostics  D. Remote access capability
B. Direct instructions  E. Centralized monitoring
C. Control dispersed assets  F. None of the Above

80. ________________the simplest type; however, it is expensive because of the individual channels needed for each connection. In a series configuration, the number of channels used is reduced; however, channel sharing has an impact on the efficiency and complexity of SCADA operations.
A. Point-to-point is functionally  D. Redundancy
B. Radio telemetry  E. Communicate directly
C. Channel sharing  F. None of the Above

81. The series-star and multi-drop configurations’ use of one channel per device results in decreased efficiency and________________________.
A. Remote diagnostics  D. Increased system complexity
B. Direct instructions  E. Centralized monitoring
C. Control dispersed assets  F. None of the Above
82. Point-to-point connections are used for all control center to field site communications, with _________________.
A. Send new set points   D. Redundancy
B. Radio telemetry       E. Two connections using radio telemetry
C. Channel sharing       F. None of the Above

83. A regional control center sits above the primary control center for a higher level of supervisory control. The corporate network has access to all control centers through the WAN, and field sites can be accessed remotely for _________________.
A. Remote diagnostics   D. Processing the information
B. Direct instructions  E. Troubleshooting and maintenance operations
C. Control dispersed assets F. None of the Above

84. The primary control center polls field devices for data at defined intervals (e.g., 5 seconds, 60 seconds, etc.) and can send ________________ to a field device as required.
A. New set points       D. Redundancy
B. Radio telemetry      E. Communicate directly
C. Channel sharing      F. None of the Above

85. In addition to polling and issuing high-level commands, the SCADA server also watches for ________________ coming from field site alarm systems.
A. Remote diagnostics   D. Priority interrupts
B. Direct instructions  E. Centralized monitoring
C. Control dispersed assets F. None of the Above

86. In the case of SCADA systems, they provide the same functionality of RTUs. When used in DCSs, PLCs are implemented as local controllers within a _________________.
A. Supervisory control scheme D. Cyber security program
B. Cyber security team       E. DoS attack
C. Physical impacts          F. None of the Above

87. Which of the following missing terms are also implemented as the primary components in smaller control system configurations?
A. DCSs                D. Geographically remote field control stations
B. SCADA control technology E. PLCs
C. RTUs               F. None of the Above

88. Both the electrical power transmission and distribution grid industries use ________________ technology to operate highly interconnected and dynamic systems consisting of thousands of public and private utilities and rural cooperatives for supplying electricity to end users.
A. DCSs               D. Geographically remote field control stations
B. SCADA control technology E. Geographically distributed SCADA control
C. RTUs               F. None of the Above

89. SCADA systems monitor and control electricity distribution by collecting data from and issuing commands to ________________ from a centralized location.
A. DCSs               D. Geographically remote field control stations
B. SCADA control technology E. Geographically distributed SCADA control
C. RTUs               F. None of the Above
90. Which of the following missing terms are often tied together? This is the case for electric power control centers and electric power generation facilities. Although the electric power generation facility operation is controlled by a DCS, the DCS must communicate with the SCADA system to coordinate production output with transmission and distribution demands.
A. DCSs  D. SCADA systems and DCSs
B. SCADA control technology  E. PLCs
C. RTUs  F. None of the Above

**Topic 3 - ICS Characteristics, Threats and Vulnerabilities**

91. Most Industrial Control Systems (ICSs) in use today were established years ago, long before public and private networks, desktop computing, or the Internet were a common part of__________________________.
A. Different risks and priorities  D. Cyber security vulnerabilities and incidents
B. Business operations  E. Unexpected outages of systems
C. Safety and security  F. None of the Above

92. Initially, ICSs had little resemblance to IT systems in that ICSs were isolated systems running proprietary control protocols using__________________________.
A. Outages  D. Adopting IT solutions
B. Deterministic responses  E. Specialized hardware and software
C. New security solutions  F. None of the Above

93. Widely obtainable, low-cost Internet Protocol (IP) devices are now replacing proprietary solutions, which increases the possibility of__________________________.
A. Different risks and priorities  D. Cyber security vulnerabilities and incidents
B. Significantly less isolation  E. Unexpected outages of systems
C. Safety and security  F. None of the Above

94. As ICSs are adopting IT solutions to promote corporate connectivity and remote access capabilities, and are being designed and implemented using industry standard computers, operating systems (OS) and network protocols, they are starting to resemble__________________________.
A. IT systems  D. IT solutions
B. Deterministic responses  E. Specialized hardware and software
C. New security solutions  F. None of the Above

95. This integration supports__________________________, but it provides significantly less isolation for ICSs from the outside world than predecessor systems, creating a greater need to secure these systems.
A. Policies and procedures  D. Cyber security programs
B. New IT capabilities  E. DoS attacks and malware
C. Physical impacts  F. None of the Above

96. While security solutions have been designed to deal with these security issues in typical IT systems, special precautions must be taken when introducing these same solutions to ICS environments. In some cases,__________________________ are needed that are tailored to the ICS environment.
A. Outages  D. Adopting IT solutions
B. Deterministic responses  E. Specialized hardware and software
C. New security solutions  F. None of the Above
97. ICSs have many characteristics that differ from traditional Internet-based information processing systems, including___________________.
A. Different risks and priorities   D. Cyber security vulnerabilities and incidents
B. Significantly less isolation   E. Unexpected outages of systems
C. Safety and security   F. None of the Above

98. ICSs are generally time-critical; delay is not acceptable for the delivery of information, and high throughput is typically not essential. In contrast, IT systems typically require high throughput, but they can typically withstand___________________.
A. Outages   D. Substantial levels of delay and jitter
B. Deterministic responses   E. Specialized hardware and software
C. New security solutions   F. None of the Above

99. ICSs must display___________________.
A. Outages   D. IT solutions
B. Deterministic responses   E. Specialized hardware and software
C. New security solutions   F. None of the Above

100. Many ICS processes are continuous in nature. _____________that control industrial processes are not acceptable.
A. Different risks and priorities   D. Cyber security vulnerabilities and incidents
B. Significantly less isolation   E. Unexpected outages of systems
C. Safety and security   F. None of the Above

101. Which of the following terms often must be planned and scheduled days/weeks in advance?
A. Outages   D. Adopting IT solutions
B. Deterministic responses   E. Specialized hardware and software
C. New security solutions   F. None of the Above

102. In a typical IT system, data confidentiality and integrity are typically the primary concerns. For an ICS, human safety and fault tolerance to prevent loss of life or endangerment of public health or confidence, regulatory compliance, loss of equipment, loss of intellectual property, or___________________.
A. Different risks and priorities   D. Cyber security vulnerabilities and incidents
B. Lost or damaged products   E. Safety and security
C. Safety and security   F. None of the Above

103. The personnel responsible for operating, securing, and maintaining ICSs must understand the link between___________________.
A. Different risks and priorities   D. Cyber security vulnerabilities and incidents
B. Lost or damaged products   E. Safety and security
C. Safety and security   F. None of the Above

104. In a typical IT system, the primary focus of security is protecting the operation of IT assets, whether___________________. and the information stored on or transmitted among these assets.
A. Current security capabilities   D. Normal ICS functionality
B. Centralized or distributed   E. Especially vulnerable
C. More difficult to upgrade   F. None of the Above
105. In some architectures, ____________________ and processed centrally is more critical and is afforded more protection.
A. Current security capabilities  D. Normal ICS functionality
B. Information stored  E. Especially vulnerable
C. More difficult to upgrade  F. None of the Above

106. For ICSs, ____________________ (e.g., PLC, operator station, DCS controller) need to be carefully protected since they are directly responsible for controlling the end processes.
A. Edge clients  D. Both IT and control systems
B. Typical IT system  E. Automated using server-based tools
C. ICSs and their real time OSs  F. None of the Above

107. ICSs can have very complex interactions with physical processes and consequences in the ICS domain can manifest in physical events. Which of the following terms is integrated into the industrial control system must be tested to prove that they do not compromise normal ICS functionality?
A. Current security capabilities  D. Normal ICS functionality
B. All security functions  E. Especially vulnerable
C. More difficult to upgrade  F. None of the Above

