

# LEVEL I — SIMULATION EXAM 5 (85 QUESTIONS)

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**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 installing smoke detectors in a hotel. Guest room ceilings are smooth and flat at 9 feet. The largest guest room measures 14 feet by 18 feet. How many spot-type smoke detectors are needed in this room based on the default 30-foot listed spacing?

- A. Two detectors to cover the long dimension of the room
- B. Three detectors arranged in a triangular pattern for uniform coverage
- C. One detector because the room dimensions are within the 30-foot spacing
- D. Four detectors placed in each quadrant of the room ceiling

2. A fire alarm technician arrives at a job site and discovers that the ceiling above the suspended grid in a retail store has no dedicated return ductwork. The HVAC system returns air through the open ceiling space. The technician has a spool of FPLR cable on the truck. Can this cable be used for the fire alarm circuits in this ceiling space?

- A. Yes, FPLR is rated for use in any commercial ceiling space installation
- B. Yes, because FPLR is a higher rating than FPL and covers plenum requirements
- C. No, but installing the FPLR cable inside metallic conduit will satisfy the requirement
- D. No, the space is a plenum and requires FPLP cable which the technician must obtain

3. A fire alarm technician is calculating the total wire resistance for a voltage drop calculation. The NAC circuit uses 14 AWG copper conductors. The farthest notification appliance is 250 feet from the panel. What total conductor length should be used in the calculation?

- A. 250 feet because only the distance to the farthest device is relevant
- B. 500 feet because the round-trip distance includes both outgoing and return conductors
- C. 375 feet because a 50% overhead factor is applied to the one-way distance
- D. 125 feet because only half the circuit carries alarm current during activation

4. A fire alarm system draws 0.55 amps in standby and 4.8 amps in alarm. A qualifying emergency generator provides automatic backup power. Per NFPA 72, what is the minimum secondary battery standby duration when the generator meets the code's reliability criteria?

- A. 4 hours of standby followed by 5 minutes of alarm operation
- B. 12 hours of standby followed by 5 minutes of alarm operation
- C. 24 hours of standby followed by 5 minutes of alarm operation
- D. 8 hours of standby followed by 15 minutes of alarm operation

5. A fire alarm technician is installing addressable devices on an SLC loop. The panel manufacturer's documentation states that the maximum loop capacity is 198 devices. The current installation has 195 devices connected. A change order adds 8 new smoke detectors to the project. What must the technician do?

- A. Install all 8 detectors on the existing loop since 3 additional devices are within tolerance
- B. Reduce the number of existing devices by removing 5 to accommodate the 8 new ones
- C. Notify the supervisor that the loop capacity will be exceeded and an additional SLC is needed
- D. Install the 8 detectors using a conventional IDC circuit instead of the addressable SLC

6. A fire alarm technician is preparing to install a manual fire alarm station near a main entrance exit door. The wall adjacent to the door is glass from floor to ceiling. The nearest solid wall suitable for mounting is 8 feet from the door. What should the technician do?

- A. Document the condition and request a design solution since the 5-foot requirement cannot be met
- B. Mount the pull station on the glass wall using approved glass-mounting hardware and adhesive
- C. Install the pull station on the nearest solid wall at 8 feet since it is the closest available surface
- D. Mount a surface-mounted backbox on the glass with through-glass bolts for structural support

7. An electrician tells the fire alarm technician that the dedicated fire alarm panel circuit breaker has been fitted with an AFCI breaker for enhanced safety. What is the fire alarm technician's correct response?

- A. Accept the installation because AFCI protection provides superior fire prevention capability
- B. Request the AFCI be replaced with a standard breaker but add GFCI protection instead
- C. Accept the AFCI if the panel manufacturer approves it in their installation documentation
- D. Require the AFCI breaker to be replaced with a standard breaker per NEC and NFPA 72

8. A fire alarm technician is installing a rate-of-rise heat detector in a warehouse loading dock. The loading dock doors open frequently during the day, and outdoor temperatures in winter drop to 15°F while summer temperatures reach 95°F. What concern should the technician address about rate-of-rise detection in this location?

- A. The extreme cold temperatures will permanently damage the rate-of-rise sensing element
- B. Rapid temperature changes from opening loading dock doors may cause nuisance activations
- C. Rate-of-rise detectors cannot operate below 32°F and must be replaced with smoke detectors
- D. The 80°F temperature swing between seasons exceeds the detector's calibration tolerance

9. A fire alarm technician is connecting a control module to activate the magnetic lock release on an emergency exit door. When the fire alarm activates, the magnetic lock must release to allow free egress. What signal from the fire alarm system triggers this release?

- A. A trouble signal indicating that the access control system has lost communication
- B. A supervisory signal indicating that the exit door has been propped open beyond its timer
- C. An alarm signal from the fire alarm system that commands the control module to release the lock
- D. A manual reset command entered by the fire alarm technician at the control panel interface

10. A fire alarm technician is installing smoke detectors in a building with 10-foot ceilings. One room has a ceiling-mounted HVAC supply diffuser in the center. The technician plans to mount the smoke detector 3 feet from the diffuser. A coworker suggests this is too close. Per NFPA 72, what is the guidance?

- A. Three feet of clearance from a supply diffuser is adequate for proper detector operation
- B. The detector must be at least 6 feet from any HVAC supply diffuser on the ceiling
- C. NFPA 72 requires exactly 5 feet of separation between detectors and supply diffusers
- D. Detectors should not be placed in the direct airflow path — evaluate the diffuser's throw pattern

11. A fire alarm technician is verifying the primary power connection for a fire alarm panel. The technician opens the building's electrical distribution panel and finds the fire alarm circuit breaker is labeled but does not have a lock-on device installed. What must be corrected?

- A. A lock-on device must be installed on the breaker to prevent accidental disconnection
- B. The breaker label is sufficient and a lock-on device is only recommended, not required
- C. The breaker must be replaced with a larger amperage unit that includes a built-in lock
- D. A padlock must be installed on the electrical panel door to protect all breakers inside

12. Two 12-volt sealed lead-acid batteries are installed in a fire alarm panel. Battery 1 reads 13.2 VDC and Battery 2 reads 10.8 VDC, both measured individually with no load. What do these readings indicate?

- A. Battery 2 has significantly lower voltage than Battery 1 and both should be replaced as a matched set
- B. Both batteries are within normal operating range and no corrective action is needed
- C. Only Battery 2 needs replacement since Battery 1 is within acceptable voltage range
- D. The voltage difference is caused by the series connection and is a normal condition

13. A fire alarm technician is installing cable supports for fire alarm cable running along the underside of a corrugated metal deck above a ceiling grid. The cable run is 80 feet long. The technician spaces support clips every 8 feet. A coworker says the supports should be closer together. What NEC article governs the support interval for this cable type?

- A. NEC Article 300 which provides general wiring support requirements for all cable installations
- B. The support interval depends on the specific cable type and the applicable NEC article for that cable
- C. NEC Article 760 which requires 4-foot support intervals for all fire alarm cable types
- D. NEC Annex C which provides cable support intervals as part of the conduit fill calculation tables

14. A fire alarm technician is installing visible notification appliances in a large open office area measuring 50 feet by 40 feet. Using wall-mounted strobes only, what approach must the technician take per NFPA 72?

