LEVEL I — SIMULATION EXAM 3 (85 QUESTIONS)

Time Limit: 110 Minutes

Allowed References: NFPA 72 (2022), NFPA 70 (2020), Ugly's Electrical References (2020)

DOMAIN 1.1 — INSTALLATION (Questions 1–46)

1. A fire alarm technician is reviewing the project specifications for a new office building. The specification calls for a fire alarm system with "point-level device identification." Which system type meets this requirement?

A. A conventional system with dedicated zones for each individual room

B. A conventional system with end-of-line resistors at each device location

C. An addressable system where each device has a unique electronic address

D. A municipal fire alarm system connected to a street-level pull box network

2. A technician discovers that the ceiling space in a retail store uses the open area above the suspended grid as the HVAC return air path. No dedicated return ductwork exists. What is the minimum cable rating required for fire alarm circuits in this space?

A. FPL because the space is above a suspended ceiling in a commercial building

B. FPLR because the cable will be routed horizontally through a commercial space

C. THHN because any cable in conduit satisfies the plenum space requirement

D. FPLP because the ceiling space functions as a return air plenum

3. A fire alarm technician is installing a Class B notification appliance circuit. The circuit serves 12 horn/strobes across two corridors. Where must the end-of-line resistor be installed?

A. At the fire alarm control panel on the NAC output terminal block

B. At the last notification appliance on the circuit after all other devices

C. At the midpoint of the circuit between the two corridor sections

D. At each notification appliance to provide individual device supervision

4. During installation, a technician needs to mount a pull station on a wall next to an exit door. The finished floor to the bottom of the door frame is 0 inches. The technician measures 44 inches from the floor and marks the mounting location. Does this placement comply with NFPA 72?

A. Yes, 44 inches is within the required 42 to 48 inch mounting height range

B. No, pull stations must be mounted between 36 and 42 inches above the floor

C. No, the measurement should be taken from the threshold, not the finished floor

D. Yes, but only if the pull station is a dual-action type approved for this height

5. A fire alarm control unit has four NAC outputs, each rated at 2.0 amps. A technician needs to install 20 horn/strobes that each draw 0.350 amps in alarm. What is the minimum number of NAC circuits needed to power all 20 devices without exceeding any output rating?

A. Three NAC circuits with devices distributed to balance the load equally

B. Two NAC circuits with 10 devices on each circuit for a balanced installation

C. Four NAC circuits to keep each circuit well below the maximum rated output

D. Five NAC circuits with four devices each for maximum safety margin

6. A technician is terminating 14 AWG stranded copper conductors at a fire alarm device. After making the connection and tightening the terminal screw, the technician skips the tug test due to time pressure. Why is this a problem?

A. A skipped tug test means an unverified connection that may fail under vibration or thermal cycling

B. The NEC requires a documented tug test result for every connection in a fire alarm system

C. The tug test is needed to stretch the conductor slightly for optimal contact pressure

D. The panel cannot supervise the circuit unless every termination passes a measured pull force

7. A fire alarm technician is selecting a smoke detector for a server room where very early warning detection is required to protect sensitive electronic equipment. Which detection technology provides the highest sensitivity for this application?

A. A photoelectric spot-type detector mounted at standard ceiling spacing

B. An ionization detector because it responds fastest to invisible particles

C. A multi-criteria detector combining smoke and carbon monoxide sensing

D. An aspirating (air sampling) detection system with very early warning sensitivity

8. A technician is installing fire alarm conduit alongside existing plumbing waste lines above a ceiling. The conduit will run parallel to the plumbing for approximately 30 feet. Is there any NEC concern with this routing?

A. Yes, fire alarm conduit cannot be installed within 10 feet of any plumbing waste lines

B. No, fire alarm conduit may run alongside plumbing as long as the conduit is properly supported

C. Yes, the fire alarm conduit must be installed in a separate joist bay from all plumbing

D. No, but only if the fire alarm cable inside the conduit is rated for wet locations

9. A fire alarm technician is working on a construction site and needs to use a power drill connected to a temporary power outlet. Per OSHA requirements for construction sites, what electrical protection must be provided on temporary power circuits?

A. Ground-fault circuit interrupter protection on all temporary power circuits

B. Arc-fault circuit interrupter protection on circuits used for portable power tools

C. Double-insulated power tools only with no GFCI protection required

D. A licensed electrician must be present whenever temporary power is used

10. A conventional fire alarm panel has 8 zone inputs. The technician needs to wire smoke detectors for a three-story building with the second floor divided into two separate fire zones by a fire wall. How many zones are needed at minimum for the detector circuits alone?

A. Three zones — one for each floor since zoning is based on floor separation only

B. Two zones — the building only needs zones for the floors with detectors

C. Four zones — one for each floor plus a separate zone for the divided second floor area

D. Eight zones — one for each room in the building to provide maximum identification

11. A technician measures the resistance across a newly installed Class B IDC at the panel terminals. All devices are connected and the EOLR is installed. The meter reads 4.7 kΩ. The specified EOLR value for this panel is 4.7 kΩ. What does this reading confirm?

A. The circuit has at least one device in alarm creating a combined resistance reading

B. The circuit has a ground fault that coincidentally matches the EOLR resistance value

C. The panel's supervision circuitry is not functioning and cannot detect the EOLR

D. The circuit is continuous from the panel through all devices to the EOLR with no faults

12. A fire alarm technician is running cable through a conduit with three existing 90-degree bends. The technician needs to add one more offset bend of approximately 30 degrees. Can the technician proceed, or is a pull box required?

A. A pull box is required because any bend after three 90-degree bends exceeds the limit

B. The technician can proceed because the total is 300 degrees, which is under 360 degrees

C. A pull box is required because the maximum number of bends is three regardless of degrees

D. The technician must remove one existing bend before adding the offset to maintain compliance

13. A fire alarm technician is installing a smoke detector near the entry to a commercial kitchen. The area experiences occasional cooking fumes. Which detector type would be most appropriate to reduce nuisance alarms in this location?

A. A multi-criteria detector that analyzes multiple environmental inputs before alarming

B. An ionization detector because it is less sensitive to cooking particles than other types

C. A fixed-temperature heat detector rated at 135°F to avoid smoke-based nuisance alarms

D. A standard photoelectric detector with a protective screen over the sensing chamber

14. A fire alarm technician is installing a visible notification appliance in a conference room that measures 28 feet by 28 feet. Per NFPA 72 Table 18.5.5.5.1(a), what is the minimum candela rating for a single wall-mounted strobe to cover this room?

A. 15 candela which covers rooms up to 20 feet by 20 feet with a single wall appliance

B. 75 candela which exceeds the room dimensions and provides additional coverage margin

C. 60 candela which is the minimum requirement for rooms in this size range

D. 30 candela which is the minimum for a room of this dimension per the NFPA 72 table

15. Which of the following describes the correct relationship between NFPA 72 and the NEC regarding fire alarm system installations?

A. The NEC supersedes NFPA 72 whenever the two codes have conflicting requirements

B. NFPA 72 governs system performance while the NEC governs wiring installation methods

C. NFPA 72 and the NEC are identical documents published under two different cover titles

D. The NEC applies only to power wiring and has no jurisdiction over fire alarm circuits

16. A technician is installing an addressable smoke detector base and notices that the SLC wiring at this device uses a T-tap connection — the SLC conductors run through the base without breaking, and a short branch wire connects the base to the main circuit. Is this wiring method acceptable?

A. Yes, T-tap connections are the preferred wiring method for all addressable device bases

B. Yes, but only if the branch wire is the same gauge as the main SLC conductors

C. It depends on the manufacturer and system protocol — some SLC designs permit T-taps

D. No, T-tap connections are universally prohibited on all fire alarm system circuits

17. A fire alarm technician is installing conduit in a mechanical room. The conduit will carry power-limited fire alarm circuits. A 120 VAC junction box for building lighting is located nearby. What is the minimum separation between the fire alarm conduit and the power junction box?

A. PLFA conductors must be in a separate raceway but no specific minimum distance is required

B. A minimum of 2 inches of separation is required between the conduit and the junction box

C. A minimum of 6 inches of separation is required between the conduit and the junction box

D. A minimum of 12 inches of separation is required between the conduit and the junction box

18. A fire alarm technician needs to install a smoke detector on a wall because ceiling mounting is not feasible. Per NFPA 72, the top of the detector must be within what distance of the ceiling?