108. In a typical IT system, access control can be implemented without significant regard for ____________________.
A. ICS experts  D. Both IT and control systems
B. Typical IT system  E. Automated using server-based tools
C. Data flow  F. None of the Above

109. Which of the following terms are especially vulnerable to resource unavailability and timing disruptions?
A. Policies and procedures  D. Cyber security programs
B. The cyber security team  E. Legacy systems
C. Physical impacts  F. None of the Above

110. Which of the following terms are more difficult to upgrade in a control system network? Many systems may not have desired features including encryption capabilities, error logging, and password protection.
A. Current security capabilities  D. Normal ICS functionality
B. Software and hardware applications  E. Especially vulnerable
C. More difficult to upgrade  F. None of the Above

111. ICSs and their real time OSs are often resource-constrained systems that typically do not include ____________________. There may not be computing resources obtainable on ICS components to retrofit these systems with current security capabilities.
A. ICS experts  D. Both IT and control systems
B. Typical IT system  E. Automated using server-based tools
C. Typical IT security capabilities  F. None of the Above
112. Which of the following terms and media used by ICS environments for field device control and intra-processor communication are typically dissimilar from the generic IT environment, and may be proprietary?
A. Current security capabilities  D. Normal ICS functionality
B. Communication protocols  E. Especially vulnerable
C. More difficult to upgrade  F. None of the Above

113. Change management is paramount to maintaining the integrity of _______________.
A. ICS experts  D. Both IT and control systems
B. Typical IT system  E. Automated using server-based tools
C. ICSs and their real time OSs  F. None of the Above

114. Which of the following terms represent one of the greatest vulnerabilities to a system?
A. Proprietary protocols  D. Unpatched systems
B. Third-party security solutions  E. WANs and the Internet
C. OPC  F. None of the Above

115. Which of the following terms on IT systems, including security patches, are typically applied in a timely fashion based on appropriate security policy and procedures. In addition, these procedures are often automated using server-based tools.
A. ICS experts  D. Both IT and control systems
B. Software updates  E. Automated using server-based tools
C. ICSs and their real time OSs  F. None of the Above

116. Software updates on ICSs cannot always be implemented on a timely basis because these updates need to be thoroughly tested by the vendor of the industrial control application and the end user of the application before being implemented and _______________often must be planned and scheduled days/weeks in advance.
A. Optimal mitigation strategies  D. ICS outages
B. Common networking protocols  E. Third-party cyber security solutions
C. Commonly known vulnerabilities  F. None of the Above

117. The ICS may also require revalidation as part of the update process. Change management is also applicable to _______________. The change management process, when applied to ICSs, requires careful assessment by ICS experts working in conjunction with security and IT personnel.
A. Hardware and firmware  D. Both IT and control systems
B. Typical IT system  E. Automated using server-based tools
C. ICSs and their real time OSs  F. None of the Above

118. Typical IT systems allow for diversified support styles, perhaps to support disparate but _______________.
A. Optimal mitigation strategies  D. Lifetime of the deployed technology
B. Common networking protocols  E. interconnected technology architectures
C. Commonly known vulnerabilities  F. None of the Above

119. Which of the following terms have a lifetime on the order of 3-5 years, with brevity due to the quick evolution of technology?
A. Proprietary protocols  D. Defense-in-depth strategy for the ICS
B. Third-party security solutions  E. Typical IT components
C. OPC  F. None of the Above
120. For ICSs where technology has been established in many cases for very specific use and implementation, the ________________ is often in the order of 15-20 years and sometimes longer.
A. Optimal mitigation strategies  D. Lifetime of the deployed technology
B. Common networking protocols  E. Third-party cyber security solutions
C. Commonly known vulnerabilities  F. None of the Above

121. Typical IT components are typically local and easy to access, while ICS components can be isolated, remote, and require ________________.
A. ICS experts  D. Both IT and control systems
B. Typical IT system  E. Extensive physical effort to gain access to them
C. ICSs and their real time OSs  F. None of the Above

122. Obtainable computing resources for ICSs (including central processing unit [CPU] time and memory) tend to be very limited because these systems were designed to maximize control system resources, with little to no extra capacity for ________________.
A. Optimal mitigation strategies  D. Lifetime of the deployed technology
B. Common networking protocols  E. Third-party cyber security solutions
C. Commonly known vulnerabilities  F. None of the Above

123. In some instances, ________________ are not allowed due to vendor license agreements and loss of service support can occur if third party applications are installed.
A. Proprietary protocols  D. Defense-in-depth strategy for the ICS
B. Third-party security solutions  E. WANs and the Internet
C. OPC  F. None of the Above

124. Which of the following terms can come from numerous sources, including adversarial sources such as hostile governments, terrorist groups, industrial spies, disgruntled employees, malicious intruders, and natural sources such as from system complexities, human errors and accidents, equipment failures and natural disasters?
A. Policies and procedures  D. Cyber security programs
B. The cyber security team  E. Threats to control systems
C. Physical impacts  F. None of the Above

125. To protect against adversarial threats (as well as known natural threats), it is necessary to create a defense-in-depth strategy for the ________________.
A. Proprietary protocols  D. Defense-in-depth strategy for the ICS
B. ICS  E. WANs and the Internet
C. OPC  F. None of the Above

126. The following lists vulnerabilities that may be found in typical ICSs. The order of these vulnerabilities does not necessarily reflect any priority in terms of likelihood of occurrence or severity of impact. The vulnerabilities are grouped into ________________ categories to assist in determining optimal mitigation strategies.
A. Optimal mitigation strategies  D. Policy and Procedure, Platform, and Network
B. Common networking protocols  E. Third-party cyber security solutions
C. Commonly known vulnerabilities  F. None of the Above
127. ICS vendors have begun to open up their proprietary protocols and publish their protocol specifications to enable third-party manufacturers to build ________________.
A. Proprietary protocols          D. Defense-in-depth strategy for the ICS
B. Third-party security solutions  E. WANs and the Internet
C. Compatible accessories         F. None of the Above

128. Organizations are also transitioning from proprietary systems to less expensive, standardized technologies such as Microsoft Windows and Unix-like operating systems as well as common networking protocols such as TCP/IP to reduce costs and ________________.
A. Optimal mitigation strategies   D. Lifetime of the deployed technology
B. Common networking protocols     E. Improve performance
C. Commonly known vulnerabilities  F. None of the Above

129. Another standard contributing to this evolution of open systems is OPC, a protocol that enables interaction between control systems and ________________.
A. Current security capabilities   D. Normal ICS functionality
B. Protection                      E. Especially vulnerable
C. PC-based application programs   F. None of the Above

130. The transition to using these open protocol standards provides economic and technical benefits, but also increases the susceptibility of ICSs to cyber incidents. These standardized protocols and technologies have ________________, which are susceptible to sophisticated and effective exploitation tools that are widely obtainable and relatively easy to use.
A. Optimal mitigation strategies   D. Lifetime of the deployed technology
B. Common networking protocols     E. Third-party cyber security solutions
C. Commonly known vulnerabilities  F. None of the Above

131. In addition, corporate networks are often connected to strategic partner networks and to the Internet. Control systems also make more use of WANs and the Internet to transmit data to their ________________.
A. Proprietary protocols          D. Remote or local stations and individual devices
B. Third-party security solutions  E. WANs and the Internet
C. OPC                           F. None of the Above

132. This integration of control system networks with public and corporate networks increases the ________________.
A. Current security capabilities   D. Normal ICS functionality
B. Protection                      E. Accessibility of control system vulnerabilities
C. More difficult to upgrade       F. None of the Above

133. Unless appropriate security controls are installed, these vulnerabilities can expose all levels of the ICS network architecture to complexity-induced error, adversaries and a variety of cyber threats, including ________________.
A. Proprietary protocols          D. Defense-in-depth strategy for the ICS
B. Third-party security solutions  E. WANs and the Internet
C. Worms and other malware        F. None of the Above
134. Which of the following terms is designed to track incidents of a cyber security nature that directly affect ICSs and processes? This includes events such as accidental cyber-associated incidents, as well as deliberate events such as unauthorized remote access, DoS attacks, and malware infiltrations.