- A. Install a single high-candela strobe that covers the entire space from one wall location
- B. Install four strobes in a 2x2 grid pattern at the standard 30-foot detector spacing
- C. Consult NFPA 72 Table 18.5.5.5.1(a) and use multiple appliances to cover the full room area
- D. Install ceiling-mounted strobes instead because wall-mounted units cannot cover spaces over 40 feet

15. A fire alarm technician discovers that a plumbing contractor has hung a heavy cast iron drain pipe directly on top of a fire alarm conduit run, using the conduit as support for the pipe. What is the immediate concern?

- A. The pipe weight may cause noise interference with the fire alarm signal conductors
- B. The plumbing and fire alarm systems are sharing a support structure which violates the NEC
- C. The cast iron pipe creates a magnetic field that interferes with fire alarm circuit supervision
- D. The pipe weight may crush or deform the conduit, damaging the conductors inside

16. A fire alarm technician is connecting a smoke detector to an initiating device circuit on a conventional fire alarm panel. The detector has four terminals labeled "+" (in), "-" (in), "+" (out), and "-" (out). This terminal configuration indicates what wiring method?

- A. The detector is designed for series connection where conductors pass in and continue out to the next device
- B. The detector is designed for parallel connection with separate home-run wires to the panel
- C. The four terminals indicate the detector requires a Class A circuit with dedicated return conductors
- D. The extra terminals are for connecting a remote LED indicator and are not used for the IDC circuit

17. A fire alarm technician is installing a fire alarm system in a building with concrete block walls and a poured concrete ceiling. The technician plans to surface-mount the conduit and device boxes. What type of conduit is most commonly used for surface-mounted fire alarm installations on concrete walls?

- A. EMT conduit secured to the concrete surface with appropriate anchors and straps
- B. ENT flexible tubing because it conforms easily to the irregular surface of concrete block
- C. PVC Schedule 40 conduit because it provides superior moisture protection on concrete walls
- D. FMC flexible metal conduit because it can navigate around obstructions on the wall surface

18. A fire alarm technician discovers that a contractor has installed a fire alarm pull station inside a janitorial closet near an exit door. The closet door is typically closed but not locked. Does this placement comply with NFPA 72?

- A. Yes, because the pull station is near the exit door and within the 5-foot distance requirement
- B. Yes, because the closet is unlocked and the device remains accessible to building occupants
- C. No, pull stations must be installed in locations that are readily accessible and clearly visible
- D. No, but only because janitorial closets are classified as hazardous locations per the NEC

19. A fire alarm technician is running fire alarm cable in a cable tray that also contains Category 6 data cables from the telecommunications contractor. The fire alarm cable is FPLP rated. Per NEC Article 760, is this shared cable tray installation acceptable?

- A. No, fire alarm cables cannot share any cable management system with non-fire alarm cables
- B. Yes, because cable trays are not considered raceways and separation rules do not apply
- C. No, fire alarm cables can only share cable trays with other power-limited fire alarm cables
- D. It depends on whether the data cables are power-limited circuits and separation requirements are met

20. A fire alarm technician measures the voltage at a smoke detector location on an SLC circuit. The meter reads 0 VDC. All other devices on the same SLC are communicating normally with the panel. What is the most likely cause?

- A. The SLC conductors are reversed at this specific device location creating a polarity issue
- B. An open circuit exists in the SLC wiring at or near this device preventing voltage from reaching it
- C. The device has an internal short that is pulling the SLC voltage to zero at this location
- D. The panel's SLC output has failed and all devices are operating on residual stored energy

21. A fire alarm technician is installing a fire alarm system in a strip mall with multiple tenant spaces. Each tenant space has its own fire alarm zone. The wall between Tenant A and Tenant B is a 1-hour fire-rated partition. Can a single fire alarm zone span both tenant spaces?

- A. No, fire alarm zones should not cross fire-rated partitions because they create separate fire compartments
- B. Yes, because 1-hour fire-rated partitions do not require separate zones unless the AHJ requires it
- C. No, but only if the tenant spaces exceed 22,500 square feet each in floor area
- D. Yes, because zone boundaries are based on floor separation only, not on interior partitions

22. A technician is installing an addressable fire alarm system. The panel documentation specifies that each device on the SLC must have a unique address from 001 to 198. During installation, the technician accidentally programs two devices with the same address — both set to 047. What operational problem will this cause?

- A. Both devices will function normally since the panel can distinguish them by their physical location
- B. The panel will display an error for the second device installed but the first will continue to operate
- C. One device will operate intermittently while the other is ignored by the panel's polling sequence
- D. The panel will report a communication error because it cannot distinguish between duplicate addresses

23. A fire alarm technician needs to make a splice connection between two fire alarm cables inside a junction box. The technician has standard electrical wire nuts available. What additional step must be taken after making the wire nut connection?

- A. Apply silicone sealant around the wire nut to prevent moisture infiltration at the connection
- B. Wrap each wire nut with two layers of electrical tape for mechanical reinforcement
- C. Perform a tug test on each conductor to verify the wire nut connection is secure
- D. Solder the conductors together inside the wire nut for a permanent low-resistance connection

24. A fire alarm technician is running a fire alarm conduit parallel to a hot water pipe. The pipe is insulated but the surface temperature of the insulation measures 105°F. Is this a concern for the fire alarm conductors inside the conduit?

- A. Yes, any heat source above 90°F requires the fire alarm conduit to be relocated or shielded
- B. No, 105°F is within the temperature rating of standard fire alarm cable insulation materials
- C. Yes, the fire alarm cable must be upgraded to a high-temperature rated conductor type
- D. No, but only if the conduit is metallic which provides adequate thermal shielding

25. A fire alarm system requires both smoke detection and heat detection in the same mechanical room. The smoke detectors cover the general area while heat detectors are placed near specific equipment. In this dual-detection arrangement, what determines the correct spacing for each detector type?

- A. Each detector type follows its own spacing requirements based on its listing and NFPA 72
- B. The heat detector spacing overrides the smoke detector spacing in any room with both types
- C. Both detector types must use the smoke detector's 30-foot listed spacing for uniformity
- D. The fire alarm designer determines a custom spacing that averages both detector requirements

26. A fire alarm technician is connecting a fire alarm panel to its dedicated branch circuit. The electrician has provided a 20-amp circuit with 12 AWG conductors. The fire alarm panel's nameplate shows a maximum input current of 8 amps at 120 VAC. Is the 20-amp circuit acceptable?

- A. No, the circuit breaker must match the panel's maximum current draw exactly at 8 amps
- B. No, the circuit breaker must be sized at exactly 125% of the panel's maximum current draw
- C. Yes, but only if the conductor size is reduced to 14 AWG to match the panel's current rating
- D. Yes, a 20-amp circuit exceeds the panel's 8-amp requirement and provides adequate capacity

27. A fire alarm technician is installing a beam smoke detector across a 120-foot-wide warehouse with 25-foot ceilings. The beam detector consists of a transmitter on one wall and a reflector on the opposite wall. What advantage does this detector type offer over spot-type smoke detectors in this application?

- A. Beam detectors are less expensive to install than multiple spot-type detectors in large spaces
- B. Beam detectors respond faster than spot-type detectors to all types of fire conditions
- C. Beam detectors can protect large open areas with high ceilings where spot detectors may be ineffective
- D. Beam detectors do not require periodic testing and are maintenance-free after initial commissioning

28. When two resistors are connected in series — R1 at 1,000 ohms and R2 at 2,200 ohms — what is the total resistance of the circuit?

