LEVEL I — SIMULATION EXAM 7 (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 preparing to install smoke detectors in a data center with a 12-foot ceiling and a 2-foot raised access floor. Equipment racks generate significant heat that creates strong upward air currents. Where should detection be considered in this environment?

A. Only on the ceiling because smoke always rises directly to the highest point in the room

B. Both above the ceiling tiles and below the raised floor in addition to standard ceiling detection

C. Only below the raised floor because cables under the floor represent the primary fire risk

D. Only at the equipment rack level because that is where fires are most likely to originate

2. A fire alarm technician is reviewing a project specification that calls for "pathway survivability Level 2" on all voice evacuation circuits. Per NFPA 72 Chapter 12, which of the following methods satisfies this requirement?

A. Installing all voice circuits in standard EMT conduit throughout the building

B. Routing all voice circuits through a building that is fully protected by sprinklers

C. Using standard FPLP cable without any additional physical protection measures

D. Protecting voice circuits with 2-hour fire-rated construction or 2-hour rated cable

3. A fire alarm technician needs to connect a 120 VAC magnetic door holder to an addressable fire alarm system. The door holder must release when the fire alarm activates. Which addressable device provides the output to control the door holder?

A. A control module that receives a panel command and activates relay contacts for the door holder

B. A monitor module that senses the door holder's position and reports it to the panel

C. An isolation module that protects the SLC from the door holder's 120 VAC circuit

D. A sync module that coordinates the door holder release with notification appliance activation

4. A fire alarm technician is troubleshooting an addressable panel that displays "DEVICE CONFLICT — ADDRESS 023." Two devices on the SLC are both programmed with address 023. What operational problem does this create?

A. The panel will operate both devices normally but display only one location descriptor

B. The panel cannot distinguish between the two devices causing unreliable communication

C. One device will override the other and only the first device installed will function

D. The SLC will automatically reassign a new address to the duplicate device

5. A fire alarm technician is installing fire alarm cable and encounters a 2-inch gap between the top of a concrete masonry wall and the underside of the steel deck above. The gap is not fire-rated. The technician wants to route the cable through this gap to reach the other side of the wall. Is this acceptable?

A. Yes, any gap in a non-fire-rated wall is acceptable for routing fire alarm cable

B. No, fire alarm cable can only pass through walls via conduit penetrations with firestop

C. It depends on whether the wall is fire-rated — a non-fire-rated wall does not require firestop

D. No, all cable passages through walls must use core-drilled holes regardless of the wall rating

6. A fire alarm technician is installing a conventional fire alarm system in a small office building. The building has six rooms on a single floor. The project drawings show all six rooms connected to a single IDC zone. During installation, the technician notices that one room is separated from the others by a 2-hour fire-rated wall. What concern should this raise?

A. The fire-rated wall creates a separate fire compartment and the zone should not cross it

B. The single-zone design is acceptable because all rooms are on the same floor level

C. The 2-hour rating is irrelevant to fire alarm zone boundaries in conventional systems

D. The zone is too small and should be expanded to include adjacent corridors as well

7. A fire alarm technician measures the voltage at the panel's SLC output terminals and reads 26.8 VDC. The panel manufacturer specifies an SLC operating range of 24 to 32 VDC. The technician's coworker says this voltage seems high. Is the coworker's concern valid?

A. Yes, any voltage above the nominal 24 VDC indicates the panel's regulator is malfunctioning

B. Yes, the SLC voltage should be exactly 24.0 VDC under all operating conditions

C. No, 26.8 VDC falls within the manufacturer's specified operating range of 24 to 32 VDC

D. No, but only because the SLC is not energized during standby and the reading is residual

8. A fire alarm technician is installing visible notification appliances in a room measuring 35 feet by 35 feet. Per NFPA 72 Table 18.5.5.5.1(a), a single 15 cd wall-mounted strobe covers up to 20 × 20 feet, and a single 75 cd strobe covers up to 45 × 45 feet. Which option correctly addresses this room?

A. One 15 cd strobe mounted centrally on the longest wall for balanced room coverage

B. Two 15 cd strobes on opposite walls to combine their coverage across the room

C. Four 15 cd strobes one on each wall to ensure complete coverage of all corners

D. One 75 cd wall-mounted strobe because a single unit can cover a room up to 45 × 45 feet

9. On a construction site, a fire alarm technician observes that scaffold planking on a scaffold being used by another trade is missing guardrails on one side. No fall protection equipment is being used. The scaffold is 12 feet above ground level. What should the fire alarm technician do?

A. Nothing, since the unsafe scaffold belongs to another trade and is not the technician's concern

B. Report the unsafe condition to the site safety officer or site superintendent immediately

C. Personally install temporary guardrails on the scaffold before any other work proceeds

D. Use the scaffold only after verifying that the planking is structurally sound and stable

10. Using Ohm's Law, a fire alarm technician calculates the resistance in a circuit that has 24 VDC applied and draws 0.008 amps of current. What is the circuit resistance?

A. 3,000 ohms calculated by dividing the voltage by the current

B. 0.192 ohms calculated by multiplying the voltage by the current

C. 192 ohms calculated by dividing the current by the voltage in milliamps

D. 24,008 ohms calculated by adding the voltage and current values together

11. A fire alarm technician is installing a fire alarm panel in a building and discovers that the electrical room where the panel will be mounted has no ventilation. The room temperature regularly reaches 95°F during summer. What concern should the technician raise?

A. The room needs additional lighting to allow technicians to read the panel display clearly

B. The panel must be mounted on a vibration-dampening bracket to protect internal components

C. The panel's UL listing may specify a maximum ambient temperature that could be exceeded

D. Elevated temperatures may reduce the panel's operating life and affect battery performance

12. A fire alarm technician is running fire alarm conduit through a metal stud wall. The technician drills a hole through the metal stud for the conduit to pass through. What must be done to protect the cable or conductors at the stud penetration?

A. The edges of the hole must be deburred to prevent them from cutting into conductor insulation

B. A listed bushing or grommet must protect the conductors from the sharp metal edges of the stud

C. The hole must be enlarged to twice the conduit diameter to prevent contact with the stud

D. Fire-rated caulk must be applied around the conduit at the stud penetration point

13. A fire alarm technician is installing a heat detector in a room with a ceiling height of 22 feet. The detector has a listed spacing of 50 feet at a 10-foot ceiling. Per NFPA 72, what must the technician do regarding the detector spacing?

A. Reduce the spacing per NFPA 72 Table 17.6.3.5.1 based on the 22-foot ceiling height

B. Maintain the 50-foot spacing because listed spacing is fixed regardless of ceiling height

C. Double the spacing to 100 feet because higher ceilings spread heat over a larger area

D. Eliminate the heat detector and substitute a smoke detector for the 22-foot ceiling height

14. A fire alarm system is being installed in a two-story medical office building. The first floor has a waiting room, exam rooms, and administrative offices. The second floor has a laboratory and additional exam rooms. What determines whether this building requires a fire alarm system?

A. The total square footage of the building and the number of stories above grade

B. The building's occupancy classification, occupant load, and applicable building code provisions

C. The decision of the building owner based on their insurance requirements and risk assessment

D. Whether the building has an automatic sprinkler system that could substitute for fire alarm

15. A fire alarm technician is connecting two fire alarm cables together inside a junction box using wire nuts. After making the splice, the technician wraps electrical tape around each wire nut. A coworker points out that the tape is unnecessary. Who is correct?

A. The technician is correct because electrical tape provides essential moisture protection

B. The technician is correct because NEC requires tape on all wire nut connections in fire alarm circuits

C. The coworker is correct because tape is only required in wet locations per NFPA 72

D. The coworker is correct — listed wire nuts do not require tape and a tug test is the critical step

16. A fire alarm technician is installing conduit for fire alarm circuits in a building. The conduit run from the panel to the first device location requires routing around a large HVAC unit. The planned route requires two 90-degree bends and four 45-degree bends. What is the total number of bend degrees in this run?

A. 360 degrees which is at the maximum limit and a pull box should be strongly considered

B. 270 degrees which is well within the 360-degree maximum between pull points

C. 540 degrees which exceeds the maximum and requires at least one pull box

D. 180 degrees which is exactly half of the allowable maximum between pull points

17. A fire alarm technician is installing cable in a building with steel deck and bar joist construction. The technician wants to attach the fire alarm cable to the bar joists using J-hooks. The cable will hang below the bar joist bottom chord by approximately 2 inches. Is this installation acceptable?

A. No, fire alarm cable must be secured directly against the structural member at all times

B. No, J-hooks are not an approved support method for fire alarm cable installations

C. Yes, J-hooks are a commonly accepted support method for cable routing on bar joists

D. Yes, but only if the cable hangs less than 1 inch below the bottom chord of the joist

18. A fire alarm technician is installing a fire alarm system in a building with a mezzanine level. The mezzanine is open to the floor below with no walls or ceiling enclosing it. The mezzanine area is 800 square feet. Should the mezzanine be a separate fire alarm zone from the main floor?