A. Optimal mitigation strategies  
B. Common networking protocols  
C. Commonly known vulnerabilities

D. An Industrial Security Incident Database (ISID)  
E. Third-party cyber security solutions  
F. None of the Above

135. Data is collected through investigation into ____________ and from private reporting by member organizations that wish to have access to the database.

A. Current security capabilities  
B. Protection  
C. Publicly known incidents

D. Normal ICS functionality  
E. Especially vulnerable  
F. None of the Above

136. Each incident is researched and ______________ (confirmed, likely but unconfirmed, unlikely or unknown, and hoax/urban legend).

A. Proprietary protocols  
B. Third-party security solutions  
C. Then rated according to reliability

D. Defense-in-depth strategy for the ICS  
E. WANs and the Internet  
F. None of the Above

**Topic 4- ICS Security Program Development Section**

137. Organizations should develop and deploy an ICS security program. ICS security plans and programs should be regular with and integrated with ______________, programs, and practices, but must be tailored to the detailed requirements and characteristics of ICS technologies and environments.

A. Economic impacts  
B. Undesirable incidents  
C. Existing IT security experience

D. ICS technologies and environments  
E. Damage to the environment  
F. None of the Above

138. Which of the following terms mandates that the threat to the ICS should be measured and monitored to protect the interests of employees, the public, shareholders, customers, vendors, and the larger society?

A. Policies and procedures  
B. Responsible risk management  
C. Physical impacts

D. Cyber security programs  
E. DoS attacks and malware  
F. None of the Above

139. The importance of secure systems should be further highlighted as business reliance on ______________.

A. Economic impacts  
B. Undesirable incidents  
C. Interconnectivity increases

D. ICS technologies and environments  
E. Damage to the environment  
F. None of the Above

140. DoS attacks and malware (e.g., worms, viruses) have become all too common and have already impacted ICSs. In addition, a cyber breach in some sectors can have ______________.

A. Policies and procedures  
B. The cyber security team  
C. Significant physical impacts

D. Cyber security programs  
E. DoS attacks and malware  
F. None of the Above
141. Physical impacts include the set of direct consequences of _______________. The potential effects of paramount importance include personal injury and loss of life. Other effects include the loss of property (including data) and damage to the environment.
A. Economic impacts     D. ICS technologies and environments
B. Undesirable incidents  E. Damage to the environment
C. ICS failure           F. None of the Above

142. Economic impacts are a second-order effect from physical impacts resulting from
A. Policies and procedures D. Cyber security programs
B. The cyber security team E. An ICS incident
C. Physical impacts       F. None of the Above

143. Which of the following terms could result in consequences to system operations, which in turn inflict a greater economic loss on the facility or organization. On a larger scale, these effects could negatively impact the local, regional, national, or possibly global economy.
A. Policies and procedures D. Cyber security programs
B. The cyber security team E. DoS attacks and malware
C. Physical impacts       F. None of the Above

144. Another second-order effect, the repercussions from the loss of national or public confidence in an organization, is many times overlooked. It is, however, a very real target and one that could be accomplished through ________________
A. Economic impacts     D. ICS technologies and environments
B. Undesirable incidents  E. Damage to the environment
C. An ICS incident       F. None of the Above

145. Which of the following terms of any sort detract from the value of an enterprise, but safety and security incidents can have longer-term negative impacts than other types of incidents on all stakeholders—employees, shareholders, customers, and the communities in which an organization operates?
A. Undesirable incidents D. Cyber security programs
B. The cyber security team E. DoS attacks and malware
C. Physical impacts       F. None of the Above

146. Effectively integrating security into an ICS requires defining and executing a comprehensive program that addresses ________________, ranging from identifying objectives to day-to-day operation and ongoing auditing for compliance and improvement.
A. Economic impacts     D. ICS technologies and environments
B. Undesirable incidents  E. Damage to the environment
C. All aspects of security F. None of the Above

147. Cyber security programs with visible, top-level support from ________________ are more likely to achieve compliance, function more smoothly, and have earlier success than programs that do not have that support.
A. Policies and procedures D. Cyber security programs
B. The cyber security team E. Organization leaders
C. Physical impacts       F. None of the Above
148. Whenever a new system is being planned and installed, it is imperative to take the time to address security throughout the lifecycle, from architecture to procurement to installation to _________________.

A. Economic impacts   D. ICS technologies and environments
B. Undesirable incidents   E. Damage to the environment
C. Maintenance to decommissioning  F. None of the Above

149. There are serious risks in deploying systems to production based on the postulation that they will be secured later. If there are ________________ to secure the system appropriately before deployment, it is unlikely that there will be sufficient time and resources later to address security.

A. Policies and procedures   D. Cyber security programs
B. Insufficient time and resources   E. DoS attacks and malware
C. Physical impacts   F. None of the Above

150. While the control engineers will play a large role in securing the ICS, they will not be able to do so without teamwork and support from both the ______________. IT often has years of security experience, much of which is applicable to ICS.

A. Economic impacts   D. ICS technologies and environments
B. Undesirable incidents   E. IT department and management
C. There are serious risks   F. None of the Above

151. The cyber security team should develop the corporate policy that defines the guiding charter of the security organization and the roles, responsibilities, and accountabilities of _________________.

A. Policies and procedures   D. Cyber security programs
B. System owners and users   E. DoS attacks and malware
C. Physical impacts   F. None of the Above

152. The cyber security team should agree upon and document the objective of the security program, the business organizations affected, all the computer systems and networks involved, the budget and resources required, and the division of responsibilities. The scope can also address business, training, audit, legal, and regulatory requirements, as well as _________________.

A. Economic impacts   D. ICS technologies and environments
B. Undesirable incidents   E. Damage to the environment
C. Timetables and responsibilities   F. None of the Above

153. Policies and procedures are at the root of every successful security program and wherever possible, ________________ should be joined with existing operational/management policies.

A. Economic impacts   D. ICS technologies and environments
B. Undesirable incidents   E. Damage to the environment
C. ICS specific policies and procedures   F. None of the Above

154. Which of the following terms aid to ensure that security protection is both regular and current to protect against evolving threats, and also help to educate?

A. The security testing   D. Detailed risk assessment
B. Policies and procedures   E. The vulnerability assessment
C. Perform incorrect actions   F. None of the Above
155. After the risks for the various systems are clearly understood, the cyber security team should examine ______________ to see if they sufficiently address the risks to the ICS.
A. Policies and procedures  D. Cyber security programs
B. Existing security policies  E. DoS attacks and malware
C. Physical impacts  F. None of the Above

156. Security procedures should be documented, tested, and updated periodically in response to policy and technology changes. Consider developing ICS security policies and procedures based on the ______________, deploying progressively heightened security postures as the Threat Level increases.
A. Economic impacts  D. ICS technologies and environments
B. Undesirable incidents  E. Homeland Security Advisory System Threat Level
C. There are serious risks  F. None of the Above

157. The cyber security team ought to identify the applications and computer systems within the ICS, as well as the networks within and interfacing to the ICS. The focus should be on systems rather than just devices, and should include _______________ and instrument-based systems that use a monitoring device such as an HMI.
A. Detailed vulnerability assessment  D. Identifying the vulnerabilities
B. PLCs, DCSs, SCADA  E. Attempt to verify vulnerabilities
C. Any problems that arise  F. None of the Above

158. There are several commercial enterprise inventory tools that can identify and document all hardware and software resident on a network. Care must be taken before using these tools to locate ICS assets; teams should first conduct an assessment of how these tools work and what impact they might have on the ________________.
A. Security testing  D. Detailed risk assessment
B. Connected control equipment  E. The vulnerability assessment
C. Perform incorrect actions  F. None of the Above

159. The organization should then implement a detailed vulnerability assessment for the highest-priority systems and assessments for _______________ as deemed prudent/as resources allow.
A. Detailed vulnerability assessment  D. Identifying the vulnerabilities
B. Lower-priority systems  E. Attempt to verify vulnerabilities
C. Any problems that arise  F. None of the Above

160. Which of the following terms will help identify any weaknesses that may be present in the systems that could allow the confidentiality, integrity, or availability of systems and data to be adversely affected, along with the associated cyber security risks and mitigation approaches to reduce the risks?
A. The security testing  D. Detailed risk assessment
B. Time-critical assessment  E. The vulnerability assessment
C. Implement incorrect actions  F. None of the Above