- A. 3,200 ohms because series resistance is the sum of the individual values
- B. 688 ohms because series resistance uses the reciprocal formula for combining values
- C. 2,200 ohms because total resistance equals the largest individual resistor in the circuit
- D. 1,600 ohms because series resistance is the average of the two individual values

29. A fire alarm technician is installing fire alarm conduit and needs to route it through a floor assembly to reach the floor below. After core-drilling a hole through the concrete floor, what must be done after the conduit is installed through the penetration?

- A. The conduit must be sealed with duct tape at both the top and bottom of the floor penetration
- B. The penetration must be firestopped with an approved material to maintain the floor's fire rating
- C. The conduit must be secured with expansion anchors at the top and bottom of the penetration
- D. A pull box must be installed directly above and below the floor penetration for access

30. A fire alarm technician is installing cable in an existing building and discovers that asbestos-containing ceiling tiles are present. What should the technician do before proceeding with any work above the ceiling?

- A. Proceed with the installation using standard PPE since fire alarm work is low-disturbance
- B. Remove the asbestos tiles in the immediate work area using wet methods and double-bagging
- C. Install all fire alarm cable below the ceiling grid to avoid disturbing the asbestos material
- D. Stop work and report the condition because asbestos handling requires qualified abatement personnel

31. A fire alarm technician is installing a ceiling-mounted horn/strobe in a room with a 10-foot ceiling. The appliance is a combination unit with both audible and visible components. Per NFPA 72, what determines the coverage area of this ceiling-mounted visible appliance?

- A. The room dimensions and ceiling height combined with the specific candela rating
- B. NFPA 72 Table 18.5.5.5.1(a) which covers both wall and ceiling mounting configurations
- C. The same 30-foot spacing used for smoke detectors on the same ceiling surface
- D. The audible component's rated coverage area which always exceeds the visible coverage

32. A fire alarm technician needs to verify the proper operation of a fire alarm system's secondary power transfer. The technician's test plan calls for disconnecting primary AC power. Before performing this test, what must the technician verify?

- A. That the HVAC system has been shut down to prevent interference with the power transfer
- B. That the batteries are connected, properly charged, and capable of sustaining the system
- C. That all notification appliance circuits have been silenced to reduce battery drain during testing
- D. That the supervising station has scheduled a backup power source for the building

33. A fire alarm technician is mounting a smoke detector in a corridor with a ceiling height of 8 feet. The corridor is 6 feet wide. What is the maximum spacing between smoke detectors in this corridor based on the default 30-foot listed spacing?

- A. 30 feet between detectors because the listed spacing applies regardless of corridor width
- B. 15 feet between detectors because corridors require half the standard spacing
- C. 20 feet between detectors based on a corridor-specific spacing reduction formula
- D. 41 feet because the corridor spacing calculation uses 0.7 times the listed spacing differently

34. A fire alarm technician is installing fire alarm equipment near a swimming pool in a hotel. The pool area has high humidity and chlorine vapors in the air. What type of detection technology is most appropriate for this environment?

- A. Photoelectric smoke detectors because they are resistant to humidity and chemical vapors
- B. Ionization smoke detectors because the chlorine atmosphere neutralizes nuisance particle sources
- C. Aspirating smoke detection because the sampling unit can be located outside the pool area
- D. Heat detectors because the corrosive and humid environment makes smoke detectors impractical

35. A fire alarm technician is installing a new fire alarm system in a mixed-use building with retail on the ground floor and offices on floors 2 through 5. The SLC from the main panel runs vertically through all five floors. What cable type is required for this vertical SLC run?

- A. FPL because the SLC operates at low voltage and does not require riser-rated cable
- B. FPLP regardless of whether the riser shaft is a plenum space or not
- C. FPLR at minimum because the cable passes through more than one floor in a vertical run
- D. Standard thermostat wire because SLC circuits carry only data signals, not power

36. A fire alarm technician is installing a notification appliance on a wall that contains a large window. The strobe must be mounted on the wall section between two windows. The available mounting surface is only 14 inches wide. Can the technician proceed with this mounting location?

- A. No, notification appliances require a minimum mounting surface width of 24 inches
- B. Yes, as long as the device can be securely mounted and the lens is not obstructed by the window frames
- C. No, notification appliances cannot be mounted on walls containing windows due to glare interference
- D. Yes, but only if the device is a horn-only model without a visible component

37. A fire alarm panel's NAC output is rated at 2.5 amps. The technician is designing a circuit with horn/strobes that draw 0.330 amps each. What is the maximum number of devices that can be connected to this single NAC output without exceeding the rated capacity?

- A. Seven devices maximum at 2.310 amps total, keeping the load below the 2.5-amp rating
- B. Eight devices at 2.640 amps total because a 10% tolerance is applied to NAC output ratings
- C. Six devices at 1.980 amps total to maintain a 50% safety margin below the rated output
- D. Nine devices because the 0.330-amp per-device draw allows for the maximum quantity

38. A fire alarm technician is installing a duct smoke detector on a return air duct. The duct is 36 inches wide by 18 inches high. The detector's sampling tubes must span the full width of the duct. What determines the number and size of holes in the sampling tubes?

- A. The fire alarm panel's programming parameters for duct detector sensitivity levels
- B. The distance between the duct detector and the fire alarm control panel location
- C. The fire marshal's standard specification for all duct detector installations in the jurisdiction
- D. The duct width, air velocity, and the detector manufacturer's installation instructions

39. A fire alarm technician is running cable through an existing conduit and encounters significant friction during the pull. The technician applies pulling lubricant but the resistance remains high. Upon investigation, the technician discovers the conduit already contains the maximum number of conductors permitted by the NEC. What must the technician do?

- A. Remove some existing conductors to make room for the fire alarm cable in the same conduit
- B. Install a separate dedicated conduit for the fire alarm cable to avoid exceeding conduit fill
- C. Use a smaller gauge fire alarm cable to fit within the remaining conduit space
- D. Request a waiver from the AHJ to exceed the conduit fill percentage for this single run

40. A fire alarm technician is installing devices in a building with a suspended ceiling. The technician mounts a smoke detector base directly to a ceiling tile without any additional support. Is this an acceptable mounting method?

- A. Yes, ceiling tiles provide adequate support for the weight of a smoke detector
- B. Yes, but only if the ceiling tile is a heavy-duty type rated for equipment mounting
- C. No, detector bases must be mounted to a structural element or to an approved support bracket
- D. No, but only because ceiling tiles are too thick for the twist-lock base to engage properly

41. A fire alarm technician is installing a fire alarm system and discovers that the electrical distribution panel is located 150 feet from the fire alarm control panel location. The primary power circuit will use 12 AWG conductors. Is there any concern with this distance?

- A. The distance may cause voltage drop on the 120 VAC primary power circuit that should be calculated
- B. No concern because 120 VAC primary power circuits are not affected by distance
- C. The distance exceeds the maximum 100-foot limit for fire alarm dedicated branch circuits
- D. The distance requires the use of 10 AWG conductors regardless of the voltage drop calculation

42. A fire alarm technician is connecting multiple SLC devices in a corridor. The last device at the end of the corridor is a manual fire alarm station. After connecting all devices and programming addresses, the technician tests the pull station and finds it does not respond to the panel. The technician checks the address setting and finds it is set to 000. What does address 000 typically indicate?