A. No, because the mezzanine is open to the floor below and shares the same air volume

B. Yes, because the mezzanine constitutes a separate occupied level regardless of openness

C. No, but only if the mezzanine area is less than 1,000 square feet as a threshold

D. Yes, because all elevated platforms above 4 feet require independent fire alarm zones

19. A fire alarm technician is installing a combination heat/smoke detector base. The base has four screw terminals and a twist-lock slot for the detector head. Before mounting the base, the technician notices the base has a compatibility marking that indicates it works only with specific detector models from the same manufacturer. Why is this marking important?

A. Using an incompatible base could result in a physical mismatch that damages the detector head

B. The marking is only relevant for warranty purposes and does not affect device operation

C. An incompatible base will cause the detector to operate at an incorrect sensitivity level

D. Using an incompatible base prevents proper communication between the device and the panel

20. A fire alarm technician is installing notification appliances in a gymnasium with 24-foot ceilings. The gym measures 80 feet by 100 feet. Wall-mounted horn/strobes are mounted at 96 inches above the floor. What challenge does the high ceiling present for audible notification?

A. Sound output from devices at 96 inches may be absorbed by the large air volume above

B. The gymnasium requires ceiling-mounted appliances exclusively at heights above 20 feet

C. Sound energy dissipates in the large volume, potentially requiring higher output or more devices

D. High ceilings have no effect on audible notification because sound travels horizontally

21. A fire alarm technician is installing a detector in a room where the ceiling transitions from a flat section to a sloped section. The flat portion is 8 feet high and the slope rises to a peak at 14 feet. Per NFPA 72, where should the smoke detector be positioned?

A. Within 3 feet of the peak on the sloped section where smoke accumulates first

B. On the flat ceiling section because it provides the most consistent detector performance

C. At the exact transition point where the flat ceiling meets the sloped section

D. At the midpoint of the sloped section to provide balanced coverage of both ceiling areas

22. A fire alarm technician is installing pull stations in a school corridor. The corridor has exits at both ends and one exit in the middle that leads to an exterior courtyard. The distance from Exit 1 to Exit 2 is 250 feet, and Exit 3 is at the 125-foot midpoint. What is the minimum number of pull stations required?

A. Two pull stations — one within 5 feet of each end exit since the middle exit is supplementary

B. Three pull stations — one within 5 feet of each of the three exit doors

C. Four pull stations to ensure travel distance from any point does not exceed 200 feet

D. Five pull stations to cover all exits plus intermediate locations for travel distance compliance

23. A fire alarm technician is connecting the primary power supply to a fire alarm panel. The dedicated branch circuit uses a 15-amp breaker with 14 AWG conductors. The panel draws a maximum of 6 amps. During connection, the technician notices the circuit uses a standard residential-grade receptacle rather than a hardwired connection. Is this acceptable?

A. Yes, receptacle connections are acceptable for fire alarm panels in all occupancy types

B. Yes, as long as the receptacle is dedicated to the fire alarm panel and is clearly identified

C. No, but only because the receptacle is residential-grade rather than commercial-grade

D. No, fire alarm panels should be hardwired to the dedicated branch circuit per standard practice

24. A fire alarm technician is installing fire alarm cable alongside a bundle of Category 6 data cables in a common cable pathway above a suspended ceiling. The data cables carry Power over Ethernet (PoE) at 48 VDC. Per NEC Article 760, does this installation require separation between the fire alarm cable and the PoE data cables?

A. Yes, PoE cables at 48 VDC are classified as power cables requiring full separation

B. Yes, any cable carrying more than 24 VDC must be separated from fire alarm circuits

C. No separation is required if both cable types are power-limited circuits per the NEC

D. No, because data cables and fire alarm cables are both low-voltage and inherently compatible

25. A technician is performing continuity testing on a newly installed Class B IDC before connecting it to the panel. With the EOLR connected at the last device, the meter reads 4.7 kΩ. Without the EOLR, the meter reads 0.4 Ω between the two conductors at the panel end. What do these two readings confirm?

A. The circuit is continuous with normal wire resistance, and the EOLR value reads correctly at the panel

B. The EOLR is defective because its value should be less than the wire resistance

C. The wire resistance is too high and indicates a poor connection somewhere on the circuit

D. The readings are inconsistent and suggest a partial short on the circuit near the EOLR

26. A fire alarm technician is working in a confined space — a small mechanical room with limited ventilation — to install a fire alarm panel. Per OSHA regulations, what must be verified before entering a confined space?

A. The fire alarm panel must be de-energized before the technician enters the space

B. A supervisor must be physically present inside the confined space during all work

C. The space must be evaluated for atmospheric hazards and OSHA entry procedures followed

D. A confined space entry permit and atmospheric monitoring must be in place before entry

27. A fire alarm technician is installing smoke detectors in a corridor with a suspended ceiling. The ceiling tiles are 2 × 4 feet, and the grid is hung 10 inches below a concrete deck. The technician plans to mount the detector to the ceiling grid rather than to the concrete deck above. Is this appropriate?

A. Yes, mounting to the ceiling grid is acceptable because the tiles form the finished ceiling surface

B. The detector base must be secured to the grid with an approved support clip or bracket

C. The detector must be mounted directly to the concrete deck using appropriate anchors

D. Either the grid or the deck is acceptable as long as the detector is within 4 inches of the tiles

28. A fire alarm technician is installing a fire alarm system in a strip mall. Each tenant space has a separate fire alarm zone. Tenant A's zone includes three smoke detectors and one pull station. During installation, the technician discovers that the pull station in Tenant A is wired to Tenant B's zone circuit by mistake. What must be corrected?

A. The pull station must be rewired to Tenant A's zone circuit to match the approved drawings

B. The zone assignment can remain if the panel programming is updated to reflect the change

C. The error is acceptable because pull station zone assignment does not affect alarm response

D. The pull station should be removed from Tenant A and a new one installed on the correct circuit

29. A fire alarm technician is installing cable in a location where the ceiling space transitions from a non-plenum area (ducted return) to a plenum area (open return) at a partition wall. The technician is using FPL cable. What must happen at the transition point?

A. The FPL cable may continue through the plenum area if it is installed inside metallic conduit

B. A junction box must be installed and FPL cable spliced to standard building wire for the plenum

C. The FPL cable must be terminated and FPLP cable used for the portion in the plenum space

D. The FPL cable can continue unchanged because cable type is based on the starting location

30. A fire alarm technician is installing a notification appliance circuit in a large retail store. The NAC design calls for 18 horn/strobes drawing 0.280 amps each. The panel has four NAC outputs rated at 2.0 amps each. How should the 18 devices be distributed across the NAC circuits?

A. All 18 on one NAC because 18 × 0.280 = 5.04 amps is within a single 2.0-amp output capacity

B. Two NAC circuits with 9 devices each for balanced loading at 2.52 amps per circuit

C. Four NAC circuits with devices split roughly equally because each circuit carries less load

D. Three NAC circuits — two circuits with 6 devices each and one circuit with 6 devices

31. A fire alarm technician finishes wiring a conventional IDC and connects it to the panel. Upon startup, the panel shows "ALARM — ZONE 5" immediately. No devices have been activated. The technician measures the resistance at the Zone 5 terminals and reads 2.1 Ω. The specified EOLR for this panel is 4.7 kΩ. What is the most likely cause?

A. The EOLR was not installed and the panel sees only the wire resistance as a near-short condition

B. The EOLR is installed correctly but the panel's zone input board is defective

C. A smoke detector on Zone 5 activated immediately upon receiving power from the panel

D. The IDC conductors are too long and the total wire resistance is pulling the circuit into alarm

32. During installation of a fire alarm system, the technician discovers that the building's electrical panel is located in a tenant space that is locked after business hours. The fire alarm panel's dedicated breaker is inside this locked electrical panel. What concern does this present?

A. The fire alarm dedicated breaker must be accessible to authorized personnel at all times

B. Locked electrical panels are acceptable because breakers should not be casually accessed

C. The lock is only a concern if the tenant space contains the fire alarm control panel

D. The building owner must provide a key box at the electrical panel for fire department access

33. A fire alarm technician is installing an addressable smoke detector at the top of an elevator hoistway. The purpose of this detector is to initiate elevator recall when smoke is detected in the hoistway. Per NFPA 72, what type of signal should this detector generate when it activates?

A. A supervisory signal because the detector monitors elevator equipment rather than occupied space

B. A trouble signal that alerts maintenance staff to investigate the hoistway condition

C. A pre-alarm signal that starts a 60-second investigation timer before recall is initiated

D. An alarm signal that initiates Phase I elevator recall to the designated floor

34. A fire alarm technician is installing conduit in a building and needs to cross a 6-inch structural beam that runs perpendicular to the conduit path. The technician plans to use two 90-degree bends — one up and one down — to cross over the beam. Each bend adds approximately 6 inches of conduit length. How many degrees of the 360-degree maximum do these two bends consume?