161. Vulnerability scanners often attempt to confirm vulnerabilities by _______________ and conducting a representative set of attacks against devices and networks.
A. Detailed vulnerability assessment  D. Identifying the vulnerabilities
B. Extensively probing  E. Attempt vulnerabilities
C. Any problems that arise  F. None of the Above
162. ICSs were planned and built to control and automate real-world processes or ______________. Given the wrong instructions, they could implement incorrect actions, causing waste, equipment damage, injury, or even deaths.
A. The security testing  D. Detailed risk assessment
B. Equipment  E. The vulnerability assessment
C. Implement incorrect actions  F. None of the Above

163. Recognizing the vulnerabilities within an ICS requires a dissimilar approach than in a typical IT system. In most cases, devices on an IT system can be rebooted, restored, or replaced with ______________.
A. Detailed vulnerability assessment  D. Identifying the vulnerabilities
B. Little interruption of service to its customers  E. Attempt to verify vulnerabilities
C. Any problems that arise  F. None of the Above

164. An ICS controls a physical process and therefore has real-world consequences associated with its actions. Some actions are time-critical, while others have a ______________.
A. Security testing  D. Detailed risk assessment
B. More relaxed timeframe  E. Vulnerability assessment
C. Perform incorrect actions  F. None of the Above

165. When any assessment of an ICS is being implemented, ICS personnel must be aware that testing is occurring, and be prepared to immediately tackle ______________.
A. Detailed vulnerability assessment  D. Identifying the vulnerabilities
B. PLCs, DCSs, SCADA  E. Attempt to verify vulnerabilities
C. Any problems that arise  F. None of the Above

166. If manual control of the system is possible, personnel capable of implementing manual control should be present during the ______________.
A. Security testing  D. Detailed risk assessment
B. Time-critical  E. The vulnerability assessment
C. Perform incorrect actions  F. None of the Above

167. Additionally, security auditors need to understand the ICS under test, the risk involved with the test, and the consequences associated with unintentional stimulus or ______________.
A. Detailed vulnerability assessment  D. Identifying the vulnerabilities
B. PLCs, DCSs, SCADA  E. DoS to the ICS
C. Any problems that arise  F. None of the Above

168. Organizations should understand the detailed risk assessment, identify the cost of mitigation for each risk, compare the cost with the ______________, and select those mitigation controls where cost is less than the potential risk.
A. Security testing  D. Detailed risk assessment
B. Risk of occurrence  E. Vulnerability assessment
C. Perform incorrect actions  F. None of the Above
169. The controls to mitigate a detailed risk may vary among types of systems. For example, ________________ might be dissimilar for ICSs than for corporate payroll systems and e-commerce systems.
A. Other security sensors  
B. Other possible deployments  
C. Initiate response to cyber incidents  
D. User authentication controls  
E. Firewalls used to protect control systems  
F. None of the Above

170. Implementing ______________ may bring changes to the way in which personnel access computer programs, applications, and the computer desktop itself.
A. Redundant access points  
B. Hardware firewalls  
C. An ICS security program  
D. Management of firewall configurations  
E. Blocking  
F. None of the Above

**Topic 5 - Network Architecture Section**

171. When designing a network architecture for an ICS deployment, it is typically recommended to separate the ICS network from the corporate network. The nature of network traffic on these two networks is dissimilar: Internet access, FTP, e-mail, and remote access will typically be permitted on the ______________ but should not be on the ICS network.
A. A firewall and a DMZ  
B. Network environments  
C. ICS network  
D. Corporate network  
E. Dedicated hardware firewalls  
F. None of the Above

172. Rigorous change control procedures for ________________, configuration, and software changes may not be in place on the corporate network.
A. High level of security  
B. Network firewall(s)  
C. Data from the ICS  
D. Network equipment  
E. Corporate network  
F. None of the Above

173. If ICS network traffic is carried on the corporate network, it could be intercepted or be subjected to a denial of service attack. By having separate networks, ________________ on the corporate network should not be able to affect the ICS network.
A. A firewall and a DMZ  
B. Network environments  
C. Security and performance problems  
D. Stateful inspection firewalls filter packets  
E. Dedicated hardware firewalls  
F. None of the Above

174. Practical contemplations often mean that a connection is required between the ICS and corporate networks. This connection is ________________ and careful consideration should be given to the design.
A. High level of security  
B. Network firewall(s)  
C. Data from the ICS  
D. A significant security risk  
E. Corporate network  
F. None of the Above

175. If the networks must be connected, it is strongly recommended that only minimal (single if possible) connections be allowed and that the connection is through ________________.
A. A firewall and a DMZ  
B. Network environments  
C. ICS network  
D. Stateful inspection firewalls filter packets  
E. Dedicated hardware firewalls  
F. None of the Above
176. A DMZ is a separate network segment that connects directly to ____________________. Servers containing the data from the ICS that needs to be accessed from the corporate network are put on this network segment.
A. High level of security       D. The firewall
B. Network firewall(s)         E. Corporate network
C. Data from the ICS           F. None of the Above

177. Only DMZ systems should be accessible from the corporate network. With any external connections, the minimum access should be permitted through the firewall, including _______________________.
A. A firewall and a DMZ       D. Opening only the ports required for specific communication
B. Network environments       E. Dedicated hardware firewalls
C. ICS network               F. None of the Above

178. Network firewalls are devices or systems that control the flow of network traffic between networks engaging differing _________________.
A. Security postures       D. A significant security risk
B. Network firewall(s)     E. Corporate network
C. Data from the ICS        F. None of the Above

179. Firewalls have applicability in ___________________ that do not include or require Internet connectivity.
A. A firewall and a DMZ       D. Stateful inspection firewalls filter packets
B. Network environments      E. Dedicated hardware firewalls
C. ICS network               F. None of the Above

180. By engaging firewalls to control connectivity to these areas, an organization can prevent unauthorized access to the respective systems and resources within_____________________.
A. High level of security    D. A significant security risk
B. The more sensitive areas  E. Corporate network
C. Data from the ICS         F. None of the Above

181. Which of the following terms at the network layer, determine whether session packets are legitimate, and evaluate the contents of packets at the transport layer (e.g., TCP, UDP) as well?
A. A firewall and a DMZ packets       D. Stateful inspection firewalls filter packets
B. Network environments packets     E. Dedicated hardware firewalls packets
C. ICS network packets              F. None of the Above

182. Which of the following terms keeps track of active sessions and uses that information to determine if packets should be forwarded or blocked? It offers a high level of security and good performance, but it may be more expensive and complex to administer. Additional rule sets for ICS applications may be required.
A. High level of security       D. A significant security risk
B. Network firewall(s)         E. Stateful inspection
C. Data from the ICS           F. None of the Above
183. In an ICS environment, ________________are most often installed between the ICS network and the corporate network.
A. A firewall and a DMZ  D. Firewalls
B. Network environments  E. Dedicated hardware firewalls
C. ICS network  F. None of the Above

184. Appropriately configured, they can greatly restrict undesired access to and from control system host computers and controllers, thereby improving security. They can also potentially improve a control network’s responsiveness by removing _________________.
A. High level of security  D. A significant security risk
B. Network firewall(s)  E. Non-essential traffic from the network
C. Data from the ICS  F. None of the Above

185. When designed, configured, and maintained appropriately, dedicated hardware firewalls can contribute significantly to increasing the _________________.
A. Firewall and a DMZ  D. Security of today’s ICS environments
B. Network environments  E. Dedicated hardware firewalls
C. ICS network  F. None of the Above

186. Firewalls provide several tools to enforce a security policy that cannot be accomplished locally on the current set of process control devices obtainable in the market, including the ability to: Block all communications with the exception of definitive enabled communications between devices on the _________________.
A. High level of security  D. Unprotected LAN and protected ICS networks
B. Network firewall(s)  E. Corporate networks
C. Data from the ICS  F. None of the Above

187. Blocking is based on source and _________________.
A. Other security sensors  D. Destination IP address pairs, services, and ports
B. Other possible deployments  E. Firewalls used to protect control systems
C. Initiate response  F. None of the Above

188. Blocking can occur on ________________ , which is helpful in limiting high-risk communications such as e-mail.
A. Redundant access points  D. Management of firewall configurations
B. Hardware firewalls  E. Both inbound and outbound packets
C. Users can be restricted  F. None of the Above

189. Enforce secure authentication of all users seeking to gain access to the ICS network. There is flexibility to employ varying protection levels of authentication methods including simple passwords, complex passwords, two-factor authentication technologies, tokens, biometrics and smart cards. Select the particular method based upon the ________________ to be protected, rather than using the method that is obtainable at the device level.
A. Other security sensors  D. Enforce secure authentication
B. Other possible deployments  E. Firewalls used to protect control systems
C. Vulnerability of the ICS network  F. None of the Above
190. Enforce destination authorization. _____________ can be limited and allowed to reach only the nodes on the control network necessary for their job function. This reduces the potential of users intentionally or accidentally gaining access to and control of devices for which they are not authorized, but adds to the complexity for on-the-job-training or cross-training employees.