A. Within 4 inches of the ceiling to remain outside the dead air space zone

B. Within 12 inches of the ceiling to keep the detector in the smoke accumulation layer

C. Within 6 inches of the ceiling for wall-mounted detectors in commercial applications

D. Within 24 inches of the ceiling when ceiling mounting is documented as infeasible

19. A fire alarm technician is installing a waterflow switch on a sprinkler riser. The switch has an adjustable retard setting. What is the purpose of the retard mechanism?

A. To amplify the waterflow signal for transmission over long circuit distances

B. To increase the sensitivity of the paddle mechanism for detecting slow leaks

C. To reduce the electrical current draw of the switch during normal standby operation

D. To introduce a time delay that prevents false alarms from momentary water surges

20. A fire alarm panel requires a dedicated, unswitched branch circuit. The electrician has connected the panel to a circuit that also supplies a nearby exit sign. Does this installation comply with code requirements?

A. No, the fire alarm panel must be on a dedicated circuit that serves no other loads

B. Yes, because exit signs are life safety devices and may share the fire alarm circuit

C. Yes, as long as the combined load does not exceed the circuit breaker rating

D. No, but only because exit signs draw excessive current that could affect panel operation

21. Per NEC Article 760, which of the following is a requirement for the branch circuit supplying a fire alarm control unit?

A. The circuit must be identified at the distribution panel with a lock-on breaker device

B. The circuit must be protected by a GFCI breaker for personnel safety at the panel

C. The circuit breaker must include a lock-on device preventing accidental disconnection

D. The circuit must be supplied from the building's emergency generator panel only

22. A fire alarm technician is terminating wires at a junction box and discovers that the red and black conductors from two different fire alarm circuits are the same color. How can the technician identify which conductors belong to which circuit?

A. By measuring the voltage on each conductor with the circuits energized

B. By using a tone generator on one circuit and an amplifier probe to identify the conductors

C. By disconnecting all conductors and relying on the wire positions within the conduit

D. By pulling new wire with different colored conductors to eliminate the identification issue

23. A fire alarm technician is calculating the total conduit fill for a 3/4-inch EMT conduit. The technician plans to install six 14 AWG THHN conductors. Per NEC Annex C Table C1, the maximum number of 14 AWG THHN conductors permitted in 3/4-inch EMT is 22. Is the planned installation acceptable?

A. No, because fire alarm circuits require a dedicated conduit with no more than four conductors

B. No, because 14 AWG conductors are not permitted in 3/4-inch EMT for fire alarm circuits

C. Yes, but only if the conductors are all from the same fire alarm circuit

D. Yes, six conductors is well within the maximum of 22 permitted by the Annex C table

24. A fire alarm technician finishes installing all devices and wiring for a new fire alarm system. Before energizing the system, what wiring test should be performed to verify insulation integrity?

A. Megger testing on all circuits with devices disconnected to check insulation resistance

B. Voltage testing at each device location to verify proper polarity on all conductors

C. Current testing on each circuit to verify that standby current matches specifications

D. Functional testing of each device to verify proper activation and panel response

25. A fire alarm technician installs a smoke detector directly at the intersection where the wall meets the ceiling. During inspection, the AHJ rejects this placement. Why?

A. The detector must be at least 12 inches from any wall when ceiling-mounted

B. The detector is in the dead air space and must be at least 4 inches from the junction

C. The detector must be wall-mounted rather than ceiling-mounted in this room type

D. The detector is too close to the wall and must be centered in the room for proper coverage

26. A fire alarm circuit uses 18 AWG conductors on a signaling line circuit. What is the primary factor that determines whether this conductor size is adequate?

A. The maximum voltage that will be applied to the circuit during alarm conditions

B. The ambient temperature of the space where the conductor will be installed

C. The total current draw and the circuit length relative to voltage drop requirements

D. The number of devices connected to the circuit regardless of their current consumption

27. A fire alarm technician is reviewing construction documents and sees a symbol consisting of a small triangle with the letters "WF" inside it on the plumbing riser diagram. What does this symbol represent?

A. A waterflow switch installed on a sprinkler system pipe to detect water movement

B. A wall-mounted fire extinguisher located adjacent to the sprinkler riser

C. A water filter assembly installed on the fire protection water supply line

D. A wet-pipe fire sprinkler valve assembly at the base of the sprinkler riser

28. A fire alarm technician is installing a heat detector in an unheated warehouse where winter temperatures can drop to 10°F and summer temperatures can reach 100°F. The detector's rated activation temperature is 135°F. Is this detector selection appropriate?

A. No, the detector must be rated for sub-freezing operation with a cold-weather housing

B. No, the temperature swing is too wide for any fixed-temperature heat detector to function

C. Yes, the detector's rated temperature must be replaced based on the highest ambient only

D. Yes, the 135°F rating provides at least 20°F margin above the maximum ambient of 100°F

29. A fire alarm technician is installing an addressable manual fire alarm station. After mounting the device and connecting the SLC wiring, what must the technician verify before leaving the device location?

A. That the device produces an audible click when the handle is pulled and released

B. That the device is connected to the correct NAC circuit for its notification zone

C. That the device address is correctly set to match the address schedule in the shop drawings

D. That the device key is left in the unlocked position for building occupant access

30. A fire alarm technician is mounting a ceiling-mounted notification appliance. The appliance includes both audible and visible components. Which orientation requirement applies?

A. The audible component must face downward while the visible lens faces the nearest wall

B. The visible lens must face downward for proper light distribution throughout the space

C. The device may be oriented in any direction because ceiling-mounted devices are omnidirectional

D. The audible component must face the nearest exit door for maximum sound projection

31. A conventional fire alarm panel supervises its initiating device circuits by monitoring what electrical characteristic?

A. The resistance created by the end-of-line resistor on each supervised circuit

B. The voltage at the last device on each circuit compared to the source voltage

C. The current draw of each initiating device during standby and alarm conditions

D. The capacitance between the two conductors of each initiating device circuit

32. A fire alarm technician is installing conduit through a fire-rated wall assembly. Which of the following is required at the point where the conduit penetrates the fire-rated wall?

A. The conduit must be supported within 12 inches of each side of the wall penetration

B. An oversized conduit sleeve must be installed through the wall before the conduit is routed

C. No special requirements exist for conduit penetrations through fire-rated assemblies

D. The penetration must be firestopped with an approved fire-rated sealant or device

33. A fire alarm technician is installing cable in a building and encounters a section where the cable must transition from a concealed ceiling space to an exposed wall run at 5 feet above the floor in a storage room. What must change at the transition point?

A. The cable type must change from FPLP to FPL at the point of transition

B. A junction box must be installed at the transition point for all cable direction changes

C. The cable must be placed in a raceway for the exposed portion to protect against damage

D. The cable gauge must increase by one size for any exposed cable run below 7 feet

34. A fire alarm system is being installed in a building with 12-foot ceilings. The technician plans to install spot-type smoke detectors at the default 30-foot spacing. Is any spacing adjustment required for this ceiling height?

A. No, 30-foot spacing for smoke detectors does not require reduction for 12-foot ceilings

B. Yes, smoke detector spacing must be reduced by 10% for every foot above 10 feet

C. Yes, NFPA 72 Table 17.6.3.5.1 requires spacing reduction for all ceilings above 10 feet

D. No, but only if the detectors are analog addressable with automatic sensitivity adjustment

35. A fire alarm technician is installing a duct smoke detector on a supply air duct. The detector's sampling tubes must extend into the duct interior. What determines the correct length and number of sampling tube holes?

A. The fire alarm panel manufacturer's specifications for the SLC circuit loading

B. The number of air handling units connected downstream of the detector location

C. The local AHJ's standard specification for all duct detector installations

D. The width of the duct and the air velocity at the detector's installed location

36. A fire alarm technician must install visible notification appliances in a corridor that is 150 feet long. Per NFPA 72, strobes must be placed within 15 feet of each corridor end and spaced no more than 100 feet apart. What is the minimum number of strobes required?