A. 90 degrees because the two bends are in opposite directions and partially cancel each other

B. 360 degrees because each offset requires two additional 45-degree bends at the transition points

C. 180 degrees — each 90-degree bend counts toward the maximum regardless of direction

D. 0 degrees because offset bends made to cross obstructions are exempt from the bend count

35. A fire alarm technician is installing a strobe in a patient room in a hospital. The room is 12 × 14 feet with a 9-foot ceiling. Per NFPA 72, what is the minimum candela rating for a single wall-mounted visible appliance in this room?

A. 15 cd because rooms up to 20 × 20 feet require only the minimum candela rating

B. 15 cd which is the minimum available rating and covers the room based on NFPA 72 tables

C. 30 cd because hospital patient rooms have a higher candela requirement than standard rooms

D. 75 cd because sleeping areas always require a higher candela rating for visible notification

36. A fire alarm technician is installing a fire alarm system in a restaurant. The dining area has a smooth flat ceiling at 10 feet. The kitchen has a hood system over the cooking line with a grease-laden atmosphere. What detection strategy is most appropriate?

A. Smoke detectors in the dining area and heat detectors in the kitchen near cooking equipment

B. Heat detectors throughout both the dining area and the kitchen for consistent protection

C. Smoke detectors throughout both areas with protective covers on the kitchen detectors

D. No detection in the kitchen because the hood system provides fire protection for the cooking area

37. A fire alarm technician discovers that the fire alarm panel's AC power indicator is illuminated but the battery charger indicator is off. The batteries read 22.4 VDC with no load. What does this combination of symptoms suggest?

A. The panel is operating normally and the charger enters rest mode when batteries are full

B. The batteries are overcharged and the charger has shut down to prevent thermal damage

C. The AC power supply is providing inadequate voltage for the charger to function properly

D. The charger circuit has failed and the batteries are slowly discharging without being recharged

38. A fire alarm technician is installing devices in a building under construction. Drywall finishing has just been completed, and fine drywall dust is still settling throughout the building. The project schedule requires smoke detector installation this week. What precaution should the technician take?

A. Install the detectors without bases to allow the sensing chambers to acclimate to the dust

B. Install detector bases now but delay installing detector heads until construction dust settles

C. Install the complete detectors now with manufacturer-approved protective dust covers

D. Skip the smoke detector installation entirely and install heat detectors as temporary substitutes

39. A fire alarm technician is calculating the battery requirement for a system. The standby current is 0.70 amps and the alarm current is 5.0 amps. Using 24-hour standby and 5-minute alarm with a 20% safety factor, the calculated minimum is 20.90 Ah. The available battery options are 18 Ah and 26 Ah sets. Which should be selected?

A. The 18 Ah set because it is closest to the required capacity and reduces panel weight

B. Either set is acceptable since both are within the standard battery tolerance range

C. The 26 Ah set because it must equal or exceed the calculated minimum of 20.90 Ah

D. The 18 Ah set because the 20% safety factor already accounts for capacity shortfall

40. A fire alarm technician is installing a smoke detector on a ceiling directly below an air conditioning vent. The supply air temperature is 58°F and the room temperature is 74°F. What risk does this installation create?

A. Cold supply air can create condensation on the detector that triggers nuisance alarms or faults

B. The temperature difference accelerates smoke particle detection improving response time

C. Cold air from the vent increases the detector's sensitivity beyond its calibrated range

D. The supply air creates positive pressure that forces smoke into the detector more effectively

41. A fire alarm technician is installing an addressable system and must connect a conventional zone of six existing smoke detectors to the new addressable panel. The existing detectors are 2-wire conventional units. What addressable device allows these conventional detectors to be monitored by the new panel?

A. A conventional zone adapter module that monitors the existing IDC as a single addressable point

B. An SLC splitter that divides the signaling line circuit to accommodate conventional devices

C. A protocol converter that changes the conventional detector signals to addressable format

D. A monitor module configured to supervise the conventional IDC and report its status to the panel

42. A fire alarm technician is installing conduit supports and must secure EMT conduit within a specific distance of a junction box per NEC requirements. What is the maximum distance from a junction box at which the conduit must be secured for 3/4-inch EMT?

A. Within 6 feet of each box or fitting as specified by the NEC for all EMT sizes

B. Within 4 feet of each box or fitting for all EMT conduit sizes and types

C. Within 3 feet of each box or fitting per NEC Section 358.30 for 3/4-inch EMT

D. Within 18 inches of each box or fitting to prevent conduit movement at the connection

43. A fire alarm technician is running a new fire alarm circuit and discovers that the planned conduit route passes through a concrete firewall. The technician core-drills a hole through the firewall for the conduit. After installing the conduit, what must be done before the installation passes inspection?

A. The conduit must be pressure-tested to verify there are no air leaks at the firewall penetration

B. The penetration must be sealed with a listed firestop system to restore the wall's fire rating

C. A pull box must be installed on each side of the firewall within 12 inches of the penetration

D. The conduit size must be increased by one trade size where it passes through the firewall

44. A fire alarm technician is testing a newly installed Class B SLC loop on an addressable panel. The panel reports that all 85 devices are communicating normally. The technician then physically disconnects the SLC wiring at device number 43 — the approximate midpoint of the circuit. What should happen?

A. The panel should report a trouble for the open circuit and devices 44 through 85 should stop communicating

B. All devices should continue communicating because the panel automatically switches to Class A mode

C. Only device 43 should show a trouble signal while all other devices continue to operate normally

D. The panel should immediately activate the notification appliances for the affected devices

45. A fire alarm technician is verifying the primary power connection for a fire alarm panel. The dedicated branch circuit breaker at the electrical distribution panel has a red handle and is labeled "FIRE ALARM — DO NOT TURN OFF." However, no lock-on device is present. Does this installation meet code requirements?

A. Yes, the red handle and labeling are sufficient identification for the fire alarm circuit

B. Yes, because the "DO NOT TURN OFF" warning serves the same purpose as a lock-on device

C. No, a lock-on device is required in addition to the identification labeling per NEC Article 760

D. No, but only because the breaker handle color should be orange rather than red

46. A fire alarm technician is installing a notification appliance circuit that will serve two separate corridors connected by a fire-rated door. Corridor A is on the east side and Corridor B is on the west side of the fire door. Should both corridors be on the same NAC circuit?

A. Yes, both corridors may be on the same NAC as long as the total load does not exceed output capacity

B. Yes, because fire-rated doors between corridors do not affect NAC circuit assignment

C. No, corridors separated by fire-rated doors must always be on separate NAC circuits

D. No, but the circuits must be combined if the sequence of operations requires simultaneous activation

DOMAIN 1.2 — MAINTENANCE (Questions 47–82)

47. A fire alarm technician arrives at a building to perform semiannual testing. The building manager reports that the fire alarm system has been "acting up" with intermittent trouble signals for the past three weeks but no service call was placed. What should the technician address first?

A. Proceed with the scheduled semiannual testing and address the intermittent troubles afterward

B. Investigate the intermittent trouble signals before beginning the scheduled semiannual testing

C. Perform the semiannual testing as scheduled and document the reported troubles for a future visit

D. Contact the fire alarm panel manufacturer for a remote diagnostic before touching the system

48. During annual testing, a fire alarm technician activates a smoke detector on the fifth floor of an office building. The panel correctly displays the alarm and the horn/strobes activate on floors 4, 5, and 6 per the sequence of operations. The technician calls the supervising station, which confirms the alarm signal was received and identified correctly. Has this detector passed the functional test?

A. Yes, the complete signal chain has been verified — device activation, panel response, notification, and transmission

B. No, the technician must also verify that elevator recall and HVAC shutdown activated for this alarm

C. No, the test is incomplete until the technician measures the detector's sensitivity reading

D. Yes, but only if the technician also verifies the device address matches the as-built drawings

49. A fire alarm system generates a persistent "TROUBLE — SLC 2 — GROUND FAULT" signal. The technician disconnects SLC 2 at the panel and the ground fault clears. The technician reconnects the first half of SLC 2 and the ground fault remains clear. The technician then adds the second half and the ground fault returns. Where is the fault located?

A. On the panel's SLC 2 output board because reconnecting any portion causes the fault

B. On the first half of SLC 2 because the fault appeared when the first half was connected

C. At the midpoint junction box where the two halves of SLC 2 connect together

D. On the second half of SLC 2 because the fault only returns when this section is connected

50. A fire alarm technician is testing a horn in a warehouse. The technician measures 68 dB at a point 50 feet from the horn. The average ambient noise level in the warehouse during operations is 78 dB. Per NFPA 72, does this horn provide adequate audible notification at this measurement point?