A. Redundant access points  
B. Hardware firewalls  
C. Users  
D. Management of firewall configurations  
E. Blocking  
F. None of the Above

191. Other possible deployments include using either _____________ or small standalone hardware firewalls in front of, or running on, individual control devices.

A. Other security sensors  
B. Other possible deployments  
C. Host-based firewalls  
D. Enforce secure authentication  
E. Firewalls used to protect control systems  
F. None of the Above

192. Using firewalls on an individual device basis can create substantial management overhead, especially in change management of _____________.

A. Redundant access points  
B. Hardware firewalls  
C. Users can be restricted  
D. Firewall configurations  
E. Blocking  
F. None of the Above

193. There are several issues that must be addressed when deploying firewalls in ICS environments, particularly the following: Firewalls used to protect control systems should be configured so they do not permit either incoming or outgoing traffic by default. The default configuration should only be modified when it is necessary to _____________.

A. Other security sensors  
B. Other possible deployments  
C. Initiate response to cyber incidents  
D. Enforce secure authentication  
E. Permit connections to or from trusted systems  
F. None of the Above

194. Which of the following terms do require ongoing support, maintenance, and backup? Rule sets need to be reviewed to make sure that they are providing adequate protection in light of ever-changing security threats.

A. Redundant access points  
B. Hardware firewalls  
C. Users can be restricted  
D. Management of firewall configurations  
E. Blocking  
F. None of the Above

195. System capabilities, such as available disk space, should be monitored to make sure that the firewall is achieving its data collection tasks and can be depended upon in the event of a _____________.

A. Other security sensors  
B. Other possible deployments  
C. Initiate response to cyber incidents  
D. Enforce secure authentication  
E. Security violation  
F. None of the Above

196. Real-time monitoring of firewalls and other security sensors is required to rapidly detect and initiate response to _____________.

A. Other security sensors  
B. Other possible deployments  
C. Cyber incidents  
D. Enforce secure authentication  
E. Firewalls used to protect control systems  
F. None of the Above
197. The ICS network should, at a minimum, be logically separated from the corporate network on ______________________ . When enterprise connectivity is required: There should be documented and minimal (single if possible) access points between the ICS network and the corporate network. Redundant access points, if present, must be documented.
A. Redundant access points  D. Management of firewall configurations
B. Hardware firewalls  E. Physically separate network devices
C. Users can be restricted  F. None of the Above

198. A stateful firewall between the ICS network and _______________ should be configured to deny all traffic except that which is explicitly authorized.
A. Other security sensors  D. Enforce secure authentication
B. Other possible deployments  E. Corporate network
C. Initiate response to cyber incidents  F. None of the Above

199. The firewall rules should at a minimum provide source and destination filtering (i.e. filter on media access control [MAC] address), in addition to TCP and User Datagram Protocol (UDP) port filtering and ICMP type and ________________.
A. Redundant access points  D. Management of firewall configurations
B. Code filtering  E. Blocking
C. Users can be limited  F. None of the Above

200. An acceptable approach to enabling communication between __________ and a corporate network is to implement an intermediate DMZ network.
A. Other security sensors  D. Enforce secure authentication
B. Other possible deployments  E. An ICS network
C. Initiate response to cyber incidents  F. None of the Above

201. The DMZ should be connected to the ______________ such that detailed (limited) communication may occur between only the corporate network and the DMZ, and the ICS network and the DMZ.
A. Redundant access points  D. Management of firewall configurations
B. Hardware firewalls  E. Blocking
C. Firewall  F. None of the Above

202. The corporate network and the ______________ should not communicate directly with each other.
A. DMZ  D. ICS network
B. DMZ-capable firewall  E. The primary security risk
C. An antivirus server  F. None of the Above

203. ICS networks and corporate networks can be segregated to enhance cyber security using______________________ .
A. Each DMZ  D. Wireless access points on the DMZ network
B. Historian’s application layer code  E. DMZ between the corporate and control networks
C. Different architectures  F. None of the Above
204. If the ___________________ resides on the control network, a firewall rule must exist that allows all hosts from the enterprise to communicate with the historian. Typically, this communication occurs at the application layer as Structured Query Language (SQL) or HTTP requests.
A. DMZ D. Data historian
B. DMZ-capable firewall E. Primary security risk
C. Antivirus server F. None of the Above

205. Flaws in the historian's application layer code could result in a compromised historian. Once the historian is compromised, the remaining nodes on the ____________ are vulnerable to a worm propagating or an interactive attack.
A. Each DMZ D. Wireless access points on the DMZ network
B. Control network E. DMZ between the corporate and control networks
C. ICS network F. None of the Above

206. A substantial improvement is the use of firewalls with the ability to establish a ______________.
A. DMZ D. The corporate network and the ICS network
B. DMZ-capable firewall E. DMZ between the corporate and control networks
C. An antivirus server F. None of the Above

207. Which of the following terms holds one or more critical components, such as the data historian, the wireless access point, or remote and third party access systems?
A. Each DMZ D. Wireless access points on the DMZ network
B. Historian’s application layer code E. DMZ between the corporate and control networks
C. ICS network F. None of the Above

208. In effect, the use of a DMZ-capable firewall allows the creation of ________________.
A. DMZ D. The corporate network and the ICS network
B. An intermediate network E. The primary security risk
C. An antivirus server F. None of the Above

209. Creating a DMZ requires that the firewall offer three or more interfaces, rather than the typical public and private interfaces. One of the interfaces is connected to the corporate network, the second to the control network, and the remaining interfaces to the shared or insecure devices such as the data historian server or wireless access points on the ____________
A. Each DMZ D. DMZ network
B. Historian’s application layer code E. DMZ between the corporate and control networks
C. ICS network F. None of the Above

**Patch Management Server**

210. By placing corporate-accessible components in the DMZ, no direct communication paths are required from the corporate network to the control network; each path effectively ends in the _________________.
A. DMZ D. Corporate network and the ICS network
B. DMZ-capable firewall E. Primary security risk
C. Antivirus server F. None of the Above
211. Most firewalls can allow for______________, and can specify what type of traffic may be forwarded between zones.
   A. Multiple DMZs   D. Wireless access points on the DMZ network
   B. Historian’s application layer code  E. DMZ between the corporate and control networks
   C. ICS network     F. None of the Above

212. If a patch management server, an antivirus server, or other security server is to be used for the control network, it should be located directly on the DMZ. Both functions could reside on a_______________.
   A. Single server     D. The corporate network and the ICS network
   B. DMZ-capable firewall  E. The primary security risk
   C. An antivirus server  F. None of the Above

213. Having patch management and antivirus management dedicated to the control network allows for controlled and secure updates that can be tailored for the unique needs of the ICS environment. It may also helpful if the antivirus product chosen for ICS protection is not the same as the antivirus product used for the ________________.
   A. Each DMZ     D. Wireless access points on the DMZ network
   B. Corporate network  E. DMZ between the corporate and control networks
   C. ICS network     F. None of the Above