A. One strobe centered at the 75-foot midpoint of the corridor run

B. Two strobes — one within 15 feet of each end of the corridor

C. Four strobes spaced evenly at 37.5-foot intervals throughout the corridor

D. Three strobes spaced to meet both the end-distance and maximum spacing requirements

37. A fire alarm technician is soldering a wire connection at a junction box on a fire alarm circuit. Is soldering an acceptable termination method for fire alarm circuits?

A. Yes, soldering is the preferred termination method for all fire alarm circuit connections

B. Yes, but only if the solder connection is also mechanically secured before soldering

C. No, soldered connections are not an approved termination method for fire alarm circuits

D. No, unless the solder is a listed fire-rated type specifically approved for fire alarm use

38. A technician is installing fire alarm devices in a building where the general contractor has scheduled ceiling tile installation for the following day. The fire alarm rough-in above the ceiling is 90% complete, with three smoke detector bases and two junction boxes remaining. What should the technician do?

A. Request that the rough-in inspection occur today since ceiling closure cannot be delayed

B. Inform the general contractor that ceiling tile installation can proceed as scheduled

C. Install the remaining items after ceiling tiles are in place by lifting tiles temporarily

D. Complete the remaining rough-in work immediately before the ceiling is closed

39. Using the power formula $P = V \times I$, what is the power consumed by a notification appliance circuit operating at 24 VDC with a total alarm current of 2.5 amps?

A. 60 watts consumed by the NAC during alarm conditions

B. 9.6 watts consumed by the NAC during alarm conditions

C. 26.5 watts consumed by the NAC during alarm conditions

D. 48 watts consumed by the NAC during alarm conditions

40. A fire alarm technician needs to install a manual fire alarm station at an exit door. The door is located at the end of a corridor, and the nearest wall surface suitable for mounting is 7 feet from the door frame. Does this location comply with NFPA 72?

A. Yes, the pull station may be up to 10 feet from the exit doorway per code

B. No, the pull station must be within 5 feet of the exit doorway per NFPA 72

C. Yes, as long as the pull station is visible from the exit door location

D. No, the pull station must be mounted directly on the door frame itself

41. A fire alarm system design calls for Class A wiring on the signaling line circuit. Compared to a Class B configuration, what additional wiring is required?

A. A dedicated ground conductor must be installed alongside the SLC conductors

B. An isolation module must be installed at every device location on the circuit

C. A return path must be provided so the SLC forms a loop back to the panel

D. Each device must be connected with a home-run wire directly to the panel

42. A fire alarm technician is installing an addressable control module that will activate an elevator recall relay. The module receives a command from the panel over the SLC and closes a set of dry contacts. What type of circuit does the control module connect to on its output side?

A. A conventional relay contact circuit connected to the elevator control system

B. The notification appliance circuit that activates horn/strobes during elevator recall

C. The signaling line circuit that communicates with the addressable smoke detectors

D. The initiating device circuit that monitors the smoke detector in the elevator lobby

43. A fire alarm technician is working on a ladder at a height of 10 feet. The ladder is positioned against a wall. Per safe ladder use practices, how far above the upper support point should the ladder extend?

A. At least 3 feet above the upper support point or landing surface

B. At least 5 feet above the upper support point for maximum stability

C. The ladder does not need to extend above the support point when leaning against a wall

D. At least 1 foot above the upper support point as a minimum clearance

44. A fire alarm system has both smoke detectors and sprinkler waterflow switches connected to the same fire alarm control panel. During an alarm event, which of these devices generates an alarm signal?

A. Only the smoke detectors generate alarm signals; waterflow switches generate supervisory

B. Neither device generates an alarm — both generate supervisory signals for monitoring

C. Both the smoke detectors and the waterflow switches generate alarm signals

D. Only the waterflow switch generates an alarm; smoke detectors generate trouble signals

45. A fire alarm technician is installing an end-of-line resistor on a Class B IDC. The panel specifications call for a 3.3 kΩ EOLR. The technician only has 4.7 kΩ resistors available on site. Can the technician substitute the 4.7 kΩ resistor?

A. Yes, a higher resistance value provides better supervision and is always acceptable

B. No, the EOLR must match the value specified by the panel manufacturer exactly

C. Yes, as long as the resistor value is within 20% of the specified value

D. No, but any commercially available resistor between 2.2 kΩ and 10 kΩ will work

46. A fire alarm technician is installing cable supports for fire alarm cable routed along the underside of a metal deck above a ceiling grid. What is the maximum support interval per standard installation practices?

A. Per NEC requirements, cable must be supported at intervals appropriate to the cable type

B. Cable supports are only required at junction boxes and device locations

C. Fire alarm cable does not require mechanical support when routed above suspended ceilings

D. Cable must be supported at 12-inch intervals for all above-ceiling installations

DOMAIN 1.2 — MAINTENANCE (Questions 47–82)

47. A fire alarm technician is called to investigate frequent nuisance alarms from smoke detectors in a newly renovated office space. The renovation was completed two weeks ago. What is the most likely cause of the nuisance alarms?

A. The smoke detectors are incompatible with the new HVAC system installed during renovation

B. The SLC communication protocol was changed during the renovation affecting detector polling

C. The detector mounting bases were loosened during renovation causing intermittent connections

D. Residual construction dust from the renovation is contaminating the detector sensing chambers

48. Per NFPA 72 Table 14.4.3.2, the fire alarm control unit's basic functions must be tested at what frequency?

A. Monthly to ensure the panel's processor and display are functioning correctly

B. Quarterly to verify all panel input and output functions are operational

C. Annually by testing all panel functions including alarm processing and signal transmission

D. Semiannually to coincide with the smoke detector functional testing schedule

49. A fire alarm technician is performing annual testing on a fire alarm system. The technician activates a smoke detector and the panel displays the correct alarm. The notification appliances activate. However, the technician calls the supervising station and learns that no signal was received. The technician verifies that the communication module shows "online" status. What should the technician investigate next?

A. The notification appliance circuits because the alarm current may be affecting transmission

B. The communication pathway between the panel and the station for signal delivery issues

C. The smoke detector's listed compatibility with the installed communication module type

D. The panel's SLC circuit board because it may not be forwarding the alarm to the communicator

50. A fire alarm system battery calculation shows a required capacity of 18 Ah. The installed batteries are rated at 17 Ah each in a series pair. Is this battery installation code-compliant?

A. No, the installed battery capacity is less than the calculated minimum requirement

B. Yes, because the 20% safety factor allows for minor variations in battery capacity

C. Yes, because batteries in series double the ampere-hour capacity to 34 Ah total

D. No, but only because the batteries must be connected in parallel to combine capacity

51. A fire alarm technician is performing the semiannual functional test on smoke detectors in a 10-story building. The building has 450 smoke detectors. Per NFPA 72, which approach to testing is acceptable?

A. Testing all 450 detectors during each semiannual visit for complete coverage

B. Testing only the detectors on floors that have experienced alarms in the past year

C. Testing only the detectors on five floors per visit on a rotating schedule

D. Testing all 450 detectors is required during each semiannual test period

52. During annual testing of emergency control functions, the fire alarm technician activates a smoke detector in an elevator lobby. The elevator recall signal is sent but the elevators do not return to the designated floor. Where does the fault most likely exist?

A. In the smoke detector which is not generating the correct signal type for elevator recall

B. In the panel programming which has not assigned elevator recall to that detector zone

C. In the interface between the fire alarm system and the elevator controller

D. In the notification appliance circuit which shares wiring with the elevator recall relay

53. A fire alarm technician receives a report that a horn/strobe in a hallway is making a "clicking" sound during normal standby when no alarm condition exists. What is the most likely cause?

A. The NAC circuit has a voltage fluctuation causing the device to partially activate

B. The device has an internal component failure causing intermittent operation

C. The panel is performing an automatic weekly self-test of all notification appliances

D. The horn/strobe is receiving interference from a nearby wireless access point

54. Per NFPA 72, when testing a waterflow switch, the alarm signal must be received at the panel within what maximum time from the start of sustained water flow?

A. Within 90 seconds of sustained water flow at the inspector's test connection

B. Within 60 seconds of sustained water flow without any retard delay permitted

C. Within 30 seconds of sustained water flow for immediate alarm notification

D. Within 120 seconds of sustained water flow including the maximum retard setting

55. A fire alarm technician is troubleshooting an addressable system that shows a trouble signal for "SLC Communication Failure — Multiple Devices." Fifteen consecutive device addresses are not responding. What is the most likely cause?