A. Yes, 68 dB exceeds the minimum 60 dB required for all non-sleeping commercial spaces

B. Yes, because audible notification is supplemented by visible notification in industrial spaces

C. No, the horn output of 68 dB does not achieve the required 15 dB above the 78 dB ambient

D. No, but only because the measurement was taken at 50 feet rather than the standard 10 feet

51. A fire alarm technician is performing sensitivity testing on smoke detectors in an analog addressable system. The panel's sensitivity report shows that 8 of 120 detectors are reading above 3.0% obscuration per foot. The manufacturer's acceptable range is 0.5% to 3.7%. What action should be taken for these 8 detectors?

A. Schedule cleaning for these detectors because they are approaching the upper sensitivity limit

B. Replace all 8 detectors immediately because they have exceeded the acceptable range

C. No action is needed because all readings are within the manufacturer's listed range

D. Increase the polling rate for these 8 devices to monitor their sensitivity more frequently

52. During periodic testing, the technician tests a waterflow switch by opening the inspector's test valve. Water flows freely from the test connection. After 45 seconds, the panel displays the waterflow alarm. The technician closes the test valve and waits. After the water stops flowing, the alarm signal remains active on the panel. What does this indicate?

A. The waterflow switch has failed because it should automatically restore when flow stops

B. The alarm requires a manual panel reset which is normal behavior for waterflow alarms

C. The panel has a programming error that prevents automatic restoration of waterflow alarms

D. The waterflow switch paddle is stuck in the activated position and requires physical inspection

53. A fire alarm technician discovers during annual testing that a smoke detector at address 091 generates an alarm at the panel, but the panel displays the location as "VACANT — NOT ASSIGNED." What does this indicate?

A. The detector hardware has failed and is transmitting a generic unassigned identification code

B. The SLC wiring at this device has a fault that prevents the panel from reading the full address

C. The panel's SLC communication board cannot process the alarm because the device is unassigned

D. The device's location descriptor was never programmed into the panel after installation

54. During testing of emergency control functions, the fire alarm technician activates a smoke detector in an elevator lobby. The panel displays the alarm and the elevator recall signal is sent. The technician observes that one of three elevators in the bank recalls to the ground floor but the other two do not respond. What should be investigated?

A. The elevator recall relay contacts should only recall one elevator, not all three, per standard design

B. The panel programming may be sending the recall signal to only one elevator controller

C. The interface wiring between the fire alarm panel and the two non-responding elevator controllers

D. The smoke detector type because lobby detectors must be specifically listed for elevator recall

55. A fire alarm technician is inspecting a fire alarm system and discovers that the panel's dedicated branch circuit breaker is a 30-amp unit with 10 AWG conductors. The panel's maximum current draw is 5 amps. Is this circuit configuration acceptable?

A. Yes, the 30-amp circuit exceeds the panel's 5-amp requirement and provides adequate capacity

B. No, the circuit breaker must be sized to not exceed 125% of the panel's maximum current draw

C. Yes, but only if the panel manufacturer's installation manual permits circuits up to 30 amps

D. No, because 10 AWG conductors are too large for fire alarm panel primary power connections

56. During semiannual testing, the fire alarm technician activates a smoke detector with aerosol smoke. The detector takes 35 seconds to activate. The technician has been testing identical detectors on the same floor, and all others activated within 5 to 10 seconds. What does the extended response time suggest?

A. The aerosol smoke can was running low and producing insufficient test smoke for the detector

B. The detector's sensing chamber is contaminated and the detector should be cleaned or replaced

C. The 35-second response is within acceptable limits and does not indicate a problem

D. The SLC polling rate for this specific device is slower than for the other detectors on the circuit

57. A fire alarm technician is testing the secondary power transfer on a fire alarm panel. The technician disconnects the AC power and the panel transfers to battery. The technician reconnects AC power after 10 minutes. The panel returns to AC operation and the charger activates. The technician notices the battery voltage is 23.8 VDC immediately after the test. Is this voltage a concern?

A. No, the batteries will be slightly discharged after 10 minutes on standby and the charger will restore them

B. Yes, the batteries should read at least 26 VDC immediately after a 10-minute discharge

C. No, but only if the voltage recovers to above 26 VDC within 30 minutes of charger activation

D. Yes, the immediate voltage drop to 23.8 indicates the batteries are near end of life

58. A fire alarm technician is performing annual testing on a fire alarm system installed five years ago. The building owner asks how much longer the smoke detectors will last before needing replacement. Per NFPA 72, what is the correct guidance?

A. NFPA 72 does not specify a fixed replacement age — detectors must maintain listed sensitivity

B. NFPA 72 requires all detectors to be replaced at 10 years regardless of condition or testing results

C. NFPA 72 requires replacement when the detector fails two consecutive sensitivity tests

D. NFPA 72 defers to the local AHJ to establish detector replacement schedules for each building

59. A fire alarm system has both DACT and cellular communication paths to the supervising station. The DACT's telephone line is disconnected due to the carrier discontinuing copper service. The cellular communicator continues to function normally. What is the system's current monitoring status?

A. The system is fully monitored because the cellular communicator provides complete coverage

B. The system has lost its primary communication path but the backup path remains operational

C. The system has lost communication redundancy and the DACT path must be replaced or removed

D. The system is no longer monitored because DACT is the primary path and cannot be removed

60. Per NFPA 72 Table 14.4.3.2, how frequently must manual fire alarm stations be visually inspected?

A. Monthly to verify each station is accessible, visible, and undamaged

B. Semiannually as part of the regular fire alarm system inspection schedule

C. Annually during the comprehensive system inspection and testing cycle

D. Quarterly to catch obstructions from furniture, equipment, and building changes

61. A fire alarm technician tests a pull station during annual testing. The station activates correctly and the panel displays the proper alarm. However, when the technician attempts to reset the pull station with the reset key, the mechanism does not release and the station remains in the activated position. What should be documented?

A. The pull station passed the activation test but the reset key may not be the correct type

B. The pull station failed the test because any device that cannot be properly reset is defective

C. The test result is acceptable because reset functionality is not part of the functional test

D. The pull station mechanism is jammed and must be replaced with a new unit

62. A fire alarm system's event log shows "AC POWER RESTORED" entries at 3:12 AM every Tuesday for the past two months. The building has had no known utility power interruptions during this period. What does this pattern suggest?

A. A scheduled building system is briefly interrupting the fire alarm panel's power every Tuesday

B. The panel's event log has a software error that generates false power restoration entries

C. The utility company performs scheduled maintenance every Tuesday affecting the building

D. The panel's AC power monitoring circuit has a drift that triggers at the same time weekly

63. During testing, the fire alarm technician discovers that visible notification appliances in a common area flash in synchronization except for one strobe that flashes approximately 0.5 seconds after the others. The devices are all on the same NAC circuit. What is the most likely cause?

A. The out-of-sync device is a different model that uses an incompatible synchronization protocol

B. The NAC circuit voltage at the out-of-sync device is too low for the sync circuit to function

C. The out-of-sync device has an internal synchronization module failure requiring replacement

D. The synchronization signal wire is disconnected at the out-of-sync device location

64. A fire alarm technician is testing an addressable smoke detector and the panel shows "ALARM — HEAT DETECTOR — ADDRESS 055 — SERVER ROOM." The technician is testing a smoke detector at address 055 that is physically installed in a conference room, not the server room. How many errors exist in the panel display?

A. One error — the location descriptor is incorrect but the device type may be correctly programmed

B. Two errors — both the device type and the location descriptor are incorrect in the programming

C. One error — only the device type is wrong since the location is based on the physical address

D. Three errors — the device type, location, and address are all incorrect in the panel database

65. A fire alarm technician is troubleshooting a NAC circuit that shows an intermittent open fault. The trouble appears for a few seconds and then clears. This has been happening several times per week. What troubleshooting approach is most appropriate?

A. Replace all notification appliances on the circuit because one device has an intermittent contact

B. Add a data logger to the circuit to capture the electrical conditions when the fault occurs

C. Tighten every terminal connection on the entire NAC circuit and monitor for recurrence

D. Inspect all connections on the circuit looking for a loose termination affected by vibration or thermal cycling

66. A fire alarm technician performs a battery load test. The batteries are rated at 26 Ah. The system alarm current is 4.5 amps. After applying the alarm load for the required duration, the batteries read 24.2 VDC. Do the batteries pass the load test?

A. Yes, 24.2 VDC under alarm load is above the minimum operating voltage for the system

B. No, the batteries must maintain their float voltage throughout the entire load test duration

C. Yes, but only if the batteries recover to above 26 VDC within 15 minutes after the test

D. No, any voltage below 25 VDC under load indicates insufficient battery capacity

67. A fire alarm technician discovers during inspection that a smoke detector in a corridor has a piece of masking tape covering one of the two sensing chamber openings. The tape appears to have been placed intentionally. What must be documented?