214. The primary security risk in this type of architecture is that if a computer in the DMZ is compromised, then it can be used to launch an attack against the control network via application traffic permitted from _________________.
   A. The DMZ to the control network   D. The corporate network and the ICS network
   B. DMZ-capable firewall           E. The primary security risk
   C. An antivirus server             F. None of the Above

215. In summary, non-firewall-based solutions will generally not provide suitable isolation between control networks and corporate networks. ________________ are marginally acceptable but should be only be installed with extreme care.
   A. DMZ      D. The corporate network and the ICS network
   B. DMZ-capable firewall     E. The two-zone solutions (no DMZ)
   C. An antivirus server               F. None of the Above

216. The most secure, manageable, and ___________ and corporate network segregation architectures are typically based on a system with at least three zones, incorporating a DMZ.
   A. Corporate network   D. Control network
   B. DMZ                  E. A defense-in-depth architecture
   C. Scalable control network  F. None of the Above

217. A single security product, technology or solution cannot adequately protect _______________ by itself. A multiple layer strategy involving two (or more) different overlapping security mechanisms, a technique also known as defense-in-depth, is desired so that the impact of a failure in any one mechanism is minimized.
   A. An ICS     D. The corporate network and the ICS network
   B. DMZ-capable firewall     E. The primary security risk
   C. An antivirus server             F. None of the Above
218. A defense-in-depth architecture strategy includes the use of firewalls, the creation of demilitarized zones, ________________ along with effective security policies, training programs and incident response mechanisms.
A. Corporate network  D. Control network
B. DMZ  E. A defense-in-depth architecture
C. Intrusion detection capabilities  F. None of the Above

219. When installing a ______________ without a DMZ for shared servers, particular care needs to be taken with the rule design.
A. Single two-port firewall  D. The corporate network and the ICS network
B. DMZ-capable firewall  E. The primary security risk
C. An antivirus server  F. None of the Above

220. At a minimum, all rules should be stateful rules that are both IP address and port (application) specific. The address portion of the rules should restrict incoming traffic to a very small set of shared devices (e.g., the data historian) on the control network from a controlled set of addresses on the ________________.
A. Corporate network  D. Control network
B. DMZ  E. A defense-in-depth architecture
C. Allowed ports  F. None of the Above

221. Allowing any IP addresses on the ______________ to access servers inside the control network is not recommended.
A. Corporate network  D. Control network
B. DMZ  E. A defense-in-depth architecture
C. Allowed ports  F. None of the Above

222. In addition, ______________ should be carefully limited to relatively secure protocols such as Hypertext Transfer Protocol Secure (HTTPS).
A. Corporate network  D. Control network
B. DMZ  E. A defense-in-depth architecture
C. The allowed ports  F. None of the Above

223. Allowing HTTP, FTP, or any unencrypted SCADA protocol to cross the ______________ is a security risk due to the potential for traffic sniffing and modification.
A. Control networks  D. FTP and Trivial File Transfer Protocol (TFTP)
B. Firewall  E. Both IP address and TCP/UDP port specific
C. Traffic  F. None of the Above

224. Rules should be added to deny inbound communication with the ________________.
A. Corporate network  D. Control network
B. DMZ  E. A defense-in-depth architecture
C. Allowed ports  F. None of the Above

225. Rules should only allow devices internal to the ______________ the ability to establish connections outside the control network.
A. Control networks  D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address  E. Both IP address and TCP/UDP port specific
C. Traffic  F. None of the Above
226. On the other hand, if the __________ is being used, then it is possible to configure the system so that no traffic will go directly between the corporate network and the control network. With a few special exceptions (noted below), all traffic from either side can terminate at the servers in the DMZ. This allows more flexibility in the protocols allowed through the firewall.
A. Corporate network  D. Control network
B. DMZ  E. Defense-in-depth architecture
C. DMZ architecture  F. None of the Above

227. Which of the following terms might be used to communicate from the PLCs to the data historian, while HTTP might be used for communication between the historian and enterprise clients?
A. PLCs  D. MODBUS/TCP
B. Rules  E. Ports and services
C. DoS attacks  F. None of the Above

228. Both protocols are inherently insecure, yet in this case, they can be used safely because neither actually crosses between the __________.
A. Two networks  D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address  E. Both IP address and TCP/UDP port specific
C. Traffic  F. None of the Above

229. An extension to this concept is the idea of using “disjoint” protocols in all control network to corporate network communications. That is, if a protocol is allowed between the __________, then it is explicitly not allowed between the DMZ and corporate network.
A. PLCs  D. DMZ and corporate network
B. Control network and DMZ  E. Ports and services
C. DoS attacks  F. None of the Above

230. In addition to these rules, the firewall should be configured with outbound filtering to stop forged IP packets from leaving the __________. In practice this is achieved by checking the source IP addresses of outgoing packets against the firewall’s respective network interface address.
A. Control networks  D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address  E. Control network or the DMZ
C. Traffic  F. None of the Above

231. The intent is to prevent the control network from being the source of spoofed (i.e., forged) communications, which are often used in DoS attacks. Thus, the firewalls should be configured to forward IP packets only if those packets have a correct source IP address for the __________.
A. Control network or DMZ networks  D. DMZ and corporate network
B. Rules  E. Ports and services
C. DoS attacks  F. None of the Above
Summary

232. In summary, the following should be considered as recommended practice for general firewall rule sets: The base rule set should be deny all, permit none. ____________ between the control network environment and the corporate network should be enabled and permissions granted on a specific case-by-case basis.
A. Control networks   D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address   E. Both IP address and TCP/UDP port specific
C. Ports and services   F. None of the Above

233. There should be a documented business justification with risk analysis and a responsible person for each________________________ .
A. PLCs   D. Permitted incoming or outgoing data flow
B. Rules   E. Ports and services
C. DoS attacks   F. None of the Above

234. All “permit” rules should be both IP address and________________________, and stateful if appropriate.
A. Control networks   D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address   E. Both IP address and TCP/UDP port specific
C. TCP/UDP port specific   F. None of the Above

235. All rules should restrict traffic to ____________________ or range of addresses.
A. A specific IP address   D. DMZ and corporate network
B. Rules   E. Ports and services
C. DoS attacks   F. None of the Above

236. Traffic should be prevented from transiting directly from the control network to the corporate network. All traffic should terminate in the___________________.
A. Control networks   D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address   E. Both IP address and TCP/UDP port specific
C. DMZ   F. None of the Above

237. Any protocol allowed between the control network and DMZ should explicitly NOT be allowed between the DMZ and ____________ (and vice-versa).
A. Control networks   D. FTP and Trivial File Transfer Protocol (TFTP)
B. Corporate networks   E. Both IP address and TCP/UDP port specific
C. Traffic   F. None of the Above

238. All outbound traffic from the control network to the corporate network should be source and________________________ .
A. PLCs   D. DMZ and corporate network
B. Rules   E. Destination-restricted by service and port
C. DoS attacks   F. None of the Above

239. Outbound packets from the control network or DMZ should be allowed only if those packets have _________________ that is assigned to the control network or DMZ devices.
A. Control networks   D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address   E. Both IP address and TCP/UDP port specific
C. A correct source IP address   F. None of the Above
240. Control network devices should not be allowed to access ________________.
A. PLCs D. DMZ and corporate network
B. The Internet E. Ports and services
C. DoS attacks F. None of the Above

241. Which of the following terms should not be directly connected to the Internet, even if protected via a firewall?
A. Control networks D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address E. Both IP address and TCP/UDP port specific
C. Traffic F. None of the Above

242. All firewall management traffic should be carried on either a separate, secured management network (e.g., out of band) or over an encrypted network with two-factor authentication. Traffic should also be limited by IP address to ________________.
A. PLCs D. DMZ and corporate network
B. Specific management stations E. Ports and services
C. DoS attacks F. None of the Above

243. Which of the following terms are used for transferring files between devices? They are implemented on almost every platform including many SCADA systems, DCSs, PLCs, and RTUs, since they are very well known and use minimum processing power.
A. Control networks D. FTP and Trivial File Transfer Protocol (TFTP)
B. Correct source IP address E. Both IP address and TCP/UDP port specific
C. Traffic F. None of the Above

244. Neither protocol was created with security in mind; for ________________, the login password is not encrypted, and for TFTP, no login is required at all.
A. FTP D. DMZ and corporate network
B. All TFTP communications E. Security controls
C. DoS attacks F. None of the Above

245. Some FTP implementations have a history of buffer overflow vulnerabilities. As a result, ________________ should be blocked, while FTP communications should be allowed for outbound sessions only or if secured with additional token-based two-factor authentication and an encrypted tunnel. More secure protocols, such as Secure Copy (SCP), should be employed whenever possible.
A. FTP D. DMZ and corporate network
B. All TFTP communications E. Security controls
C. DoS attacks F. None of the Above

**Topic 6 – ICS Security Controls Section**

246. Which of the following missing terms are the management, operational, and technical controls (i.e., safeguards or countermeasures) prescribed for an informational system to protect the confidentiality, integrity, and availability of the system and its information?
A. FTP D. DMZ and corporate network
B. All TFTP communications E. Security controls
C. DoS attacks F. None of the Above
247. Which of the following missing terms are organized into three classes; management, operational, and technical controls?