A. All fifteen devices have simultaneously failed due to a manufacturer defect

B. The panel's polling rate is too slow to communicate with all devices on the loop

C. A power surge has damaged the panel's SLC communication circuit board

D. An open or short fault on the SLC wiring is isolating a section of the circuit

56. During a periodic inspection, the fire alarm technician checks the panel's trouble log and finds a recurring "Low Battery" trouble that appears every night and clears every morning. What does this pattern suggest?

A. The batteries are reaching end of life and cannot maintain voltage during overnight periods

B. The battery charger is functioning marginally and cannot maintain full charge overnight

C. The panel has a software error that generates false low battery signals during low-use periods

D. The building's AC power is being turned off at night causing unnecessary battery discharge

57. A fire alarm technician is testing tamper switches on sprinkler system control valves. After turning the valve wheel two full revolutions, no supervisory signal has been generated at the panel. What should be documented?

A. The tamper switch has failed its functional test and must be repaired or replaced

B. The test is inconclusive because tamper switches require three revolutions to activate

C. The tamper switch passed because supervisory signals have a built-in 5-minute delay

D. The test method was incorrect because tamper switches must be tested electrically only

58. A fire alarm technician is reviewing an analog addressable panel's detector sensitivity report. One detector shows a reading of 1.2% obscuration per foot, and the manufacturer's acceptable range is 0.5% to 3.7% obscuration per foot. What is the status of this detector?

A. The detector has failed sensitivity testing and must be cleaned or replaced immediately

B. The detector is at the low end of its range and should be scheduled for early replacement

C. The detector is within its listed sensitivity range and requires no corrective action

D. The detector reading must be verified with a separate calibrated test instrument

59. A fire alarm technician disconnects the primary AC power to a fire alarm panel during testing. The panel generates a trouble signal for AC power loss exactly 3 hours later. Is this response code-compliant?

A. No, the AC power loss trouble must be annunciated immediately with no delay

B. No, the maximum delay for AC power loss trouble is 60 minutes per NFPA 72

C. Yes, but only if the building is equipped with an emergency generator backup

D. Yes, NFPA 72 permits a delay of up to 3 hours for AC power loss trouble signals

60. A fire alarm technician finds that all smoke detectors in a building are five years old. Sensitivity testing was performed at year one and year three. When is the next sensitivity test due?

A. At year seven because sensitivity testing alternates every two years after the initial test

B. At year five because sensitivity testing is required annually after the third year

C. No further testing is required because two sensitivity tests satisfy the lifetime requirement

D. At year six because sensitivity testing becomes annual after detectors reach five years old

61. During functional testing, the technician activates a smoke detector with approved aerosol. The panel shows "ALARM" for the correct device address. The technician notes that the panel event log shows the alarm time as 14:32 but the technician's watch shows 14:47. What should be documented?

A. The panel's internal clock is incorrect and needs to be set to the accurate current time

B. The 15-minute difference is within acceptable tolerance and requires no corrective action

C. The detector has a 15-minute response delay indicating the sensing chamber needs cleaning

D. The technician's watch is likely incorrect and the panel time should be accepted as accurate

62. A fire alarm technician is performing annual testing on visible notification appliances. During the test, the technician observes that one strobe in a group of four in a large room flashes at a noticeably different rate than the other three. What deficiency does this indicate?

A. The candela rating of the non-synchronized strobe does not match the other three devices

B. The out-of-sync strobe is on a different NAC circuit and cross-circuit sync is not required

C. The strobe is not synchronized with the other appliances in the same field of view

D. The flash rate difference is normal and expected across devices from different production lots

63. A fire alarm system generates a trouble signal that reads "GROUND FAULT — NAC 2." The technician disconnects the NAC 2 field wiring at the panel and the ground fault trouble clears. What has been confirmed?

A. The NAC 2 circuit board at the panel is functioning normally with no internal faults

B. The ground fault is on the panel's internal wiring between the circuit board and terminals

C. The panel's ground fault detection circuitry is oversensitive and needs recalibration

D. The ground fault is located on the NAC 2 field wiring or connected appliances

64. During testing, the fire alarm technician discovers that when a smoke detector on the second floor activates, the horn/strobes on the third floor do not activate — but the sequence of operations requires floors 1, 2, and 3 to receive notification for any second-floor alarm. What is the most likely cause?

A. The third floor horn/strobes have all failed simultaneously during the testing period

B. The panel programming does not include the third floor NAC zone in the second floor alarm response

C. The second floor smoke detector is generating a supervisory signal instead of an alarm

D. The third floor NAC circuit has an open fault preventing power delivery to the appliances

65. A fire alarm technician is called to a building where the fire alarm panel is showing a "Battery Trouble" signal. The technician measures 27.2 VDC at the battery terminals with the charger connected. What should the technician check next?

A. The battery connections and the charger output to verify proper charging function

B. The primary AC power voltage to ensure it is within the acceptable input range

C. The panel's battery trouble threshold setting in the system programming

D. The ambient temperature in the panel room because heat causes false battery trouble

66. What is the primary purpose of the fire alarm system's Record of Completion per NFPA 72?

A. To serve as the warranty registration document for the fire alarm control panel equipment

B. To provide a list of replacement parts and maintenance supplies for the service contractor

C. To certify that the system was installed and tested in compliance with NFPA 72

D. To document the building owner's emergency evacuation plan and staff assignments

67. During annual inspection, the fire alarm technician discovers that four smoke detector heads are missing from their bases in a storage area. The bases are still wired and connected to the SLC. What should be documented?

A. The panel must be generating trouble signals for these devices since they are not communicating

B. Only the bases were inspected and found in good condition with no further action needed

C. The detectors were likely removed for cleaning and will be returned by maintenance staff

D. The missing detectors constitute a significant deficiency requiring immediate correction

68. A fire alarm technician is testing the fire alarm system's communication link to the supervising station. The technician sends a test signal and the station confirms receipt within 30 seconds. However, the station reports receiving an "unidentified account" error. What does this indicate?

A. The panel's account number programming does not match the supervising station's records

B. The communication module hardware is transmitting on an incorrect frequency band

C. The telephone line serving the DACT has been assigned a new number by the carrier

D. The supervising station's receiving equipment needs a software update for compatibility

69. A fire alarm system has a total standby current of 0.75 amps and a total alarm current of 6.0 amps. The battery calculation with the standard 24-hour standby, 5-minute alarm, and 20% safety factor yields a minimum requirement of 22.2 Ah. The installed batteries are rated at 26 Ah. Do the batteries meet the requirement?

A. No, the batteries must be at least 25% larger than the calculated minimum

B. Yes, the installed 26 Ah capacity exceeds the calculated minimum of 22.2 Ah

C. No, because the calculation should use a 25% safety factor instead of 20%

D. Yes, but only if the batteries have been load tested within the past 6 months

70. A fire alarm technician is inspecting a fire alarm system in a hotel. The technician checks the notification appliance sound levels in a guest room and measures 72 dB at the pillow. Does this meet NFPA 72 requirements?

A. Yes, 72 dB exceeds the 70 dB minimum requirement for sleeping areas

B. Yes, 72 dB meets the NFPA 72 minimum of 65 dB at the pillow in sleeping areas

C. No, the minimum sound level at the pillow in sleeping areas is 75 dB per NFPA 72

D. No, the minimum sound level at the pillow in sleeping areas is 85 dB per NFPA 72

71. A fire alarm technician is troubleshooting an intermittent trouble signal on Zone 5 of a conventional fire alarm panel. The trouble appears and clears several times per day. Using the divide-and-conquer method, the technician disconnects the wiring at the midpoint of the Zone 5 circuit. The trouble signal stops occurring on the panel-side half but continues on the field-side half. What has been determined?

A. The panel's Zone 5 input circuit board has a marginal component that is temperature-sensitive

B. The end-of-line resistor on Zone 5 has drifted outside the panel's acceptable resistance range

C. The trouble is caused by a device or wiring fault on the field-side half of the Zone 5 circuit

D. The fault is between the panel and the midpoint disconnect on the panel-side circuit section

72. A fire alarm technician is conducting a visual inspection and finds that a horn/strobe has been painted the same color as the surrounding wall by a painting contractor. How should this be handled?