A. The tape does not affect detector performance because only one opening needs to be clear

B. The tape is acceptable if it was placed by building maintenance as a temporary dust measure

C. The tape partially blocks smoke entry to the sensing chamber and must be removed immediately

D. The tape should be replaced with a manufacturer-approved protective cover for long-term use

68. A fire alarm system in a 10-story building generates a trouble signal for "NAC 6 — GROUND FAULT." The technician disconnects NAC 6 at the panel and the ground fault clears. Using divide-and-conquer, the technician reconnects the first half (floors 1–5) and the fault remains clear. The technician adds the second half (floors 6–10) and the fault returns. What should the technician do next?

A. Replace all notification appliances on floors 6 through 10 because one device has failed

B. Perform a megger test on the entire second half of NAC 6 to locate the insulation failure

C. Reprogram the panel to assign floors 6–10 to a different NAC output to bypass the fault

D. Divide the second half again — test floors 6–7 separately from floors 8–10 to narrow the location

69. During annual testing, the fire alarm technician tests the HVAC shutdown interface. When the duct detector activates, the AHU shuts down correctly. The technician resets the system and the AHU automatically restarts. The building engineer states that the AHU should require manual restart after a fire alarm shutdown. What should be documented?

A. The automatic restart is a code violation that must be corrected immediately

B. The automatic restart behavior should be verified against the approved sequence of operations

C. The automatic restart is acceptable because it restores normal building operations faster

D. The building engineer is incorrect because all AHUs must restart automatically after reset

70. A fire alarm technician is reviewing the results of a sensitivity test on an analog addressable system. One detector shows a reading of 0.3% obscuration per foot. The manufacturer's acceptable range is 0.5% to 3.7%. What does this reading indicate?

A. The detector is reading below the minimum acceptable sensitivity and must be investigated

B. The detector has been recently cleaned and is temporarily operating at a heightened sensitivity

C. The detector is performing at peak sensitivity and represents the ideal operating condition

D. The reading is within normal variation and does not require any corrective action

71. During inspection, the fire alarm technician finds that three horn/strobe devices in a second-floor corridor have been painted to match the wall color by a painting contractor. The devices are still physically mounted. What should be documented?

A. The painted devices are functional if they activate during testing and no action is needed

B. The paint can be safely removed by the technician using an approved solvent

C. The painted devices must be replaced because paint can obstruct sound and light output

D. Only the strobe lenses need to be cleaned; paint on the horn housing does not affect performance

72. A fire alarm technician is called to a building where the panel displays "TROUBLE — BATTERY CHARGER FAULT." The technician measures the AC power supply at the panel's input terminals and reads 118 VAC. The battery voltage reads 21.6 VDC with the charger connected. What is the most likely condition?

A. The AC input voltage is too low for the charger to operate within its specified range

B. The batteries have failed and are preventing the charger from reaching float voltage

C. The AC power supply is normal but the battery voltage is too low to sustain the charger circuit

D. The charger has an internal fault and is not converting AC to the DC charging voltage

73. A fire alarm technician is performing annual testing on a fire alarm system and needs to test the communication link to the supervising station. The system uses a cellular communicator. How should the technician test this communication path?

A. By physically disconnecting the cellular antenna and verifying the panel generates a trouble signal

B. By transmitting a test signal from the panel and confirming receipt with the supervising station

C. By calling the supervising station on a cell phone and asking them to verify the system status

D. By checking the communicator's signal strength indicator on the panel without sending a signal

74. Per NFPA 72, what documentation must be updated whenever a fire alarm system is modified by adding, removing, or relocating devices?

A. The as-built drawings and Record of Completion must be updated to reflect the current system

B. Only the panel's internal event log needs updating because it tracks all system changes

C. Only the device address schedule requires updating since it lists all installed devices

D. The testing records must be amended to show the modification date and scope of changes

75. A fire alarm technician discovers that the fire alarm panel's event log capacity has reached 100% and cannot record new events. The building engineer says this has been the case for several months. What operational impact does this create?

A. New events simply overwrite the oldest events and no data is permanently lost

B. The panel continues to function but new alarms may not be displayed on the LCD screen

C. The full event log has no impact because the panel operates independently of the log

D. Diagnostic and historical information is being lost which impairs troubleshooting capability

76. A fire alarm technician is testing a voice evacuation system. The pre-recorded evacuation message plays correctly through all speakers. The technician then tests the live microphone function by speaking into the firefighter's microphone at the fire command center. The message is heard on some floors but not on others. What does this indicate?

A. The microphone is generating a signal that is too weak for the amplifiers serving the silent floors

B. The amplifiers or speaker circuits serving the silent floors have a fault or are not receiving audio

C. The firefighter's microphone function is separate from the alarm notification and is not code-required

D. The live microphone always sounds only on the alarm floor and immediately adjacent floors

77. A fire alarm technician is performing a visual inspection and discovers that a smoke detector in an office has been relocated from the ceiling to a desktop by an office worker who complained about nuisance alarms. The detector is sitting on the desk disconnected from its base. What must be documented?

A. The detector has been removed from service creating an unprotected area that must be corrected

B. The detector relocation is acceptable if the office worker provides written justification

C. The detector should be reinstalled at the original ceiling location without further investigation

D. The nuisance alarm complaint should be investigated before reinstalling the detector

78. A fire alarm system in a nursing home uses a coded notification system where different chime patterns indicate different alarm zones. During testing, the technician activates a detector in Zone 3 but the chime pattern for Zone 5 sounds throughout the building. What is the most likely cause?

A. The chime device has an internal fault that generates random zone patterns when activated

B. The panel programming has the wrong notification coding assigned to the Zone 3 alarm input

C. The SLC communication error is causing the panel to identify the detector as a Zone 5 device

D. The chime system operates independently from the panel and has its own zone assignment

79. A fire alarm technician is conducting a building inspection and notices that fire alarm conduit runs through an area where a water pipe above has a slow drip. Water droplets are landing on the conduit and some water has entered a nearby junction box through a knockout opening that was never sealed. What must be documented?

A. The dripping water is a plumbing issue that does not affect the fire alarm system

B. The water will cause corrosion but only to the conduit exterior which is cosmetic

C. The open knockout must be sealed and the junction box inspected for water damage

D. The open knockout and water infiltration must be documented and corrected to prevent ground faults

80. A fire alarm technician is testing the power supply transfer from primary AC to secondary battery and back. During the test, the technician notices a brief chirp from the notification appliances at the moment AC power is restored. What does this chirp indicate?

A. The notification appliances are performing a self-test triggered by the power restoration event

B. The panel generates a brief NAC pulse during the power transfer which is normal for some panels

C. A brief voltage spike during power restoration momentarily energized the NAC circuits

D. The panel's transfer relay is bouncing during switching causing intermittent NAC activation

81. During testing of a fire alarm system, the technician discovers that the panel generates an alarm for every smoke detector activation but does not generate a supervisory signal when a tamper switch is activated. The tamper switch contact closure is confirmed at the panel terminals. What is the most likely cause?

A. The tamper switch circuit is programmed as an alarm input rather than a supervisory input

B. The tamper switch requires a different end-of-line resistor value than the alarm circuits

C. The panel cannot distinguish between alarm and supervisory signals on the same input type

D. The tamper switch wiring polarity is reversed preventing the panel from reading the signal

82. A fire alarm technician finds that a building's fire alarm system has never had a Record of Completion filed since its installation eight years ago. Annual testing has been performed and documented throughout this period. What corrective action is needed?

A. No action is needed because eight years of testing records demonstrate adequate compliance

B. A Record of Completion must be prepared documenting the current system configuration

C. The system must be completely retested under AHJ witness as if it were a new installation

D. The AHJ must be notified of the missing documentation and a retroactive filing completed

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

83. A fire alarm technician is reviewing a fire alarm floor plan and notices that the drawing scale is 1/8 inch = 1 foot. Two smoke detectors are shown 3 inches apart on the drawing. What is the actual distance between these two detectors in the field?

A. 12 feet based on the drawing scale conversion calculation

B. 36 feet based on the drawing scale conversion calculation

C. 24 feet based on the drawing scale conversion calculation

D. 48 feet based on the drawing scale conversion calculation

84. A fire alarm shop drawing includes a battery calculation that shows a minimum required capacity of 15.6 Ah after applying the 20% safety factor. The drawing specifies 12 Ah batteries. The reviewing engineer returns the drawing with a "Revise and Resubmit" notation. Why was the drawing rejected?

A. The batteries must not be rejected because they need only meet the minimum pre-safety-factor value

B. The specified batteries are undersized because 12 Ah is less than the required 15.6 Ah minimum

C. The specified 12 Ah batteries are adequate because the safety factor is optional per NFPA 72

D. The reviewing engineer made an error because the 12 Ah rating applies to each battery individually

85. A fire alarm riser diagram shows an SLC loop leaving the fire alarm control panel on the first floor, serving devices on floors 1 through 5, and returning to the panel through a separate riser. A note on the diagram indicates "Class A — SLC 1." What does the separate return path provide?