- A. Address 000 is reserved for the panel's internal diagnostic use and cannot be assigned to devices
- B. Address 000 is the default factory address that must be reprogrammed before the device will respond
- C. Address 000 indicates the device is in maintenance mode and will not respond to normal polling
- D. Address 000 is not a valid device address and the device must be programmed with its assigned address

43. A fire alarm technician is installing cable in a plenum ceiling space and runs out of FPLP cable. The technician has a full spool of FPLR cable on the truck. Can the technician use the FPLR cable to complete the run in the plenum space?

- A. Yes, FPLR can substitute for FPLP in short runs under 50 feet within a plenum space
- B. Yes, if the FPLR cable is installed inside EMT conduit throughout the plenum space
- C. No, FPLR cannot substitute for FPLP in plenum spaces under any circumstances
- D. No, but the technician can splice FPLR to the existing FPLP at the transition point

44. A fire alarm technician is connecting two notification appliance circuits at a junction box. NAC 1 carries 24 VDC during alarm and NAC 2 also carries 24 VDC during alarm. Both circuits are from the same fire alarm panel. Can these two NAC circuits share the same junction box?

- A. Yes, circuits from the same fire alarm system may share junction boxes and enclosures
- B. No, each NAC circuit must have its own dedicated junction box at every connection point
- C. Yes, but only if the junction box is a minimum of 4 inches square for adequate conductor space
- D. No, because combining two energized NAC circuits in one box creates a short circuit hazard

45. A fire alarm technician is installing a heat detector in a walk-in freezer that maintains a temperature of -10°F. The detector must activate if a fire occurs inside the freezer. What type of heat detector is most appropriate for this application?

- A. A rate-of-rise detector rated for temperatures as low as 0°F for cold environment operation
- B. A fixed-temperature detector with a low activation point appropriate for the freezer environment
- C. A combination rate-of-rise and fixed-temperature detector with standard 135°F activation rating
- D. Heat detectors cannot be installed in freezer environments and smoke detection must be used

46. A fire alarm technician is planning the conduit routing for a new fire alarm installation. The drawings show a conduit run from the panel to the first floor devices, then up through a riser to the second floor, and continuing to second floor devices. At what points must the conduit be secured per NEC requirements?

- A. Only at the fire alarm control panel and at each device location where a box is installed
- B. Only at the riser penetration points on each floor where the conduit passes through
- C. At regular support intervals and within the required distance of each box and fitting
- D. At the midpoint of each horizontal run and at the top and bottom of each vertical run

#### **DOMAIN 1.2 — MAINTENANCE (Questions 47–82)**

47. A fire alarm system in a 15-story office building generates a trouble signal reading "SLC 2 — GROUND FAULT." The building engineer reports that the trouble appeared suddenly after a heavy rainstorm. What environmental cause is most likely responsible?

- A. Lightning struck the building's antenna system and induced a surge on the SLC circuit
- B. Wind-driven rain infiltrated an exterior junction box creating a path between conductor and ground
- C. Rainwater entered the building through a roof leak and reached an SLC junction box or device
- D. The barometric pressure change from the storm caused the panel's ground fault sensor to drift

48. During annual testing of a fire alarm system, the technician discovers that elevator recall does not function when smoke detectors in the elevator lobby activate. The control module relay closes when commanded, and the technician can hear the relay click. What component should be investigated next?

- A. The wiring between the control module's relay output and the elevator controller's recall input
- B. The smoke detector in the elevator lobby because it may be generating the wrong signal type
- C. The panel's SLC communication board because it may not be sending the recall command
- D. The notification appliance circuit because elevator recall requires NAC activation first

49. A fire alarm technician is performing semiannual testing of smoke detectors in a school. Classes are in session during the testing period. How should the technician manage the notification impact during testing?

- A. Disconnect all notification appliance circuits before testing any smoke detectors
- B. Silence the horns but allow strobes to flash during each detector activation test
- C. Schedule all testing for after school hours to avoid disrupting occupied classrooms
- D. Coordinate with school administration and place the system on test to prevent building-wide alarm

50. A fire alarm system has been experiencing intermittent "TROUBLE — NAC 1" signals. The trouble appears for several hours and then clears on its own. The technician inspects the NAC 1 circuit and finds no obvious wiring problems. All devices appear to be properly connected. What diagnostic approach is most appropriate?

- A. Replace all notification appliances on NAC 1 with new devices to eliminate device failures
- B. Install a data logger or recording voltmeter on the NAC 1 circuit to capture the fault when it occurs
- C. Reprogram the panel to disable trouble reporting on NAC 1 until the root cause is identified
- D. Wait for the trouble to appear and immediately perform a full circuit resistance measurement

51. A fire alarm technician is performing a battery load test on a fire alarm system. The test requires disconnecting the AC power and allowing the batteries to power the system under alarm load for a specified duration. During the test, the technician notices the battery voltage dropping faster than expected. What should the technician do?

- A. End the test and document that the batteries failed to maintain adequate voltage under load
- B. Continue the test for the full duration regardless of the rapid voltage drop observed
- C. Reconnect AC power immediately and recharge the batteries before retesting tomorrow
- D. Add a third battery in parallel to boost the capacity and complete the test successfully

52. Per NFPA 72, when a fire alarm system is found to have a deficiency during inspection or testing, who must be notified?

- A. Only the fire alarm technician's company management for internal documentation purposes
- B. Only the supervising station so they can adjust their monitoring procedures accordingly
- C. The building owner or their designated representative must be notified of the deficiency
- D. Only the AHJ because they are the sole authority responsible for code compliance enforcement

53. A fire alarm technician is testing notification appliances and measures the sound output of a horn in an open office area. The meter reads 78 dB at the measurement point. The average ambient noise level in the office during business hours is 55 dB. Per NFPA 72, does this reading meet the audible notification requirement for non-sleeping areas?

- A. No, the sound level must be at least 85 dB regardless of the ambient noise level
- B. No, the sound level must be at least 80 dB to meet the minimum requirement in any space
- C. Yes, but only if the measurement was taken at the farthest point from the notification appliance
- D. Yes, 78 dB exceeds the requirement of 15 dB above the 55 dB average ambient (70 dB minimum)

54. A fire alarm system event log shows a "TROUBLE — DEVICE COMMUNICATION FAILURE — ADDRESS 112" that has been active for three days. The building owner states that no one has investigated the trouble. What is the operational risk of leaving this condition unresolved?

- A. The risk is minimal because the panel will automatically bypass the failed device during an alarm
- B. Address 112 cannot detect a fire condition, leaving that area unprotected until repaired
- C. The failed device will cause all other devices on the SLC to operate at reduced sensitivity
- D. The communication failure will eventually spread to adjacent devices on the same SLC loop

55. A fire alarm technician is performing annual testing on a fire alarm system. During the test of a horn/strobe on the third floor, the technician observes that the strobe appears noticeably dimmer than other strobes on the same NAC circuit. What should the technician investigate?

- A. The voltage at the dim strobe compared to other devices on the circuit to check for excessive drop
- B. The panel programming to verify the strobe has been set to the correct candela output level
- C. The ambient light level in the room because bright conditions can make strobes appear dimmer
- D. The NAC circuit fuse at the panel because a partial fuse failure can reduce voltage to some devices

56. A fire alarm system is monitored by a central station. During annual testing, the technician transmits a test alarm signal. The central station reports that they received the signal but it was coded as a "medical emergency" instead of a "fire alarm." What is the most likely cause?