A. The device must be replaced because paint can block sound output and strobe light intensity

B. The paint can be carefully removed with a solvent and the device returned to service

C. The device is acceptable as long as it activates during functional testing

D. The paint improves aesthetics and does not affect device performance

73. A fire alarm technician is preparing to functionally test a manual fire alarm station. Before activating the device, the technician should verify which of the following?

A. That the key to reset the pull station is available before the device is activated

B. That the supervising station has been notified that the system is on test status

C. That all building occupants have been relocated to a designated safe assembly area

D. That the HVAC system has been shut down to prevent smoke distribution during testing

74. Per NFPA 72, visual inspections of fire alarm system components are performed to verify what conditions?

A. That each device operates and produces the correct signal when functionally activated

B. That each device meets the manufacturer's electrical specifications at the terminal

C. That components are in place, undamaged, unobstructed, and appear ready to function

D. That each circuit meets the panel manufacturer's resistance specifications for supervision

75. During testing, the fire alarm technician activates a duct smoke detector. The panel displays the correct alarm, and the HVAC unit shuts down. However, the general building alarm does not activate. Is this the expected response?

A. No, duct detector activation must always trigger general building alarm notification

B. No, the technician should verify programming because duct detectors should activate notification

C. Yes, duct detectors should never activate general building notification appliances

D. It depends on the system design and sequence of operations for duct detector response

76. A fire alarm technician discovers during inspection that the fire alarm panel's primary power circuit breaker at the electrical panel does not have a lock-on device installed. What should be documented?

A. The missing lock-on device is a code deficiency that must be corrected

B. Lock-on devices are recommended but not required by current code editions

C. The lock-on device is only required in buildings over four stories in height

D. The lock-on device requirement applies only to panels installed after 2020

77. A fire alarm technician tests all notification appliances on a NAC circuit. All devices operate except the last two devices at the end of the circuit. The first 10 devices on the circuit all function normally. What is the most likely cause?

A. The last two devices are defective units from a bad production batch

B. An open circuit exists in the wiring between the tenth device and the eleventh device

C. The panel's NAC output voltage is insufficient to operate more than ten devices

D. The last two devices are on a separate NAC circuit that was not activated during testing

78. A fire alarm technician is troubleshooting a fire alarm panel that shows no active trouble signals, yet the supervising station reports they have not received any signals from the building in 48 hours. What component should be investigated first?

A. The panel's event log does not show the communication failure as a trouble condition

B. The primary power supply circuit to verify the panel is receiving adequate voltage

C. The notification appliance circuits to verify they are not drawing excessive current

D. The communication module or communication pathway between the panel and station

79. During a periodic inspection, the technician notices a smoke detector installed in a room that was recently converted from an office to a server room with raised floor tiles. The detector is mounted on the ceiling 14 feet above the raised floor. Are there any concerns?

A. No, the detector placement is acceptable because server rooms use standard ceiling detection

B. No, the ceiling height is within the standard range for spot-type smoke detector effectiveness

C. Yes, additional detection may be needed below the raised floor and the ceiling height should be evaluated

D. Yes, but only if the server room contains more than ten equipment racks

80. A fire alarm system uses a DACT (digital alarm communicator transmitter) to communicate with the supervising station over traditional telephone lines. The building manager informs the technician that the telephone company is discontinuing copper telephone service to the building next month. What action is required?

A. The communication method must be updated to an approved alternative before service is lost

B. No action is required because the panel will automatically switch to cellular communication

C. The building owner should negotiate with the telephone company to retain copper service

D. The DACT can operate on VoIP telephone service with no modifications required

81. A fire alarm technician performs a battery load test and records a starting voltage of 26.8 VDC and an ending voltage of 18.2 VDC after the required test duration under full alarm load. Do these batteries pass the load test?

A. Yes, because the ending voltage is above the minimum 12 VDC system shutdown threshold

B. No, because the 8.6-volt drop indicates the batteries cannot sustain adequate voltage under load

C. Yes, because any ending voltage above 16 VDC is acceptable for a 24 VDC fire alarm system

D. No, but only because the starting voltage exceeds the maximum float charge specification

82. During annual testing, a fire alarm technician discovers that the building's fire alarm system has been modified — 15 new smoke detectors were added six months ago — but the as-built drawings have not been updated. What should be documented?

A. The documentation deficiency is acceptable since changes were made less than one year ago

B. The new detectors must be removed until the as-built drawings are formally updated

C. The as-built drawings need updating but the detectors may remain in service

D. The as-built drawings must be updated to reflect the current installed system configuration

DOMAIN 1.3 — SUBMITTAL PREPARATION AND SYSTEM LAYOUT (Questions 83–85)

83. A fire alarm sequence of operations matrix shows an "X" at the intersection of "Floor 2 Smoke Detector" and "NAC Zone 3." What does this indicate?

A. Floor 2 smoke detectors are powered by NAC Zone 3 during standby operation

B. Floor 2 smoke detectors are supervised by NAC Zone 3 for trouble monitoring

C. NAC Zone 3 will activate when a Floor 2 smoke detector goes into alarm

D. NAC Zone 3 must be tested before Floor 2 smoke detectors can be commissioned

84. A fire alarm battery calculation worksheet shows the following: standby current = 0.55A, alarm current = 4.2A, standby time = 24 hours, alarm time = 5 minutes. Before applying the safety factor, what is the subtotal ampere-hour requirement?

A. 13.20 Ah from standby current multiplied by standby time only

B. 0.35 Ah from alarm current multiplied by alarm time only

C. 13.55 Ah from the sum of standby energy and alarm energy

D. The subtotal cannot be determined without knowing the battery voltage

85. A fire alarm riser diagram shows two SLC loops originating from the main fire alarm control panel, with one loop serving floors 1 through 5 and the second loop serving floors 6 through 10. What information does this diagram primarily communicate?

A. The exact physical mounting location of every device on each floor of the building

B. The vertical circuit organization showing how the SLC loops are distributed between floors

C. The candela ratings and sound pressure levels for notification appliances on each floor

D. The detailed wire termination instructions for each connection at the panel terminals

LEVEL I — SIMULATION EXAM 3: ANSWER KEY AND EXPLANATIONS

1. C — An addressable fire alarm system assigns a unique electronic address to each device on the signaling line circuit, providing point-level identification. When a device activates, the panel identifies the exact device by address and displays its type and location. This eliminates the zone-level limitation of conventional systems where only the zone — not the specific device — is identified.

2. D — When a ceiling space is used as the return air path for the HVAC system — even without dedicated ductwork — it is classified as a plenum space. FPLP (Fire Power-Limited Plenum) cable is required for all fire alarm conductors in plenum spaces because its fire-resistant jacket limits smoke and toxic fume production. Lower-rated cables such as FPL and FPLR cannot be substituted in plenum applications.

3. B — In a Class B notification appliance circuit, the end-of-line resistor is installed at the last device on the circuit. The EOLR provides the supervision reference that allows the panel to monitor the circuit for open and short fault conditions. Installing the resistor at any other location would leave a portion of the circuit unsupervised.

4. A — NFPA 72 Section 17.14 requires manual fire alarm stations to be mounted between 42 and 48 inches above the finished floor, measured to the handle or operating mechanism. At 44 inches, the placement falls within the acceptable range and complies with the code requirement.

5. C — Total alarm load = 20 devices × 0.350 amps = 7.0 amps. Each NAC output is rated at 2.0 amps. Dividing 7.0 amps across circuits: 3 circuits would require approximately 2.33 amps each, exceeding the 2.0-amp rating. Four circuits at 5 devices each = 1.75 amps per circuit, which is within the 2.0-amp rating. A minimum of four NAC circuits is required.

6. A — Skipping the tug test leaves a connection unverified for mechanical integrity. Over time, vibration, thermal cycling, and building movement can work a loose termination free, creating an open circuit that generates trouble signals or prevents alarm signal transmission. The tug test takes seconds and catches connections that feel tight but are not fully seated in the terminal.