A. An alternate power feed so devices can receive power from either direction on the loop

B. Fault tolerance so all devices continue communicating if a single open fault occurs on the loop

C. A dedicated testing path that allows the technician to isolate devices for individual testing

D. A backup communication channel that activates only during alarm conditions for reliability

LEVEL I — SIMULATION EXAM 7: ANSWER KEY AND EXPLANATIONS

1. B — Data centers require detection in three planes: above the suspended ceiling where cable trays and infrastructure can overheat, at the standard ceiling level for general area detection, and below the raised access floor where power and data cables represent a significant fire risk. NFPA 75 (Standard for the Fire Protection of Information Technology Equipment) and project specifications typically require this multi-level detection approach for comprehensive coverage.

2. D — Pathway survivability Level 2 per NFPA 72 Section 12.4 requires that circuit pathways be protected by 2-hour fire-rated construction, 2-hour rated cable (circuit integrity cable), or a listed electrical circuit protective system. Standard EMT conduit, sprinkler protection (Level 1), and standard cable without physical protection do not satisfy Level 2 requirements.

3. A — A control module is an addressable device that receives commands from the panel over the SLC and activates an output — typically a set of dry relay contacts. When the panel commands the door holder release, the control module opens its contacts, removing power from the magnetic holder and allowing the fire-rated door to close under the force of its door closer.

4. B — When two devices share the same address on an SLC, the panel cannot distinguish between them during polling. Both devices respond to the same poll command simultaneously, creating communication conflicts that result in garbled data, missed polls, and unreliable operation. The panel reports a device conflict trouble because it detects the communication interference caused by the duplicate addresses.

5. C — Whether a cable route through a wall gap requires firestop depends on the fire rating of the wall. A non-fire-rated wall does not require firestopping at penetrations because there is no fire rating to maintain. However, if the wall were fire-rated, the penetration would require an approved firestop regardless of whether the cable passes through a gap or a core-drilled hole.

6. A — NFPA 72 Section 23.8.5.4 requires that fire alarm zones not cross fire-rated wall assemblies because these walls create separate fire compartments. A zone spanning both sides of a 2-hour fire-rated wall prevents responders from determining which compartment contains the fire. The room on the other side of the fire wall should be assigned to a separate zone.

7. C — The SLC voltage of 26.8 VDC falls within the manufacturer's specified operating range of 24 to 32 VDC. SLC circuits typically operate above the nominal 24 VDC to account for voltage drops along the loop caused by device current draw and conductor resistance. A reading within the specified range indicates normal operation.

8. D — Per NFPA 72 Table 18.5.5.5.1(a), a single 75 cd wall-mounted visible notification appliance can cover a room up to 45 × 45 feet. Since the room is 35 × 35 feet, a single 75 cd strobe provides adequate coverage. A 15 cd unit only covers 20 × 20 feet and would require multiple units, making the single 75 cd appliance the most efficient compliant solution.

9. B — Observing an unsafe condition — regardless of which trade is affected — creates an obligation to report it to the site safety officer or superintendent. A scaffold at 12 feet without guardrails violates OSHA fall protection requirements and presents an imminent danger to workers. The fire alarm technician should not use the scaffold and should report the hazard immediately.

10. A — Using Ohm's Law: R = V / I = 24 / 0.008 = 3,000 ohms. This high resistance is typical of the supervision circuit created by the end-of-line resistor on a conventional IDC. Understanding resistance calculations at this scale is important for verifying EOLR values and diagnosing circuit supervision conditions during troubleshooting.

11. D — Elevated ambient temperatures affect both the fire alarm panel's electronic components and the secondary battery performance. Sealed lead-acid batteries lose capacity and experience accelerated aging at high temperatures. The panel's UL listing typically specifies a maximum ambient temperature — commonly 120°F — and sustained operation near or above this limit can reduce equipment lifespan and battery reliability.

12. B — When fire alarm cable or conductors pass through a hole drilled in a metal stud, the sharp metal edges of the hole can cut into the conductor insulation during installation or over time due to building vibration. A listed bushing or grommet must be installed in the hole to protect the conductors from the sharp edges. NEC Section 300.4 requires this protection for conductors passing through metal framing members.

13. A — NFPA 72 Table 17.6.3.5.1 requires heat detector spacing reduction based on ceiling height. At 22 feet, the listed spacing of 50 feet must be reduced per the table's reduction factors because hot air cools as it rises, producing a weaker thermal signal at higher ceilings. The reduced spacing ensures detectors can still respond to the diminished heat energy reaching the ceiling.

14. B — Whether a building requires a fire alarm system is determined by the applicable building code — primarily the IBC Section 907 — based on the building's occupancy classification, occupant load, number of stories, and other specific provisions. The building code, not the owner's preference or the presence of sprinklers alone, establishes the fire alarm requirement.

15. D — Listed wire nuts are designed and tested to provide adequate insulation and mechanical connection without additional tape. The critical quality step after making a wire nut connection is the tug test — pulling gently on each conductor to verify the connection is mechanically secure. Electrical tape does not add meaningful protection to a properly installed listed wire nut.

16. A — Two 90-degree bends = 180 degrees. Four 45-degree bends = 180 degrees. Total = 180 + 180 = 360 degrees. This is exactly at the NEC maximum of 360 degrees between pull points. While technically at the limit rather than over it, a pull box should be strongly considered because any field adjustment or additional minor offset would push the total beyond the maximum.

17. C — J-hooks are a commonly accepted and widely used support method for routing fire alarm cable and other low-voltage cables on bar joist construction. They provide a clean, organized cable pathway and are available in sizes that accommodate various cable bundle diameters. J-hooks must be spaced at intervals appropriate to the cable type per NEC requirements.

18. B — An open mezzanine constitutes a separate occupied level that should be zoned separately from the main floor for fire alarm annunciation purposes. Even though the mezzanine shares the same air volume as the floor below, it represents a distinct area where occupants may be located and where alarm zone identification helps emergency responders locate the alarm origin.

19. D — Addressable detector bases are engineered for specific detector head models and use communication protocols that vary by manufacturer and product line. An incompatible base prevents the detector head from establishing proper electrical and communication connections with the SLC, resulting in device communication failures, incorrect readings, or complete non-operation.

20. C — In a large-volume space like a gymnasium, sound energy from wall-mounted appliances dissipates as it travels through the expansive air volume. The 24-foot ceiling height and 8,000-square-foot floor area create a volume where sound levels may drop below the required 15 dB above ambient before reaching all occupied areas. More appliances or higher-output devices may be needed to achieve compliant coverage.

21. A — NFPA 72 Section 17.7.3.2.3 requires smoke detectors on sloped ceilings to be installed within 3 feet of the peak, where smoke accumulates first as it rises along the slope. Smoke follows the ceiling surface upward and collects at the highest point. Placing the detector within 3 feet of the peak ensures the earliest possible detection.

22. B — NFPA 72 Section 17.14 requires manual fire alarm stations within 5 feet of each exit doorway. With three exit doors — two end exits and one middle exit — three pull stations are required, one within 5 feet of each door. The travel distance requirement of 200 feet is also satisfied because no point in the 250-foot corridor is more than 125 feet from the nearest pull station.

23. D — While NEC Article 760 does not explicitly prohibit receptacle connections for fire alarm panels, standard industry practice and most panel manufacturers require hardwired connections to the dedicated branch circuit. A receptacle connection can be accidentally unplugged, can degrade over time, and does not provide the permanent, reliable connection that a life safety system requires.

24. C — NEC Article 760 requires separation between power-limited fire alarm circuits and power circuits (electric light, power, and Class 1 circuits). However, PoE data cables are typically classified as power-limited circuits under NEC Article 725. When both cable types are power-limited circuits, separation requirements are relaxed and sharing a cable pathway may be acceptable per NEC Section 760.136.

25. A — The two readings together confirm a healthy circuit. Without the EOLR, the 0.4 Ω reading represents the normal wire resistance of the copper conductors — confirming the circuit is continuous from end to end with good connections. With the EOLR connected, the 4.7 kΩ reading confirms the EOLR is present and reads at its correct value, which is what the panel will see during normal operation.

26. D — OSHA 29 CFR 1910.146 defines confined spaces and requires a written entry permit, atmospheric monitoring, and specific entry procedures before any worker enters a confined space. A small mechanical room with limited ventilation may qualify as a permit-required confined space. The space must be evaluated for atmospheric hazards — including oxygen deficiency, toxic gases, and explosive atmospheres — before entry.

27. B — Smoke detector bases should be secured to the ceiling grid using an approved support clip or mounting bracket designed for grid-mounted installations. Standard ceiling tiles alone may not support the weight of the detector, and grid-mounted clips provide a stable mounting platform. Some manufacturers provide specific grid-mount brackets that attach to the grid T-bar for proper support.