- A. The monitoring station's receiving equipment misidentified the signal due to a database error
- B. The fire alarm panel's communication module is transmitting on the wrong frequency band
- C. The panel's communication module is programmed with incorrect event codes for alarm signals
- D. The telephone line has excessive noise that corrupted the transmitted signal data packet

57. A fire alarm technician is troubleshooting a conventional fire alarm panel that shows "ALARM — ZONE 4" but no devices on Zone 4 were intentionally activated. Building occupants report no signs of fire. The technician measures the resistance at the Zone 4 panel terminals and reads 1.2 ohms. What condition is most likely present?

- A. The Zone 4 IDC has a ground fault that is being misinterpreted as an alarm by the panel
- B. A short circuit between the Zone 4 conductors is creating a low-resistance path that mimics device activation
- C. The Zone 4 EOLR has failed open and the panel is interpreting the loss of resistance as an alarm
- D. A smoke detector on Zone 4 has activated due to an environmental contaminant such as dust or insects

58. A fire alarm system in a hotel is equipped with smoke detectors in every guest room. During a routine test, the technician finds that 12 detectors on the eighth floor consistently fail functional testing — they do not activate when tested with approved aerosol smoke. All 12 detectors are the same age and model. What is the most likely explanation?

- A. All 12 detectors are from the same manufacturing batch and have a common defect
- B. The SLC circuit serving the eighth floor has insufficient voltage to power the detectors properly
- C. The approved aerosol smoke product has expired and is no longer producing adequate test smoke
- D. The eighth floor detectors have accumulated excessive contamination and need cleaning or replacement

59. During annual testing of a fire alarm system, the technician tests the fire alarm system's communication link to the supervising station. The panel sends a test signal but the station does not receive it. The technician verifies the communication module shows "online" status. What is the most efficient next step?

- A. Test the communication pathway at a point between the panel and the station
- B. Replace the communication module with a new unit and retest the link immediately
- C. Verify the communication pathway is functional by testing the telephone line or network connection
- D. Contact the panel manufacturer's technical support for remote diagnostic assistance

60. Per NFPA 72, smoke detector sensitivity testing can be accomplished on analog addressable systems by reviewing the panel's sensitivity reports. How frequently must this sensitivity evaluation be performed after the initial test within the first year?

- A. Every alternate year — at year three, year five, year seven, and so on from installation
- B. Annually as part of the comprehensive system functional test and inspection procedures
- C. Every three years to coincide with the NICET certification renewal cycle
- D. Only when a detector generates a "device dirty" trouble signal at the fire alarm panel

61. A fire alarm technician is troubleshooting a fire alarm panel that shows a persistent "GROUND FAULT — IDC 3" trouble signal. The technician disconnects the IDC 3 wiring at the panel and the trouble clears. The technician then reconnects the circuit at its midpoint junction box — connecting only the first half of the circuit — and the ground fault returns. What can be concluded?

- A. The IDC 3 panel input module is defective and is generating a false ground fault reading
- B. The ground fault is on the second half of the circuit beyond the midpoint junction box
- C. The midpoint junction box itself is the source of the ground fault due to water infiltration
- D. The ground fault is located on the first half of IDC 3 between the panel and the midpoint

62. A fire alarm technician is performing annual testing on a voice evacuation system. The technician activates the system and listens to the pre-recorded evacuation message on each floor. On the seventh floor, the message is clearly intelligible from most locations, but in one large conference room the words echo badly and are difficult to understand. What should be documented?

- A. The entire seventh floor voice evacuation system has failed the intelligibility test
- B. The conference room has an intelligibility deficiency that must be investigated and corrected
- C. The conference room acoustics are acceptable because the corridor speakers compensate
- D. Voice evacuation testing requires specialized acoustic instruments and cannot be assessed by ear

63. A fire alarm system was installed four years ago. The smoke detectors have had sensitivity testing performed at year one and year three. When is the next sensitivity test due?

- A. At year five, following the alternate-year schedule from the initial test
- B. At year four because the schedule changes to annual after the first two tests
- C. No further testing is required because two tests establish the detector's lifetime baseline
- D. At year six because the interval extends to three years after the initial two-year testing cycle

64. A fire alarm technician discovers during annual testing that when any smoke detector on the second floor activates, the door holders on the second floor release correctly but the door holders on the third floor do not release. The sequence of operations requires all door holders on floors 2 and 3 to release for any second-floor alarm. What is the most likely cause?

- A. The third-floor door holders are mechanically jammed and cannot release when commanded
- B. The third-floor magnetic holders have lost power due to a separate electrical circuit failure
- C. The door holder control modules on the third floor are wired to the wrong SLC loop
- D. The panel programming does not include the third-floor door holders in the second-floor alarm response

65. A fire alarm technician receives a service call for a fire alarm system that is generating a trouble signal for "PRIMARY AC POWER FAILURE." The technician arrives and measures 122 VAC at the panel's incoming power terminals. The building has normal utility power. What should the technician investigate?

- A. The panel's AC input terminals to verify they are properly connected and not corroded
- B. The building's main electrical service to check for harmonic distortion on the power supply
- C. The panel's internal AC power monitoring circuitry which may have a component failure
- D. The battery voltage because low battery voltage can cause the panel to display incorrect trouble signals

66. Per NFPA 72 Table 14.4.3.2, how frequently must the fire alarm control unit's emergency control functions — including elevator recall and HVAC shutdown — be functionally tested?

- A. Semiannually because emergency control functions are classified as critical life safety interfaces
- B. Annually as part of the comprehensive system functional test and inspection
- C. Monthly because elevator recall and HVAC shutdown affect building evacuation safety
- D. Only during initial acceptance testing with verification during annual visual inspection

67. During a fire alarm inspection, the technician discovers that a building renovation has created a new room by constructing a wall across an existing open office space. A smoke detector that previously covered the open area is now located on one side of the new wall. The other side of the wall has no smoke detection. What must be documented?

- A. A new smoke detector is needed on the other side of the wall to maintain detection coverage
- B. The existing detector provides adequate coverage because it was installed before the renovation
- C. The new wall must include a fire damper to allow smoke to pass through to the existing detector
- D. An air sampling tube must be extended through the new wall to connect with the existing detector

68. A fire alarm system's trouble log shows that a specific waterflow switch has generated three supervisory signals in the past month. Each signal appeared and then cleared within an hour. No maintenance work was performed on the sprinkler system during these periods. What is the most likely cause?

- A. The waterflow switch has a sticking paddle mechanism that occasionally moves without water flow
- B. The sprinkler system is experiencing minor pressure fluctuations that cause brief paddle movement
- C. The waterflow switch is wired as a supervisory point instead of an alarm point in the panel
- D. Water pressure fluctuations or surges are causing brief paddle movement triggering the switch

69. A fire alarm technician is testing the fire alarm system's DACT communication by sending a test signal to the supervising station. The DACT attempts to dial but the technician hears a recording that says the number has been disconnected. The monitoring station's phone number was changed last month. What is required?

- A. The fire alarm panel must have its GFCI protection reset before the DACT can dial correctly
- B. The panel manufacturer must remotely update the DACT firmware to support new phone numbers
- C. The DACT must be reprogrammed with the monitoring station's new telephone number
- D. The telephone company must configure the new number to accept signals from the DACT

70. A fire alarm technician is inspecting smoke detectors in a parking garage and discovers that all 15 detectors in the garage are photoelectric smoke detectors. The garage is open-air with vehicle exhaust present throughout. What concern should the technician raise?