7. D — Aspirating (air sampling) detection systems provide the highest sensitivity of any smoke detection technology. They continuously draw air through a pipe network to a laser-based detection chamber that can identify smoke concentrations far below what any spot-type detector can sense. Very early warning aspirating systems are the standard for protecting high-value electronic environments such as server rooms and data centers.

8. B — NEC Article 760 does not prohibit fire alarm conduit from running alongside plumbing waste lines. The separation requirements in Article 760 apply to separation from power and lighting circuits, not from plumbing. As long as the fire alarm conduit is properly supported per NEC requirements and the routing does not create an unsafe condition, the installation is acceptable.

9. A — OSHA 29 CFR 1926.405 requires ground-fault circuit interrupter (GFCI) protection on all 125-volt, single-phase, 15- and 20-ampere temporary power receptacles on construction sites. This requirement applies regardless of the type of tool being used. GFCI protection prevents electrocution from ground faults that may occur in the harsh and wet conditions common on construction sites.

10. C — A three-story building with the second floor divided into two separate fire zones by a fire wall requires four detector zones at minimum — one for the first floor, two for the divided second floor (one for each side of the fire wall), and one for the third floor. NFPA 72 requires that zones not cross fire walls because the wall creates separate fire compartments that must be individually identified.

11. D — A resistance reading that matches the specified EOLR value at the panel terminals confirms that the circuit is continuous from the panel, through all devices and wiring, to the end-of-line resistor with no open circuits, short circuits, or ground faults. This is the expected normal reading for a properly installed and supervised Class B initiating device circuit.

12. B — The NEC allows a maximum of 360 degrees of bends between pull points. Three 90-degree bends = 270 degrees. Adding a 30-degree offset brings the total to 300 degrees, which is still below the 360-degree limit. The technician can proceed with the additional bend without installing a pull box.

13. A — Multi-criteria detectors analyze multiple environmental inputs — such as smoke, heat, and carbon monoxide — using algorithms that distinguish real fire signatures from nuisance sources like cooking fumes. A single-sensor detector (ionization or photoelectric alone) is more susceptible to false activation from cooking particles. Multi-criteria technology significantly reduces nuisance alarms while maintaining reliable fire detection.

14. D — Per NFPA 72 Table 18.5.5.5.1(a), a room measuring 28 × 28 feet requires a minimum candela rating of 30 cd for a single wall-mounted visible notification appliance. The table correlates room dimensions to the minimum candela output needed to ensure the strobe flash is visible throughout the space. Selecting a lower candela rating would leave portions of the room without adequate visible notification.

15. B — NFPA 72 governs the fire alarm system's functional performance — what the system must detect, how it must notify, and how it must be tested. The NEC governs the physical installation of wiring — cable types, raceway methods, conductor sizing, and grounding. Both codes must be satisfied, and when they address the same topic, the more restrictive requirement applies.

16. C — T-tap wiring acceptability depends on the specific manufacturer and system protocol. Some addressable SLC designs permit T-tap connections while others require a continuous loop or daisy-chain topology. The installer must follow the panel manufacturer's installation instructions, which define the acceptable wiring topologies for that specific system. Never assume T-taps are universally acceptable or prohibited.

17. A — NEC Section 760.136 requires PLFA conductors to be in a separate raceway from power conductors, but does not specify a minimum physical distance between the fire alarm raceway and a power junction box. The key requirement is that the fire alarm conductors must not share the same raceway, box, or enclosure with power conductors. Maintaining separate raceways satisfies the separation requirement.

18. B — NFPA 72 Section 17.7.3.2.1 allows smoke detectors to be wall-mounted as an alternative to ceiling mounting, provided the top of the detector is within 12 inches of the ceiling. This keeps the detector within the smoke layer that accumulates near the ceiling while accommodating installations where ceiling mounting is impractical or not feasible.

19. D — The retard mechanism on a waterflow switch introduces an adjustable time delay — typically 30 to 60 seconds — between the initial paddle movement and signal transmission. This delay prevents false alarms caused by momentary water pressure surges, water hammer, or brief system testing that produces transient flow without actual sprinkler head activation.

20. A — NFPA 72 Section 10.6.5 and NEC Article 760 require the fire alarm panel to be connected to a dedicated branch circuit that serves no other loads. Exit signs, regardless of their life safety function, are a separate building load that cannot share the fire alarm panel's dedicated circuit. The circuit must supply the fire alarm system exclusively.

21. C — The lock-on device prevents the fire alarm panel's dedicated branch circuit breaker from being accidentally turned off. NEC Article 760 requires this device to ensure the primary power supply remains continuously energized during normal building operation. Without the lock-on device, maintenance personnel or building occupants could inadvertently de-energize the fire alarm panel.

22. B — A tone generator and amplifier probe is the correct tool for identifying individual conductors of the same color within a conduit or junction box. The tone generator injects a distinct signal onto one circuit at the panel end, and the amplifier probe identifies the corresponding conductors at the junction box by detecting that specific signal. This method is reliable, non-destructive, and does not require the circuits to be energized.

23. D — Six conductors in a 3/4-inch EMT conduit is well within the maximum of 22 conductors of 14 AWG THHN permitted by NEC Annex C, Table C1. The installation uses only 27% of the maximum conductor count, leaving substantial room for the 40% fill limit. The conduit size is more than adequate for this conductor count.

24. A — Megger (insulation resistance) testing should be performed on all circuits with devices disconnected before the system is energized for the first time. The megger applies a high test voltage to verify that conductor insulation is intact and free from damage, moisture, or contamination that could cause ground faults or shorts. Discovering insulation problems before energization prevents damage to connected equipment.

25. B — Smoke detectors must be installed at least 4 inches from any wall-ceiling junction to avoid the dead air space that forms in the corner. NFPA 72 Section 17.7.3.2.1 establishes this minimum clearance because stagnant air trapped in the junction prevents smoke from reaching the detector's sensing chamber, delaying or preventing activation during a fire.

26. C — The adequacy of conductor size is primarily determined by the relationship between total current draw, circuit length, and the resulting voltage drop. Higher current or longer distances produce greater voltage drop through the conductor's resistance. If the voltage at the farthest device drops below its minimum listed operating voltage, a larger conductor size with lower resistance per foot must be used.

27. A — A triangle symbol with "WF" inside represents a waterflow switch on fire alarm and plumbing drawings. Waterflow switches are installed on sprinkler system piping to detect water flow, indicating that one or more sprinkler heads have activated. The switch generates an alarm signal when water movement displaces the internal paddle mechanism.

28. D — A heat detector rated at 135°F provides a 35°F margin above the maximum expected ambient temperature of 100°F, which exceeds the minimum 20°F margin required by NFPA 72. The low winter temperatures do not affect the detector selection because the activation temperature is a maximum threshold, not a minimum. The detector will simply remain in its normal standby state during cold periods.

29. C — After mounting an addressable device and connecting the SLC wiring, the technician must verify that the device address is correctly set to match the address schedule in the approved shop drawings. An incorrect address causes the panel to display wrong location information when the device activates, directing emergency responders to the wrong location. Address verification is critical for every addressable device.

30. B — Ceiling-mounted visible notification appliances must have their lens oriented downward to distribute light in a 360-degree pattern across the space below. If the lens faces upward or sideways, the strobe flash cannot reach occupants at floor level. NFPA 72 Table 18.5.5.5.1(b) provides coverage requirements specifically for ceiling-mounted appliances with downward-facing lenses.

31. A — Conventional fire alarm panels supervise initiating device circuits by continuously monitoring the resistance created by the end-of-line resistor. Under normal conditions, the panel sees the EOLR value. An open circuit produces infinite resistance, and a short circuit produces near-zero resistance. Any deviation from the expected EOLR value triggers a trouble or alarm response depending on the panel's design.

32. D — Any penetration through a fire-rated wall assembly must be firestopped using an approved fire-rated sealant, putty, pillow, or listed firestop device. The firestop restores the fire rating of the wall at the penetration point, preventing fire and smoke from passing through the opening around the conduit. Failure to firestop penetrations is a serious building code violation that compromises compartmentalization.

33. C — When fire alarm cable transitions from a concealed ceiling space to an exposed wall run below 7 feet above the floor, the exposed portion must be installed in a raceway to protect it from physical damage. NEC Article 760 requires raceway protection for fire alarm cable in exposed locations subject to contact from equipment, materials, or personnel. The concealed portion above the ceiling may not require a raceway if damage is unlikely.