28. A — The pull station is physically located in Tenant A's space but wired to Tenant B's zone circuit. This means that if someone in Tenant A activates the pull station, the panel will indicate an alarm in Tenant B's zone — directing responders to the wrong location. The wiring must be corrected to connect the pull station to Tenant A's zone circuit as shown on the approved drawings.

29. C — When a cable route transitions from a non-plenum space to a plenum space, the cable type must change to meet the plenum requirement. FPL cable is not rated for plenum installation. The FPL cable must be terminated at a junction box at the transition point, and FPLP cable must be used for the portion of the run within the plenum space.

30. D — Total load for 18 devices: 18 × 0.280 = 5.04 amps. Each NAC output is rated at 2.0 amps. Three circuits with 6 devices each = 1.68 amps per circuit, well within the 2.0-amp rating. Two circuits would require 9 devices each at 2.52 amps, exceeding the rating. Three circuits is the minimum that keeps all circuits within rated capacity.

31. B — The panel manufacturer specifies a particular EOLR value — 4.7 kΩ in this case. Without the EOLR installed, the panel sees only the wire resistance of 2.1 Ω, which is far below the expected supervision value. Most conventional panels interpret this very low resistance as a device activation (short across the IDC), generating an immediate alarm for that zone. The EOLR must be installed at the last device.

32. A — The fire alarm panel's dedicated circuit breaker must be accessible to the fire alarm service technician, building management, and emergency responders at all times. A locked tenant space that restricts access to the breaker outside of business hours prevents authorized personnel from performing maintenance, troubleshooting, or emergency disconnection when needed. Access provisions must be established.

33. D — Smoke detectors installed in elevator hoistways are specifically intended to detect smoke that could endanger elevator passengers and trigger Phase I elevator recall. When a hoistway smoke detector activates, it generates an alarm signal that initiates elevator recall to the designated floor per NFPA 72 Section 21.3. This is an alarm function, not a supervisory or trouble function.

34. C — Each 90-degree bend counts toward the 360-degree maximum regardless of the direction of the bend. Two 90-degree bends used to cross over a beam consume 180 degrees of the allowable total. The bends do not cancel each other out because the wire inside the conduit must navigate each bend independently, creating friction and stress at each turn.

35. B — Per NFPA 72 Table 18.5.5.5.1(a), a single wall-mounted 15 cd visible notification appliance covers rooms up to 20 × 20 feet. A 12 × 14 foot patient room falls well within this coverage area. Hospital patient rooms do not have a separate higher candela requirement — the standard table applies based on room dimensions.

36. A — Smoke detectors in the dining area provide early warning for the occupancy where patrons are present and may need to evacuate. Heat detectors near the kitchen cooking line avoid the constant nuisance alarms that smoke detectors would generate from cooking fumes, grease particles, and steam. This dual-technology approach matches detection technology to each environment's specific conditions.

37. D — The AC power indicator is on, confirming the panel receives primary power. The charger indicator being off while the batteries read 22.4 VDC — well below the normal float charge range of 27.0–27.6 VDC — indicates the charger circuit has failed and is not converting AC power to the DC charging voltage. The batteries are slowly discharging under standby load without being replenished.

38. B — The best approach during active construction is to install detector bases and complete all wiring now — staying on schedule — but delay installing the detector heads until construction dust has settled. This protects the detector sensing chambers from contamination while allowing the wiring and mounting infrastructure to be completed on time. Manufacturer-approved dust covers are an alternative if heads must be installed during construction.

39. C — The calculated minimum battery capacity is 20.90 Ah. The selected batteries must equal or exceed this minimum. The 18 Ah set falls below the requirement and cannot be used. The 26 Ah set exceeds the requirement and is the correct selection. The 20% safety factor is already included in the 20.90 Ah calculation and does not permit selecting undersized batteries.

40. A — Cold supply air at 58°F hitting a detector in a 74°F room creates a localized cold spot that can cause condensation on and inside the detector. Condensation moisture on the sensing elements can trigger nuisance alarms or generate trouble signals. The cold airflow can also prevent warm smoke from reaching the detector by creating a thermal barrier that deflects rising smoke away from the sensing chamber.

41. D — A monitor module (or conventional zone module) can accept the conventional IDC wiring from the existing six 2-wire smoke detectors and report the zone's status — alarm, normal, or trouble — as a single addressable point on the new panel's SLC. This allows conventional devices to be integrated into an addressable system without replacing every detector. The module bridges the gap between conventional and addressable architecture.

42. C — NEC Section 358.30 requires 3/4-inch EMT to be secured within 3 feet of each outlet box, junction box, cabinet, or fitting. This close-support requirement prevents conduit movement at connection points that could loosen fittings, damage conductors, or compromise the raceway's physical integrity. The conduit must also be supported at intervals not exceeding 10 feet along horizontal runs.

43. B — Any penetration through a fire-rated wall — including concrete firewalls — must be sealed with a listed firestop system to restore the wall's fire rating at the penetration point. A core-drilled hole with conduit passing through it creates an opening that fire and smoke can use to spread between compartments. The firestop material seals this opening and maintains the wall's rated fire resistance.

44. A — In a Class B configuration, the SLC has a single path from the panel to the devices. When the wiring is disconnected at the midpoint (device 43), the circuit is broken and all devices beyond the disconnect point — devices 44 through 85 — lose communication with the panel. The panel reports a trouble for the open circuit and those devices stop responding to polling.

45. C — NEC Article 760 requires both identification labeling and a lock-on device on the fire alarm panel's dedicated branch circuit breaker. The red handle and warning label satisfy the identification requirement, but the lock-on device is a separate physical requirement that prevents the breaker from being accidentally turned off. Both requirements must be met — labeling alone is not sufficient.

46. D — NAC circuit assignment in corridors separated by fire-rated doors depends on the system design and the sequence of operations. If both corridors must activate simultaneously during any alarm condition, they can share a NAC circuit or be on separate circuits that are programmed to activate together. The fire-rated door between them does not automatically require separate circuits — the sequence of operations drives the design decision.

47. B — Three weeks of unaddressed intermittent trouble signals indicate an active system problem that could be masking a wiring fault, device failure, or environmental issue. Investigating and resolving the reported troubles takes priority over routine semiannual testing because an

unresolved trouble may affect the validity of test results and could indicate a condition that impairs system performance.

48. A — The functional test verified the complete signal chain: the smoke detector activated, the panel correctly identified the device, the notification appliances activated on the correct floors per the sequence of operations, and the supervising station received and confirmed the alarm signal. All required elements of a complete functional test have been satisfied for this detector.

49. D — The ground fault cleared when SLC 2 was fully disconnected. It remained clear when only the first half was reconnected. It returned only when the second half was added. This confirms the fault is on the second half of SLC 2 — the section between the midpoint and the end of the circuit. The technician should now divide the second half to further narrow the fault location.

50. C — NFPA 72 requires audible notification to be at least 15 dB above the average ambient noise level. With an ambient of 78 dB, the minimum required level is 78 + 15 = 93 dB. The measured 68 dB is 25 dB below the required minimum. Additional or higher-output notification appliances are needed to achieve compliant audible coverage in this high-noise environment.

51. A — All eight detectors reading above 3.0% obscuration are approaching the upper limit of the acceptable range (3.7%) but have not yet exceeded it. These detectors should be scheduled for cleaning to prevent them from drifting above the maximum threshold, which would trigger a trouble signal and render them non-compliant. Proactive cleaning extends detector life and prevents nuisance alarms.

52. B — Waterflow alarms on most fire alarm panels are latching alarms that require a manual panel reset to clear, even after the waterflow condition has ceased. This is normal system behavior — the alarm remains active until an operator acknowledges it and resets the panel, ensuring that every waterflow event is investigated and documented regardless of duration.

53. D — The detector hardware is functioning correctly — it activates and transmits its address properly, and the panel receives the alarm. However, the location descriptor for address 091 was never programmed into the panel's database after the device was installed. The panel displays a default "VACANT — NOT ASSIGNED" message when no location text has been entered for that address.

54. C — The fire alarm panel sent the recall signal and one elevator responded correctly, confirming the panel output is functional. The two non-responding elevators suggest a fault in the interface between the fire alarm system and those specific elevator controllers. The wiring from the control module to each elevator controller, the relay contacts, and the elevator controllers' recall inputs must all be inspected.

55. A — A 30-amp circuit with 10 AWG conductors exceeds the panel's 5-amp requirement and provides adequate capacity. NEC does not require the circuit breaker to be sized to match the panel's exact current draw — it requires adequate capacity for the connected load. The oversized

circuit does not create a code violation as long as the other requirements (dedicated, unswitched, locked-on, no GFCI/AFCI) are met.

56. B — A significantly longer response time compared to identical detectors on the same circuit strongly suggests the detector's sensing chamber is contaminated with dust, particles, or other debris that impedes smoke entry or alters the sensing element's baseline reading. The detector should be cleaned per the manufacturer's procedures and retested, or replaced if cleaning does not restore normal response time.