- A. Photoelectric detectors are the correct detector type for parking garages per NFPA 72
- B. Smoke detectors are generally not appropriate for open-air parking garages due to vehicle exhaust
- C. Ionization detectors should replace the photoelectric models for better exhaust particle detection
- D. The detectors should be supplemented with flame detectors at each parking level entrance

71. During a fire alarm system inspection, the technician reviews the Record of Completion and discovers that it was completed and signed at the time of original installation seven years ago. Since then, the building has undergone two major renovations that added over 50 new devices to the system. The Record of Completion has not been updated. What should be documented?

- A. The Record of Completion must be updated to reflect the current system configuration
- B. The original Record of Completion remains valid because it was signed at initial acceptance
- C. A new Record of Completion is only required if the panel itself was replaced during renovation
- D. The Record of Completion only needs updating when the system is expanded by more than 100 devices

72. A fire alarm technician is performing a functional test on a tamper switch. The technician turns the valve wheel two full revolutions from fully open but no supervisory signal appears at the panel. The technician checks the wiring at the tamper switch and finds it is secure. What should the technician investigate next?

- A. Whether the valve needs to be fully closed before the tamper switch will generate a signal
- B. Whether the tamper switch is mechanically adjusted correctly to detect movement at two revolutions
- C. Whether the fire alarm panel has been recently reset causing a delay in signal processing
- D. Whether the tamper switch has been wired to the panel as a supervised alarm point rather than supervisory

73. During testing, the fire alarm technician activates a smoke detector in a corridor. The panel displays the alarm correctly. The horn/strobes activate on the alarm floor. However, the technician notices that horn/strobes on the floor above and below do not activate. The sequence of operations requires notification on the alarm floor plus one floor above and one floor below. What is this notification strategy called?

- A. Total building evacuation notification that activates all devices simultaneously
- B. Positive alarm sequence notification that delays activation pending investigation
- C. Adjacent floor notification or zone-above/zone-below notification strategy
- D. Presignal notification that alerts staff before activating general building notification

74. A fire alarm system's battery charger has failed and the technician has ordered a replacement part. The building owner asks how long the system can operate on battery power alone before the batteries are depleted. The system draws 0.6 amps in standby and the batteries are rated at 18 Ah. What is the approximate maximum standby time?

- A. 18 hours based on dividing the battery capacity by the alarm current draw
- B. 30 hours based on dividing the battery capacity by the standby current draw
- C. 24 hours because that is the code-required minimum standby duration for all systems
- D. 12 hours based on applying a 50% derating factor to the battery capacity calculation

75. A fire alarm technician finds a smoke detector mounted on a wall in a corridor at a height of 24 inches below the ceiling. The corridor ceiling is 9 feet high, making the detector approximately 84 inches above the floor. Does this mounting location comply with NFPA 72?

- A. Yes, because the detector is above the standard mounting height range for notification appliances
- B. No, wall-mounted smoke detectors must have the top of the device within 12 inches of the ceiling
- C. Yes, because any wall-mounted detector between 60 and 96 inches above the floor is acceptable
- D. No, because corridor smoke detectors must be ceiling-mounted and wall mounting is prohibited

76. A fire alarm technician is troubleshooting a fire alarm system where the panel shows normal status but the supervising station reports receiving no signals for the past week. The technician checks the DACT and finds the telephone line disconnected from the back of the panel. The panel shows no communication trouble signal. What does this indicate?

- A. The panel's communication pathway supervision may have a fault or the supervision interval is too long
- B. The DACT does not require a telephone line connection and communicates via cellular backup
- C. The panel is functioning normally because communication troubles are only reported monthly
- D. The telephone line disconnection is acceptable because the panel stores signals for later transmission

77. During testing, the fire alarm technician activates a smoke detector and the panel correctly displays the alarm. The technician notices that the temporal-three alarm pattern on the horns sounds abnormal — only two pulses instead of three are sounding before the pause. What should be documented?

- A. The horn is operating within acceptable tolerance since minor pattern variations are expected
- B. The panel's temporal pattern timing is a factory setting and cannot be adjusted in the field
- C. The incorrect temporal pattern is a deficiency that must be investigated and corrected
- D. The two-pulse pattern is an acceptable alternative to the three-pulse pattern per NFPA 72

78. A fire alarm technician discovers that a smoke detector has been installed in a storage room directly above a space heater. The heater is a wall-mounted electric unit that produces warm rising air when operating. What concern does this installation create?

- A. The heater creates a warm air column that can push smoke away from the detector
- B. The heat from the space heater will cause the smoke detector to activate falsely
- C. The magnetic field from the electric heater interferes with the detector's electronics
- D. The warm air from the heater will cause condensation on the detector's sensing chamber

79. A fire alarm technician is conducting annual testing and discovers that the panel's event log is recording timestamps that are 45 minutes ahead of the actual current time. Is this a concern?

- A. No, small time discrepancies are expected and do not affect system operation
- B. No, the panel's clock automatically resynchronizes with the supervising station daily
- C. Yes, but only if the time discrepancy exceeds 60 minutes per the NFPA 72 standard
- D. Yes, inaccurate timestamps compromise event investigation and the clock must be corrected

80. During a fire alarm inspection, the technician discovers that a building tenant has mounted a large flat-screen television directly below a horn/strobe device, covering approximately 60% of the strobe lens. The horn output is not affected. What must be documented?

- A. The television obstructs the visible notification output and the obstruction must be removed
- B. The horn output is adequate and the partial strobe obstruction does not require corrective action
- C. The strobe can be repositioned 6 inches higher to clear the television without a design change
- D. The television and the horn/strobe can coexist if the remaining 40% of the lens is unobstructed

81. A fire alarm technician is testing the communication link between the fire alarm panel and the supervising station. The test signal is transmitted and the station confirms receipt. However, the station reports the signal was received from "Building 7" when the technician is testing in "Building 12." What is the cause of this discrepancy?

- A. The panel's communication module has a hardware defect that transmits incorrect identification
- B. The supervising station's receiving equipment has a database error for this account number
- C. The panel's account number or building identification code is programmed incorrectly
- D. The telephone line has been cross-connected with the fire alarm system in Building 7

82. A fire alarm technician is performing annual testing and discovers that a smoke detector in a break room generates a trouble signal for "DEVICE DIRTY" on the panel's diagnostic display. The detector has not been cleaned since installation three years ago. What action is required?

- A. No action is needed because the detector is still capable of activation as confirmed by functional test
- B. The detector must be cleaned per the manufacturer's procedures and retested for acceptable sensitivity
- C. The detector must be replaced with a new unit because dirty detectors cannot be restored to specifications
- D. The dirty device trouble is informational only and does not indicate a maintenance requirement

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

83. A fire alarm submittal package is returned from the engineer with the notation "Approved as Noted." What does this disposition require the fire alarm contractor to do?

- A. The contractor must completely redesign the submittal and resubmit for another review cycle
- B. The contractor may begin installation but must address the engineer's notes simultaneously
- C. The contractor should wait for the engineer to issue a revised set of drawings before proceeding
- D. The contractor must incorporate the noted corrections before proceeding with installation

84. A fire alarm technician is reviewing shop drawings and notices that the voltage drop calculation for NAC 3 shows 14.2 VDC at the farthest appliance. The appliances are listed for operation between 16 and 33 VDC. What action must be taken before installation begins?