A. FTP  
B. All TFTP communications  
C. DoS attacks  
D. DMZ and corporate network  
E. Security controls  
F. None of the Above

248. Each class is broken into several families of controls; each control contains a definition of the control, supplemental guidance, and ______________________ that will increase the strength of a basic control.

A. Responding to incidents  
B. Impact of a failure  
C. Protect the confidentiality  
D. Producing the desired outcome  
E. Possible enhancements  
F. None of the Above

249. A single security product or technology cannot adequately protect an ICS. Securing an ICS is based on _____________ and an appropriately configured set of security controls.

A. Identifying risks to operations  
B. Allocation of resources  
C. A risk assessment  
D. Prioritization of vulnerabilities  
E. A combination of effective security policies  
F. None of the Above

250. An effective cyber security strategy for an ICS should apply defense-in-depth, __________________________ so that the impact of a failure in any one mechanism is minimized.

A. Responding to incidents  
B. Impact of a failure  
C. Protect the confidentiality  
D. A technique of layering security mechanisms  
E. Will increase the strength  
F. None of the Above

Management Controls

251. Management controls are the security countermeasures for an ICS that focus on the management of risk and the management of information security. NIST SP 800-53 defines four families of controls within the Management controls class: Risk Assessment (RA): the process of identifying risks to ______________ by determining the probability of occurrence, the resulting impact, and additional security controls that would mitigate this impact.

A. Identifying risks to operations  
B. Allocation of resources  
C. A risk assessment  
D. Operations, assets, or individuals  
E. Impact of exploiting this vulnerability  
F. None of the Above

252. Planning (PL): development and maintenance of a plan to address information system security by executing assessments, specifying and implementing security controls, assigning security levels, and _______________________.

A. Responding to incidents  
B. Impact of a failure  
C. Protect the confidentiality  
D. Producing the desired outcome  
E. Will increase the strength  
F. None of the Above

253. System and Services Acquisition (SA): allocation of resources for information system security to be maintained throughout the system’s life cycle and the development of acquisition policies based on _________________ including requirements, design criteria, test procedures, and associated documentation.

A. Identifying risks to operations  
B. Risk assessment results  
C. A risk assessment  
D. Prioritization of vulnerabilities  
E. Impact of exploiting this vulnerability  
F. None of the Above
254. Certification, Accreditation, and Security Assessments (CA): assurance that the specified controls are implemented correctly, operating as intended, and ________________.
A. Responding to incidents D. Producing the desired outcome
B. Impact of a failure E. Will increase the strength
C. Protect the confidentiality F. None of the Above

255. Risk is a function of the likelihood of a given threat source exploiting a potential vulnerability and the resulting _________________.
A. Identifying risks to operations D. Prioritization of vulnerabilities
B. Allocation of resources E. Impact of exploiting this vulnerability
C. A risk assessment F. None of the Above

256. Which of the following terms is the process of identifying risks to an organization’s operations, assets, and individuals by determining the probability of occurrence that an identified threat will exploit an identified vulnerability and the resulting impact?
A. Responding to incidents D. Producing the desired outcome
B. Impact of a failure E. Risk assessment
C. Protect the confidentiality F. None of the Above

257. An assessment includes ______________ that can mitigate each threat and the costs associated with implementing them.
A. Identifying risks to operations D. Prioritization of vulnerabilities
B. An evaluation of security controls E. Impact of exploiting this vulnerability
C. A risk assessment F. None of the Above

258. Which of the following terms must also compare the cost of security with the costs associated with an incident?
A. Identifying risks to operations D. Prioritization of vulnerabilities
B. Allocation of resources E. Impact of exploiting this vulnerability
C. A risk assessment F. None of the Above

259. Achieving an acceptable level of risk is a process of reducing the probability of an incident that is accomplished by ________________ that can be exploited as well as consequences resulting from an incident.
A. Responding to incidents D. Producing the desired outcome
B. Impact of a failure E. Mitigating or eliminating vulnerabilities
C. Protect the confidentiality F. None of the Above

260. Which of the following terms must be based on cost and benefit with an objective to provide a business case for implementing at least a minimum set of control system security requirements to reduce risk to an acceptable level?
A. Identifying risks to operations D. Prioritization of vulnerabilities
B. Allocation of resources E. Impact of exploiting this vulnerability
C. A risk assessment F. None of the Above
261. A mistake often made during a risk assessment is to select technically interesting vulnerabilities without taking into account the______________. Vulnerabilities should be assessed and rated for risk before trying to select and implement security controls on them.
A. Responding to incidents  D. Producing the desired outcome
B. Impact of a failure   E. Level of risk associated with them
C. Protect the confidentiality  F. None of the Above

Identify the missing term.

262. Produces a list of the system vulnerabilities that could be exercised by the potential threat sources
A. Impact analysis  D. Results documentation
B. Likelihood determination  E. Risk determination
C. Vulnerability identification  F. None of the Above

263. Produces a list of the planned controls used for the information system to mitigate the likelihood of a vulnerability being exercised and reduce the impact of such an adverse event.
A. Threat identification  D. Vulnerability identification
B. Control recommendations  E. Control analysis
C. System characterization  F. None of the Above

264. Produces a likelihood rating (High, Medium, or Low) that indicates the probability that a potential vulnerability may be exercised
A. Impact analysis  D. Results documentation
B. Likelihood determination  E. Risk determination
C. Vulnerability identification  F. None of the Above

265. Produces a picture of the information system environment, and delineation of system boundaries
A. Threat identification  D. Vulnerability identification
B. Control recommendations  E. Control analysis
C. System characterization  F. None of the Above

266. Produces measurement for risk based on a scale of high, medium, or low.
A. Impact analysis  D. Results documentation
B. Likelihood determination  E. Risk determination
C. Vulnerability identification  F. None of the Above

267. Produces recommendations of security controls and alternative solutions to mitigate risk
A. Threat identification  D. Vulnerability identification
B. Control recommendations  E. Control analysis
C. System characterization  F. None of the Above

268. Produces a risk assessment report that describes the threats and vulnerabilities, measures the risk, and provides recommendations for control implementation.
A. Impact analysis  D. Results documentation
B. Likelihood determination  E. Risk determination
C. Vulnerability identification  F. None of the Above
269. Produces a threat statement containing a list of threat-sources that could exploit system vulnerabilities
A. Threat identification  D. Vulnerability identification
B. Control recommendations  E. Control analysis
C. System characterization  F. None of the Above

270. Produces a magnitude of impact (High, Medium, or Low) resulting from the exploitation of a vulnerability.
A. Impact analysis  D. Results documentation
B. Likelihood determination  E. Risk determination
C. Vulnerability identification  F. None of the Above

6.2 Operational Controls – Identify the statement.
271. Operational controls are the security countermeasures for an ICS that are primarily implemented and executed by people as opposed to systems. NIST SP 800-53 defines nine families of controls within the Operational controls class: ________________ Policy and procedures pertaining to incident response training, testing, handling, monitoring, reporting, and support services.
A. Maintenance (MA)  D. Media Protection (MP)
B. Contingency Planning (CP)  E. Physical and Environmental Protection (PE)
C. Incident Response (IR)  F. None of the Above