57. A — After 10 minutes of standby discharge, a slight voltage decrease from float charge level is normal and expected. The batteries consumed a small amount of their stored energy powering the system during the test. The charger will restore the batteries to full float voltage over the next few hours. A 10-minute standby discharge represents a tiny fraction of the battery's 24-hour rated capacity.

58. A — NFPA 72 does not specify a fixed replacement age for smoke detectors. The code requires that detectors maintain their sensitivity within the manufacturer's listed range, as verified through periodic sensitivity testing per Table 14.4.3.2. Detectors that pass sensitivity testing may continue in service regardless of age. Detectors that cannot be restored to acceptable sensitivity must be replaced.

59. C — The system has lost one of its two communication paths — the DACT — while the cellular communicator continues to function. The system is still monitored via the cellular path, but communication redundancy has been lost. The failed DACT path must either be restored with a new communication technology (such as IP) or formally removed from the system, and the communication configuration updated accordingly.

60. B — NFPA 72 Table 14.3.1 requires semiannual visual inspection of manual fire alarm stations. The inspection verifies that each station is accessible, visible, unobstructed, undamaged, and in a condition suggesting it will function properly when activated. This observational check catches conditions such as blocked access, physical damage, or obstructions that would impair the device's accessibility.

61. D — A pull station that activates correctly but cannot be reset is a defective device that must be replaced. The inability to reset means the device will remain in the alarmed state, preventing the fire alarm system from returning to normal operation. Both activation and reset functionality are essential — a device that cannot complete the full operational cycle has failed and must be replaced.

62. A — A recurring "AC POWER RESTORED" entry at exactly the same time every week strongly indicates that a scheduled building system — such as an energy management system, a lighting timer, or a cleaning crew switching off breakers — is briefly interrupting the fire alarm panel's power supply every Tuesday. The fire alarm panel's dedicated circuit must be unswitched and not subject to any automated or manual switching schedule.

63. C — When all other strobes on the same NAC circuit flash in synchronization but one device flashes with a delay, the most likely cause is a failure of the synchronization module or circuit within that specific device. If the issue were a circuit-wide problem (voltage, wiring, sync signal), all devices would be affected. A single out-of-sync device points to a device-level failure requiring replacement.

64. B — The panel display shows two errors: the device type says "Heat Detector" when a smoke detector is physically installed (device type error), and the location says "Server Room" when the device is in a conference room (location descriptor error). Both the device type and the location descriptor in the panel programming for address 055 are incorrect and must be corrected.

65. C — An intermittent open fault lasting only seconds suggests a connection that is marginally secure and breaks contact briefly due to vibration, thermal expansion, or building movement. Tightening every terminal connection on the NAC circuit — at the panel, at every device, and in every junction box — addresses the most common cause of intermittent opens. Following up with monitoring confirms whether the fix was successful.

66. A — A battery voltage of 24.2 VDC under full alarm load is above the minimum operating voltage for 24 VDC fire alarm equipment, which is typically around 20.4 VDC. The batteries demonstrated they can sustain adequate voltage while powering the full alarm load for the required duration. This performance indicates the batteries have sufficient remaining capacity and pass the load test.

67. C — Masking tape partially blocking a smoke detector sensing chamber opening restricts smoke entry and reduces the detector's ability to sense fire conditions. Even partial obstruction can delay detection or prevent activation entirely during a real fire. The tape must be removed immediately and the detector tested to verify it responds normally after the obstruction is cleared.

68. D — The ground fault has been confirmed on the second half of NAC 6 (floors 6–10). The next step in the divide-and-conquer method is to split this section again — testing floors 6–7 separately from floors 8–10. This narrows the fault location to a smaller section with each division, efficiently isolating the specific floor or circuit segment where the insulation failure exists.

69. B — Whether an AHU should restart automatically or require manual restart after a fire alarm shutdown depends on the approved sequence of operations for the specific building. Some designs intentionally require manual restart to prevent potential smoke recirculation. Others allow automatic restart upon system reset. The technician should verify the observed behavior against the approved sequence of operations document.

70. A — A sensitivity reading of 0.3% obscuration per foot falls below the manufacturer's minimum acceptable range of 0.5%. This means the detector is operating outside its listed parameters — in this case, at a sensitivity that is too high (the detector will alarm at very low smoke levels). The detector must be investigated, and the cause of the abnormally low reading determined. The device may need replacement.

71. C — Painted horn/strobe devices must be replaced because paint can obstruct the strobe lens reducing candela output below the required rating, and paint can block the horn openings reducing sound output below the required decibel level. Even if the devices activate during testing, their output may not meet the NFPA 72 performance requirements with paint partially blocking the sound and light elements.

72. D — With 118 VAC at the panel's input terminals — which is within normal utility voltage range — the primary AC power supply is present and adequate. The battery voltage of 21.6 VDC with the charger connected is well below the expected float charge range of 27.0–27.6 VDC. The charger has an internal fault and is not converting AC power to the DC charging voltage needed to maintain the batteries.

73. B — The correct method for testing any communication link is to transmit a test signal from the panel and confirm receipt with the supervising station. The technician transmits the signal, then contacts the station to verify the signal was received with the correct account identification, signal type, and event information. Simply checking signal strength indicators does not verify end-to-end communication functionality.

74. A — NFPA 72 Section 7.8 requires that the as-built drawings and Record of Completion be updated whenever the fire alarm system is modified. Adding, removing, or relocating devices changes the system configuration, and the documentation must reflect the current installed state. Outdated documentation impairs future maintenance, troubleshooting, and emergency response.

75. D — When the event log reaches capacity and cannot record new events, diagnostic and historical information about system activity — alarms, troubles, supervisory signals, and maintenance events — is being lost. This information is critical for troubleshooting intermittent problems, investigating alarm causes, and demonstrating system maintenance compliance. The log should be downloaded and cleared to restore recording capability.

76. B — The firefighter's microphone function is code-required for voice evacuation systems and must be operational on all notification zones. If the pre-recorded message plays on all floors but live microphone audio is heard on only some floors, the amplifiers or speaker circuits serving the silent floors have a fault — either in the audio input routing, the amplifier assignment, or the wiring between the amplifier and the speakers on those floors.

77. A — A smoke detector removed from its base and sitting on a desk is completely out of service — it cannot detect smoke from the ceiling where fires are detected, and it is not connected to the fire alarm circuit. This is a critical deficiency that leaves the office space unprotected. The detector must be reinstalled and the cause of the nuisance alarms investigated and addressed through proper means.

78. B — When the panel generates the wrong chime pattern — Zone 5 instead of Zone 3 — for a detector activation in Zone 3, the most likely cause is a programming error. The panel's notification

coding matrix has the wrong chime pattern assigned to the Zone 3 alarm input. The programming must be reviewed against the approved sequence of operations and corrected.

79. D — An open knockout in a junction box allows water to enter the box and contact conductor terminations and connections. Water on electrical connections causes corrosion, creates unintended current paths to ground (ground faults), and can eventually cause circuit failures. The open knockout must be sealed with an approved knockout seal, and the junction box must be inspected for existing water damage and ground fault conditions.

80. C — A brief voltage spike or transient during AC power restoration can momentarily energize the NAC circuits, producing a short chirp from the notification appliances. This occurs because the panel's power supply output may briefly exceed its regulated level during the transition from battery to AC power. While generally not harmful, the condition should be documented if it occurs consistently.

81. A — When the panel processes a tamper switch contact closure as an alarm signal rather than a supervisory signal, the most likely cause is that the tamper switch input is programmed as an alarm zone rather than a supervisory zone. The panel treats the input based on its programmed classification. The programming must be corrected to classify the tamper switch input as supervisory.

82. B — The Record of Completion is a code-required document per NFPA 72 Section 7.8.2. While eight years of annual testing records demonstrate ongoing maintenance, they do not substitute for the Record of Completion, which certifies the system's initial installation and compliance. A Record of Completion should be prepared documenting the current system configuration and filed with the AHJ.

83. C — At a scale of 1/8 inch = 1 foot, each inch on the drawing represents 8 feet in the field. Three inches on the drawing × 8 feet per inch = 24 feet actual distance between the two smoke detectors. Understanding drawing scale conversions is essential for verifying device spacing compliance during plan review and field installation.

84. C — The battery calculation yields a minimum requirement of 15.6 Ah after applying the 20% safety factor. The specified 12 Ah batteries fall below this minimum and cannot meet the code-required secondary power duration. The reviewing engineer correctly rejected the drawing because undersized batteries would leave the system unable to sustain operation for the full standby and alarm period required by NFPA 72.

85. B — A Class A SLC with a separate return path provides fault tolerance. If a single open fault occurs anywhere on the loop, the panel can communicate with all devices from the opposite direction through the return path. This ensures that no devices are lost due to a single wiring break — the defining characteristic of Class A circuit performance per NFPA 72 Chapter 12.