34. A — Smoke detector spacing at the default 30-foot listed spacing does not require reduction for ceiling heights of 12 feet. NFPA 72 Table 17.6.3.5.1, which requires spacing reduction based on ceiling height, applies to heat detectors — not smoke detectors. Smoke detector spacing is based on the detector's listed spacing and does not change with ceiling height under standard conditions.

35. D — The length and configuration of duct detector sampling tubes are determined by the width of the duct and the air velocity at the detector location. Wider ducts require longer sampling tubes with more holes to ensure air is sampled across the full duct cross-section. Air velocity affects how much air enters the sampling tubes and reaches the sensing element. Manufacturer instructions specify tube configuration based on these parameters.

36. B — NFPA 72 requires corridor visible appliances to be placed within 15 feet of each end of the corridor. With a 150-foot corridor, two strobes — one within 15 feet of each end — would be spaced approximately 120 feet apart, which exceeds the 100-foot maximum spacing. Therefore, a minimum of three strobes is needed — because two strobes placed within 15 feet of each end creates a spacing of approximately 120 feet. The technician must verify against the 100-foot rule and may need additional appliances based on the exact placement.

37. C — Soldered connections are generally not an approved termination method for fire alarm circuits. Solder connections can develop cold joints, crack under vibration, and fail to maintain reliable contact over time. Fire alarm circuits require mechanical terminations — screw terminals, compression connectors, or listed wire connectors — that maintain their integrity through building vibration, thermal cycling, and aging.

38. D — All above-ceiling rough-in work must be completed before ceiling tiles are installed. Once the ceiling is closed, concealed work becomes inaccessible for inspection and extremely difficult to modify. The technician must prioritize completing the remaining three smoke detector bases and two junction boxes immediately, before the ceiling closure deadline, to avoid costly and disruptive remediation later.

39. A — Using the power formula $P = V \times I$: $P = 24$ VDC $\times$ 2.5 amps = 60 watts. This calculation determines the total power consumed by the notification appliance circuit during alarm conditions.

Power calculations are important for sizing power supplies, determining battery capacity, and verifying that the fire alarm panel's power supply can handle the total system load during alarm.

40. B — NFPA 72 Section 17.14 requires manual fire alarm stations to be installed within 5 feet of each exit doorway. A mounting location 7 feet from the door frame exceeds this maximum distance and does not comply with the code. The pull station must be relocated to a wall surface within 5 feet of the exit door to meet the placement requirement.

41. C — Class A wiring requires a return path from the devices back to the panel, creating a loop configuration. If a single open fault occurs on the loop, signals can still reach all devices through the alternate path. Class B wiring has only one path — out to the devices and terminating with an EOLR — so an open fault isolates all devices beyond the break.

42. D — The control module's output side connects to the elevator control system through a set of dry relay contacts. When the panel sends a recall command over the SLC, the control module closes its contacts, which are wired into the elevator controller's recall input. The elevator system then executes the Phase I recall sequence. The control module acts as the interface between the fire alarm system and the elevator system.

43. A — Safe ladder use practices require that the ladder extend at least 3 feet above the upper support point or landing surface when used for access to an elevated area. This extension provides a handhold for the worker when transitioning from the ladder to the work surface and prevents the ladder from shifting or sliding below the edge of the landing.

44. C — Both smoke detectors and waterflow switches generate alarm signals. Smoke detectors alarm when they detect smoke, indicating a fire condition. Waterflow switches alarm when water flows through sprinkler piping, indicating that a sprinkler head has activated in response to fire. Tamper switches — not waterflow switches — generate supervisory signals when a valve position changes.

45. B — The end-of-line resistor must match the value specified by the fire alarm panel manufacturer. Each panel is designed to recognize a specific resistance value as the normal circuit condition. Installing a different value causes the panel to read an incorrect resistance, which may generate a false trouble signal, prevent proper supervision, or fail to detect an actual fault condition on the circuit.

46. A — NEC establishes cable support requirements that vary by cable type and installation method. Fire alarm cables must be supported at intervals appropriate to the specific cable type per the NEC articles that govern each cable designation. General support requirements include securing cable within specified distances of boxes and at regular intervals along the run to prevent sagging, stress on connections, and potential damage.

47. D — Residual construction dust from renovation activities is the most common cause of nuisance alarms in newly renovated spaces. Fine particles from drywall sanding, painting, and demolition infiltrate smoke detector sensing chambers and trigger false activations. The two-week timeline

after renovation completion is consistent with this cause. The detectors likely need cleaning or temporary protective covers during the final construction dust settling period.

48. C — NFPA 72 Table 14.4.3.2 requires the fire alarm control unit's functions to be tested annually. This includes testing alarm processing, trouble detection, supervisory signal handling, notification appliance activation, communication signal transmission, and all programmed system responses. Annual testing ensures the panel's central processing and output functions remain fully operational.

49. B — The panel correctly processed the alarm and activated notification, so the panel and detector are functioning properly. The communication pathway between the panel and the supervising station is the component that failed to deliver the signal. Causes include a failed communicator module, a disconnected communication line, a network outage, or a cellular signal interruption — all pathway-level issues rather than panel or device issues.

50. A — The installed 17 Ah batteries do not meet the calculated minimum requirement of 18 Ah. Batteries connected in series add voltage (12V + 12V = 24V) but do not add ampere-hour capacity — the series pair still provides only 17 Ah. The batteries must be replaced with a set that equals or exceeds the 18 Ah calculated minimum, including the 20% safety factor already built into the calculation.

51. D — NFPA 72 Table 14.4.3.2 requires all smoke detectors to be functionally tested semiannually. While some interpretations allow alternative testing methods with rotating schedules, the requirement is that every detector be tested within the semiannual testing interval. All 450 detectors must be tested during each semiannual test period to maintain full code compliance.

52. C — When the panel sends the elevator recall signal but the elevators do not respond, the fault most likely exists at the interface between the fire alarm system and the elevator controller. The fire alarm side — detection, processing, and signal output — is functioning correctly. The interface wiring, the control module contacts, or the elevator controller's recall input may have failed, preventing the elevators from receiving or acting on the recall command.

53. B — A horn/strobe making a clicking sound during standby — when no alarm condition exists — most likely has an internal component failure that is causing the device to partially energize or mechanically cycle. NAC circuits are de-energized during standby on most systems, so any device producing sound or movement during standby is exhibiting abnormal behavior that indicates a hardware fault requiring device replacement.

54. A — NFPA 72 requires that waterflow alarm signals be received at the panel within 90 seconds of sustained water flow at the inspector's test connection. This 90-second window includes any adjustable retard delay built into the waterflow switch, which is typically set between 30 and 60 seconds to prevent false alarms from momentary pressure surges.

55. D — When multiple consecutive device addresses stop responding simultaneously, the most likely cause is a wiring fault — an open circuit or short circuit — on the SLC that isolates a physical

section of the loop containing those devices. Fifteen consecutive addresses failing at once is far more consistent with a single wiring fault in one location than with multiple simultaneous device failures.

56. B — A low battery trouble that appears at night and clears in the morning suggests the battery charger is not maintaining adequate charge. During the day, the charger may provide enough current to keep the batteries above the trouble threshold, but overnight — when the charger cannot fully compensate for the natural self-discharge and standby load — the voltage drops below the trouble level. The charger output or battery condition requires investigation.

57. A — NFPA 72 requires tamper switches to generate a supervisory signal no more than two revolutions of the valve wheel from the normal fully open position. If two full revolutions produce no signal, the tamper switch has failed its functional test. The switch must be repaired or replaced, and the corrected device must be retested to verify proper operation before the system can pass inspection.

58. C — The detector reading of 1.2% obscuration per foot falls within the manufacturer's acceptable range of 0.5% to 3.7% obscuration per foot. The detector is operating within its listed sensitivity parameters and requires no corrective action at this time. The reading will be compared to future readings to monitor for drift over the detector's service life.