- A. The NAC 3 circuit must be redesigned to bring the voltage above the minimum listed operating range
- B. The appliances must be replaced with models that have a wider listed operating voltage range
- C. The calculation must be rechecked but 14.2 VDC is within the acceptable tolerance of the 16 VDC minimum
- D. A variance from the appliance manufacturer must be obtained to operate below the listed voltage

85. On a fire alarm floor plan, the technician sees device symbols connected by a dashed line forming a loop that leaves the fire alarm control panel and returns to it. This circuit configuration most likely represents what type of circuit?

- A. A Class B notification appliance circuit with an end-of-line resistor at the last device
- B. A conventional initiating device circuit with zone-level identification only
- C. A Class A signaling line circuit that provides fault tolerance through an alternate return path
- D. A communication circuit connecting the panel to the supervising station via telephone line

# LEVEL I — SIMULATION EXAM 5: ANSWER KEY AND EXPLANATIONS

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1. C — A room measuring 14 by 18 feet falls well within the default 30-foot listed spacing for spot-type smoke detectors. No point in the room is more than 21 feet ( $0.7 \times 30$ ) from a single centrally placed detector. One detector provides complete coverage for this room size on a smooth, flat ceiling.
2. D — When the open ceiling space serves as the HVAC return air path without dedicated ductwork, the space is classified as a plenum. FPLP cable is required for all fire alarm conductors in plenum spaces per NEC Section 760.176. FPLR is a riser-rated cable that cannot substitute for FPLP in plenum applications regardless of the circumstances.
3. B — Voltage drop calculations must use the round-trip conductor distance because current flows from the panel to the farthest device on one conductor and returns on the other. For a device 250 feet from the panel, the total conductor length is  $250 \times 2 = 500$  feet. Using only the one-way distance produces a voltage drop value that is exactly half of the actual drop.
4. A — NFPA 72 Section 10.6.7.2 permits the secondary battery standby duration to be reduced from 24 hours to 4 hours when the primary power supply is backed by an emergency generator that meets specific reliability criteria including automatic start, automatic transfer, and adequate fuel capacity. The alarm duration remains at 5 minutes under the default requirement.
5. C — Adding 8 devices to the existing 195 would bring the total to 203, exceeding the manufacturer's maximum loop capacity of 198 devices. Operating an SLC beyond its rated capacity can cause communication failures, polling timeouts, and unreliable device operation. The technician must notify the supervisor so an additional SLC loop can be added to accommodate the new devices.
6. A — NFPA 72 requires pull stations within 5 feet of each exit doorway. With no solid mounting surface available within 5 feet, the standard installation cannot be completed as designed. The technician must document the condition and request a design solution — such as a pedestal mount, a surface-mounted backbox on a suitable structural element, or an alternative approved by the AHJ.
7. D — Both AFCI and GFCI protective devices are prohibited on the fire alarm panel's dedicated branch circuit per NEC Article 760 and NFPA 72 Section 10.6.5. These devices can trip during conditions that do not represent a fire hazard, disconnecting primary power from the panel. The AFCI must be replaced with a standard thermal-magnetic circuit breaker with a lock-on device.

8. B — Rate-of-rise heat detectors activate when the temperature increases faster than 12–15°F per minute. Opening loading dock doors in winter can cause rapid temperature increases as warm interior air mixes with cold exterior air, or vice versa in summer. These rapid temperature swings can exceed the rate-of-rise threshold and trigger nuisance activations unrelated to fire.
9. C — Fire alarm systems interface with access control to ensure that magnetically locked doors on egress paths release during a fire alarm activation. The control module receives an alarm signal command from the panel and removes power from the magnetic lock, allowing the door to open freely for evacuation. This is a code-required life safety function that overrides normal security operations.
10. D — NFPA 72 cautions against placing smoke detectors in the direct airflow path of ceiling fans, supply diffusers, and other high-velocity air sources. Rather than specifying a fixed distance, the code directs the installer to evaluate the specific airflow pattern — including the diffuser's throw distance and velocity — to ensure smoke can reach the detector without being diluted or deflected.
11. A — NEC Article 760 requires the fire alarm panel's dedicated branch circuit breaker to be equipped with a lock-on device that prevents accidental disconnection. Without this device, maintenance personnel or building occupants could inadvertently turn off the fire alarm panel's primary power. The lock-on device must be installed to achieve code compliance.
12. A — Battery 1 reads 13.2 VDC which is acceptable for a fully charged 12V SLA battery. Battery 2 reads 10.8 VDC which is significantly below normal and indicates a failing cell. Batteries in a series pair should always be replaced as a matched set because a weak battery degrades the performance of the healthy battery and compromises the entire secondary power supply.
13. B — The correct support interval depends on the specific cable type being installed and the applicable NEC article governing that cable designation. Different cable types — FPL, FPLR, FPLP, and their non-power-limited equivalents — may have different support requirements. The technician should verify the manufacturer's installation instructions and the applicable NEC sections for the specific cable being used.
14. C — A 50-by-40-foot room exceeds the maximum coverage area for a single wall-mounted visible notification appliance at any standard candela rating. NFPA 72 Table 18.5.5.5.1(a) must be consulted to determine the correct candela ratings and the number of appliances required. Multiple wall-mounted strobes at appropriate candela ratings must be used to provide complete visible coverage throughout the space.
15. D — Heavy objects resting on fire alarm conduit can crush, deform, or bend the conduit, damaging the conductors inside. Damaged conductors can develop insulation failures that cause ground faults, shorts, or open circuits. The plumbing pipe must be removed from the fire alarm conduit immediately and properly supported using its own independent hangers and supports.

16. B — The four-terminal configuration with "in" and "out" designations indicates the detector is designed for series wiring where the IDC conductors enter the device at the "in" terminals, pass through the device, and continue to the next device from the "out" terminals. This daisy-chain arrangement is the standard wiring method for conventional initiating device circuits.
17. A — EMT (Electrical Metallic Tubing) is the most commonly used conduit type for surface-mounted fire alarm installations in commercial buildings, including those with concrete block walls. EMT is secured to the concrete surface using appropriate anchors and one-hole or two-hole straps. It provides physical protection for the conductors while maintaining a professional appearance.
18. C — NFPA 72 Section 17.14 requires manual fire alarm stations to be installed in locations that are readily accessible and clearly visible to building occupants. A pull station inside a closed closet — even if unlocked — is not readily visible to occupants passing through the corridor and does not meet the code's intent of providing obvious, immediately accessible manual alarm activation.
19. D — NEC Article 760 permits power-limited fire alarm cables to share cable trays with other power-limited cables under certain conditions, but specific separation requirements must be evaluated. The key determination is whether the data cables are classified as power-limited circuits and whether the separation requirements of Section 760.136 are satisfied for the specific combination of cable types present.
20. B — A 0 VDC reading at a single device location while all other devices on the same SLC communicate normally indicates a localized wiring problem. An open circuit in the SLC conductors at or near that device prevents voltage from reaching the location. If the panel or SLC output had failed, all devices on the loop would be affected, not just one.
21. A — Fire alarm zones should not cross fire-rated partitions because these partitions create separate fire compartments. If a single zone spans both sides of a fire wall, responders cannot determine which compartment contains the fire based on the zone indication alone. NFPA 72 Section 23.8.5.4 requires that zone boundaries align with fire barriers.
22. D — Duplicate addresses on an SLC cause a communication conflict because the panel cannot distinguish between two devices responding to the same polling address. The panel will report a communication error, and one or both devices may fail to communicate reliably. Every device on an SLC must have a unique address to ensure proper point-level identification and communication.
23. C — After making any wire nut connection, a tug test must be performed on each conductor to verify the connection is mechanically secure. A wire nut that feels tight during installation may not have fully engaged the conductor strands. The tug test confirms the connection will withstand vibration and thermal cycling over the life of the system without working loose.
24. B — Standard fire alarm cable insulation materials — including THHN, FPL, FPLR, and FPLP — are typically rated for temperatures up to 150°F (75°C) or higher. A pipe surface temperature

of 105°F is well within the temperature rating of standard fire alarm cable insulation and does not require cable relocation, shielding, or a special high-temperature conductor.