272. Policies and procedures to ensure that all information system users are given appropriate security training relative to their usage of the system and that accurate training records are maintained.
A. Configuration Management (CM)  D. System and Information Integrity (SI)
B. Awareness and Training (AT)  E. Maintenance (MA)
C. Personnel Security (PS)  F. None of the Above

273. Policy and procedures designed to maintain or restore business operations, including computer operations, possibly at an alternate location, in the event of emergencies, system failures, or disaster.
A. Maintenance (MA)  D. Media Protection (MP)
B. Contingency Planning (CP)  E. Physical and Environmental Protection (PE)
C. Incident Response (IR)  F. None of the Above

274. Policy and procedures for personnel position categorization, screening, transfer, penalty, and termination; also addresses third-party personnel security.
A. Configuration Management (CM)  D. System and Information Integrity (SI)
B. Awareness and Training (AT)  E. Maintenance (MA)
C. Personnel Security (PS)  F. None of the Above

275. Policy addressing physical, transmission, and display access control as well as environmental controls for conditioning (e.g., temperature, humidity) and emergency provisions (e.g., shutdown, power, lighting, fire protection).
A. Maintenance (MA)  D. Media Protection (MP)
B. Contingency Planning (CP)  E. Physical and Environmental Protection (PE)
C. Incident Response (IR)  F. None of the Above
276. Policy and procedures to protect information systems and their data from design flaws and data modification using functionality verification, data integrity checking, intrusion detection, malicious code detection, and security alert and advisory controls.
A. Configuration Management (CM)  D. System and Information Integrity (SI)
B. Awareness and Training (AT)  E. Maintenance (MA)
C. Personnel Security (PS)  F. None of the Above

277. Policy and procedures to ensure secure handling of media. Controls cover access, labeling, storage, transport, sanitization, destruction, and disposal.
A. Maintenance (MA)  D. Media Protection (MP)
B. Contingency Planning (CP)  E. Physical and Environmental Protection (PE)
C. Incident Response (IR)  F. None of the Above

278. Policy and procedures for controlling modifications to hardware, firmware, software, and documentation to ensure the information system is protected against improper modifications prior to, during, and after system implementation.
A. Configuration Management (CM)  D. System and Information Integrity (SI)
B. Awareness and Training (AT)  E. Maintenance (MA)
C. Personnel Security (PS)  F. None of the Above

279. Policies and procedures to manage all maintenance aspects of an information system.
A. Maintenance (MA)  D. Media Protection (MP)
B. Contingency Planning (CP)  E. Physical and Environmental Protection (PE)
C. Incident Response (IR)  F. None of the Above

**Identify the missing term**

280. The physical protection of the cyber components and data associated with the ICS must be addressed as part of the __________.
A. Overall security of a plant  D. Integration of access control
B. Access limiting systems  E. Classic physical security considerations
C. Peripheral extender technology  F. None of the Above

281. Security at many ICS facilities is intimately tied to plant safety. A primary goal is to keep people out of hazardous situations without preventing them from doing their job or carrying out __________.
A. Asset location technologies  D. Integration of access control
B. Emergency procedures  E. Classic physical security considerations
C. Peripheral extender technology  F. None of the Above

282. Gaining physical access to a control room or control system components often implies gaining logical access to the __________ as well.
A. Overall security of a plant  D. Granted access
B. Process control system  E. A secured area
C. Unauthorized use  F. None of the Above

283. If computers are readily accessible, and they have removable media drives (e.g., floppy disks, compact discs, etc.) or USB ports, the drives can be fitted with locks or removed from the computers and __________.
A. Asset location technologies  D. Integration of access control
B. Access limiting systems  E. Classic physical security considerations
C. USB ports disabled  F. None of the Above
284. Depending on security needs and risks, it might also be prudent to disable or physically protect power buttons to prevent _______________.
A. Overall security of a plant  D. Granted access
B. Process control system  E. A secured area
C. Unauthorized use  F. None of the Above

285. For maximum security, ________________ should be placed in locked areas and authentication mechanisms (such as keys) protected.
A. PLCs  D. DMZ and corporate network
B. Control network and DMZ  E. Servers
C. ICS network  F. None of the Above

286. The network devices on the _________________, including switches, routers, network jacks, servers, workstations, and controllers, should be located in a secured area that can only be accessed by authorized personnel. The secured area should also be compatible with the environmental requirements of the devices.
A. PLCs  D. DMZ and corporate network
B. Control network and DMZ  E. Servers
C. ICS network  F. None of the Above

287. Classic physical security contemplations typically refer to a ________________ of layered security measures.
A. Asset location technologies  D. Ringed architecture
B. Access limiting systems  E. Classic physical security considerations
C. Peripheral extender technology  F. None of the Above

288. Creating several physical barriers, both active and passive, around buildings, facilities, rooms, equipment, or ________________ , establishes these physical security perimeters.
A. Overall security of a plant  D. Granted access
B. Process control system  E. Other informational assets
C. Unauthorized use  F. None of the Above

289. Access control systems should ensure that only authorized people have ________________ .
A. Asset location technologies  D. Access to controlled spaces
B. Access limiting systems  E. Classic physical security considerations
C. Peripheral extender technology  F. None of the Above

290. A system must be able to _____________ are who they say they are (typically using something the person has, such as an access card; something they know, such as a personal identification number (PIN); or something they are, using abiometric).
A. Overall security of a plant  D. Verify that persons being granted access
B. Process control system  E. A secured area
C. Unauthorized use  F. None of the Above

291. ________________ should be highly reliable yet not interfere with the routine or emergency duties of plant personnel.
A. Asset location technologies  D. Integration of access control
B. Access limiting systems  E. Access control
C. Peripheral extender technology  F. None of the Above
292. Which of the following terms into the process system allows a view into not only security access, but also physical and personnel asset tracking, dramatically accelerating response time in emergencies, helping to direct individuals to safe locations, and improving overall productivity?
A. Asset location technologies  
B. Access limiting systems  
C. Peripheral extender technology
D. Integration of access control  
E. Classic physical security considerations  
F. None of the Above

293. Within an area, _______________ to network and computer cabinets should be limited to only those who have a need, such as network technicians and engineers, or computer maintenance staff.
A. Overall security of a plant  
B. Process control system  
C. Unauthorized use
D. Access  
E. Classic physical security considerations  
F. None of the Above

294. Consider keeping all computers in secure racks and using _______________ to connect human-machine interfaces to the racked computers.
A. Asset location technologies  
B. Access limiting systems  
C. Peripheral extender technology
D. Integration of access control  
E. Classic physical security considerations  
F. None of the Above

295. Which of the following terms include still and video cameras, sensors, and various types of identification systems?
A. Asset location technologies  
B. Access limiting systems  
C. Peripheral extender technology
D. Integration of access control  
E. Access monitoring systems  
F. None of the Above

296. Which of the following terms may employ a combination of devices to physically control or prevent access to protected resources.
A. Asset location technologies  
B. Access limiting systems  
C. Peripheral extender technology
D. Integration of access control  
E. Classic physical security considerations  
F. None of the Above

297. Locating people and vehicles in a large installation is important for safety reasons, and it is _______________ as well.
A. Overall security of a plant  
B. Process control system  
C. Unauthorized use
D. Increasingly important for security reasons  
E. A secured area  
F. None of the Above

298. Which of the following terms can be used to track the movements of people and vehicles within the plant, to ensure that they stay in authorized areas, to identify personnel needing assistance, and to support emergency response?
A. Asset location technologies  
B. Access limiting systems  
C. Peripheral extender technology
D. Integration of access control  
E. Classic physical security contemplations  
F. None of the Above
299. An alarm to the process control system should be generated when environmental specifications such as __________________ are exceeded.
A. Threat identification               D. Vulnerability identification
B. Temperature and humidity          E. Control analysis
C. System characterization           F. None of the Above

300. Computers and computerized devices used for ICS functions (such as PLC programming) should never leave the______________. Laptops and portable engineering workstations should be tightly secured and never used outside the ICS network. Antivirus and patch management should be kept current.
A. Proprietary area               D. Defense strategy for the ICS
B. ICS area                       E. WAN area
C. OPC area                      F. None of the Above