59. D — NFPA 72 Section 10.6.9 permits a delay of up to 3 hours before annunciating an AC power failure trouble signal. This delay prevents nuisance trouble signals during brief power interruptions. A trouble signal appearing at exactly 3 hours after AC power loss is at the maximum permitted delay and is code-compliant.

60. B — NFPA 72 Table 14.4.3.2 requires sensitivity testing within one year of installation and every alternate year thereafter. For a system installed five years ago with tests completed at year one and year three, the next test is due at year five. The alternate-year cycle from the initial test produces a schedule of year 1, year 3, year 5, year 7, and so on.

61. A — A 15-minute discrepancy between the panel's internal clock and actual time is a documentation and operational concern. Accurate time stamps in the event log are essential for incident investigation, regulatory compliance, and coordination with other building systems and emergency response records. The panel clock should be corrected to the accurate current time during the inspection visit.

62. C — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. A strobe flashing at a different rate than the others in the same room violates this requirement and creates a disorienting effect that can trigger seizures in photosensitive individuals. The non-synchronized strobe must be investigated and the synchronization issue corrected.

63. D — Disconnecting the NAC 2 field wiring at the panel and observing the ground fault trouble clear confirms that the fault is located on the field wiring or connected appliances — not on the panel's internal circuitry. If the fault were internal to the panel's NAC circuit board, the trouble would persist with the field wiring disconnected. The technician can now use the divide-and-conquer method on the field wiring to isolate the fault location.

64. B — When notification appliances on one floor fail to activate during an alarm from another floor, and the sequence of operations requires multi-floor notification, the most likely cause is a programming error. The panel programming does not include the third floor NAC zone in the second floor alarm response matrix. The programming must be reviewed against the approved sequence of operations and corrected.

65. A — With 27.2 VDC at the battery terminals and the charger connected — a normal float charge voltage — the batteries appear to be receiving charge. The technician should check the battery connections for tightness and corrosion, and verify the charger's output current to determine whether the charger is functioning properly. The battery trouble may be caused by intermittent connections, a marginal charger output, or a battery cell that is degrading internally.

66. C — The Record of Completion per NFPA 72 Section 7.8.2 certifies that the fire alarm system was installed and tested in compliance with NFPA 72. It requires signatures from the installer, designer, and AHJ, and documents system specifications, power supply data, circuit information, and acceptance testing results. It is a code-required document — not a warranty registration or emergency plan.

67. D — Four smoke detectors missing from their bases constitute a significant deficiency that must be documented and corrected immediately. Missing detectors leave portions of the building without fire detection coverage. The panel should be generating trouble signals for these devices since the detector heads are not communicating with the bases. The building owner must be notified and replacement detectors installed promptly.

68. A — An "unidentified account" error at the supervising station means the account number programmed into the fire alarm panel's communication module does not match the account number on file at the monitoring station. This is a programming or administrative issue — the account numbers must be reconciled between the panel and the station to ensure signals are correctly identified and processed.

69. B — The installed battery capacity of 26 Ah exceeds the calculated minimum requirement of 22.2 Ah. The 20% safety factor is already included in the 22.2 Ah calculation, so no additional margin is required. The batteries provide 3.8 Ah of capacity above the minimum, which is acceptable. Battery capacity must equal or exceed the calculated minimum — the 26 Ah batteries satisfy this requirement.

70. C — NFPA 72 Section 18.4.5.1 requires a minimum of 75 dB at the pillow in sleeping areas. A measurement of 72 dB falls below this minimum and does not comply with the code. The

notification system must be modified — either by increasing the appliance output, adding additional appliances, or repositioning existing appliances — to achieve the required 75 dB at the pillow.

71. D — When the technician disconnects the circuit at its midpoint and the trouble continues only on the field side, the fault is located on the field-side half — between the midpoint and the end of the circuit. The panel-side half is clear. The technician can continue dividing the field-side section in half to progressively narrow the fault location until the specific device or wiring segment causing the intermittent trouble is identified.

72. A — A horn/strobe that has been painted must be replaced. Paint can block the strobe lens, reducing light output below the required candela rating, and can obstruct the horn openings, reducing sound output below required decibel levels. Even if the device activates during testing, its output may not meet the performance requirements of NFPA 72. Attempting to clean paint from the device does not reliably restore factory performance.

73. B — Before activating any initiating device during testing, the technician must verify that the supervising station has been notified that the system is on test status. This prevents false alarm dispatches that would result in unnecessary fire department response. The notification must be confirmed by the station before any device testing begins, and the station must be notified again when testing is complete.

74. C — NFPA 72 Section 14.3 defines visual inspection as a physical examination that verifies components are in place, undamaged, free of obstructions, and in a condition that suggests they will function properly. Visual inspection is observational only — it does not involve operating devices, measuring electrical values, or performing functional tests. It is the first step in identifying conditions that could impair system performance.

75. D — The response to duct detector activation — whether it triggers general building notification or only HVAC shutdown — depends on the specific system design and the approved sequence of operations. Some systems program duct detectors to shut down the air handling unit only, while others include general alarm notification. The technician should verify the programmed response against the sequence of operations to determine whether the observed behavior is correct.

76. A — The absence of a lock-on device on the fire alarm panel's dedicated branch circuit breaker is a code deficiency. NEC Article 760 requires a lock-on device to prevent the breaker from being accidentally turned off, which would remove primary power from the fire alarm system. This requirement applies to all fire alarm panel installations regardless of building height or installation date.

77. B — When the first 10 devices on a NAC circuit operate but the last two do not, the most likely cause is an open circuit in the wiring between the tenth and eleventh devices. The open breaks the circuit path, preventing power from reaching the remaining devices beyond the fault. This is the

characteristic behavior of a Class B circuit with an open fault — devices beyond the break are isolated.

78. D — The communication module or communication pathway should be investigated first because the panel is operating normally with no trouble signals, but signals are not reaching the supervising station. The panel may not be detecting the communication failure if the monitoring supervision polling interval has not expired, or the communication trouble detection may have a fault of its own. The communicator, its connection, and the transmission path must all be checked.

79. C — Converting an office to a server room with raised floor tiles raises two concerns: detection may be needed below the raised floor where cables and equipment can overheat, and the ceiling height of 14 feet should be evaluated for smoke detector effectiveness. Server rooms often require detection both above the ceiling and below the raised floor per NFPA 75 and project specifications. The existing detection arrangement should be reviewed by the designer.

80. A — Loss of copper telephone service eliminates the DACT's communication pathway to the supervising station. The fire alarm system's communication method must be updated to an approved alternative — such as IP or cellular — before the telephone service is disconnected. Operating without a functional communication link to the supervising station violates NFPA 72 and leaves the building without monitored fire protection.

81. B — An ending voltage of 18.2 VDC after a load test — an 8.6-volt drop from 26.8 VDC — indicates the batteries cannot sustain adequate voltage under load. Most fire alarm equipment requires a minimum of approximately 20.4 VDC to operate properly. A drop to 18.2 VDC would cause system components to malfunction or shut down during an actual alarm event. The batteries must be replaced.

82. D — As-built drawings must be updated to accurately reflect the current installed configuration of the fire alarm system, including all 15 new smoke detectors and their locations, addresses, and circuit assignments. NFPA 72 requires system documentation to be maintained and kept current. Outdated as-built drawings create confusion during maintenance, troubleshooting, and emergency response.

83. C — An "X" at the intersection of an initiating device zone and a NAC zone in the sequence of operations matrix indicates that the NAC zone will activate when that initiating device goes into alarm. The matrix defines every input-output relationship in the system — each "X" represents a programmed response that the panel will execute when the corresponding alarm condition occurs.

84. C — Standby energy = 0.55A × 24 hours = 13.20 Ah. Alarm energy = 4.2A × 0.083 hours (5 minutes) = 0.349 Ah. Subtotal = 13.20 + 0.349 = 13.55 Ah before applying the 20% safety factor. The safety factor would then be applied to this subtotal (13.55 × 1.20 = 16.26 Ah) to determine the minimum required battery capacity.

85. B — A fire alarm riser diagram shows the vertical organization of the system — how circuits route between floors, where panels are located relative to each other, and how loops and circuits are distributed. In this case, the riser diagram communicates that SLC Loop 1 serves floors 1–5 and SLC Loop 2 serves floors 6–10, showing the system's circuit architecture from a building-level perspective.