25. A — When both smoke detectors and heat detectors are installed in the same space, each detector type follows its own spacing requirements. Smoke detectors use their listed spacing per NFPA 72 Chapter 17.7, and heat detectors use their listed spacing with ceiling height reduction factors per Table 17.6.3.5.1. The two detector types are independent systems with independent spacing rules.
26. D — A 20-amp branch circuit with 12 AWG conductors exceeds the fire alarm panel's 8-amp maximum current requirement and provides adequate capacity. NEC does not require the circuit breaker to match the panel's exact current draw — it requires the circuit to have adequate capacity for the connected load. The 20-amp circuit safely exceeds the 8-amp requirement with substantial margin.
27. C — Beam smoke detectors project a light beam across large open spaces and detect smoke by measuring the reduction in light intensity at the receiver. They are specifically designed for large open areas with high ceilings where spot-type detectors may be ineffective due to smoke stratification, excessive ceiling height, or impractical detector access for maintenance. A single beam detector can protect areas that would require dozens of spot detectors.
28. A — In a series circuit, total resistance equals the sum of all individual resistances:  $R_{total} = R1 + R2 = 1,000 + 2,200 = 3,200$  ohms. Series resistance always increases the total because each resistor adds to the overall opposition to current flow. This is the opposite of parallel resistance, where total resistance is always less than the smallest individual resistor.
29. B — Any penetration through a floor assembly — like a wall penetration — must be sealed with an approved firestop material to maintain the floor's fire rating. An unsealed conduit penetration creates an opening through which fire, smoke, and toxic gases can pass between floors, compromising the building's vertical compartmentalization and violating fire and building codes.
30. D — Asbestos is a regulated hazardous material that requires specialized handling by licensed abatement personnel. Fire alarm technicians are not qualified to disturb, remove, or work around asbestos-containing materials without proper training, equipment, and certification per OSHA regulations. Work must stop immediately and the condition reported so qualified professionals can assess and address the hazard.
31. C — NFPA 72 does not use Table 18.5.5.5.1(a) for ceiling-mounted visible appliances — that table is specifically for wall-mounted units. Ceiling-mounted visible appliances use Table 18.5.5.5.1(b), which determines coverage based on room dimensions, ceiling height, and the appliance's specific candela rating in the ceiling-mount configuration.
32. B — Before disconnecting primary AC power to test the secondary power transfer, the technician must verify that the batteries are connected, properly charged, and capable of sustaining the

system. If the batteries are dead, disconnected, or failed, removing AC power will cause the system to shut down completely rather than transferring to secondary power.

33. A — The default 30-foot listed spacing for smoke detectors applies regardless of corridor width. NFPA 72 does not require reduced spacing for narrow corridors — the 30-foot spacing between detectors in a corridor provides adequate detection coverage. Detectors are typically centered in the corridor width and spaced at or below the listed spacing along the corridor length.
34. D — Pool environments with high humidity and corrosive chlorine vapors create extreme conditions that cause rapid deterioration of smoke detector sensing chambers and frequent nuisance alarms. Heat detectors are the most appropriate technology for this environment because they are not affected by humidity, chemical vapors, or the corrosive atmosphere that would degrade or falsely activate smoke detectors.
35. C — FPLR (Fire Power-Limited Riser) cable is the minimum requirement for vertical runs that pass through more than one floor. The SLC running from the ground floor through all five floors constitutes a riser application regardless of whether it is in a dedicated riser shaft. FPLP cable may also be used since it can substitute for FPLR, but FPL is not acceptable for multi-floor vertical runs.
36. B — NFPA 72 does not specify a minimum wall width for mounting notification appliances. As long as the device can be securely mounted to the wall surface, the lens is unobstructed, and the device meets all mounting height requirements, the installation is acceptable. The 14-inch wall section between windows provides adequate surface for a standard notification appliance backbox.
37. A — Maximum devices = rated output ÷ per-device current =  $2.5 \div 0.330 = 7.57$  devices. Since partial devices cannot be installed, the maximum is 7 devices at  $7 \times 0.330 = 2.310$  amps. Eight devices would draw 2.640 amps, which exceeds the 2.5-amp rating. Always round down when calculating maximum device counts to stay within the rated output capacity.
38. D — The duct detector manufacturer's installation instructions specify the sampling tube configuration — including the number of holes, hole sizes, and tube length — based on the duct width and the expected air velocity at the installation point. Wider ducts require longer tubes to sample air across the full cross-section. Higher air velocities may require different hole configurations to ensure adequate air sampling.
39. B — When an existing conduit has reached its maximum NEC-permitted conductor count, no additional conductors can be added regardless of available physical space. The fire alarm cable must be installed in a separate dedicated conduit. NEC conduit fill limits exist to prevent overheating, ensure ease of installation, and allow for conductor removal when needed.
40. C — Ceiling tiles cannot adequately support the weight of a smoke detector and its base. Over time, the tile may sag, shift, or break under the device weight, potentially causing the detector to fall or lose its connection to the circuit. Detector bases must be mounted to a structural ceiling

element — such as the deck above, a bar joist, or an approved support bracket — independent of the ceiling grid.

41. A — While 120 VAC circuits are less affected by voltage drop than 24 VDC circuits, a 150-foot run can still experience measurable voltage drop depending on the conductor size and current draw. The technician should calculate the voltage drop to ensure the panel receives adequate voltage at its input terminals. If the drop is excessive, a larger conductor size may be needed.
42. D — Address 000 is typically not a valid assignable device address in most addressable fire alarm systems. Devices shipped from the factory are often set to 000 as a default or placeholder that must be changed to the correct address before the device will communicate with the panel. The pull station must be programmed with its assigned address from the device schedule.
43. C — FPLR cable cannot substitute for FPLP in plenum spaces under any circumstances per NEC Section 760.176. The cable substitution hierarchy only allows substitution upward — FPLP can replace FPLR or FPL, but FPLR cannot replace FPLP. The technician must obtain FPLP cable to complete the installation in the plenum space.
44. A — Multiple fire alarm circuits from the same system may share junction boxes and enclosures per NEC Article 760. The separation requirements in Article 760 apply to separating fire alarm circuits from power and lighting circuits — not from other fire alarm circuits within the same system. Both NAC circuits can coexist in the same junction box.
45. B — A walk-in freezer at -10°F requires a fixed-temperature heat detector with an activation temperature appropriate for the environment. The detector must be rated to operate in the extreme cold and must have an activation temperature high enough above the normal ambient to prevent nuisance alarms but low enough to respond to an actual fire. Standard 135°F detectors can function in freezer environments since the activation temperature is well above the ambient.
46. D — NEC requires conduit to be supported at intervals not exceeding the maximum specified for the conduit type and to be secured within the specified distance of each outlet box, junction box, cabinet, conduit body, or fitting. Both horizontal and vertical runs must be properly supported at regular intervals, at penetration points, and near all termination points.
47. C — A ground fault trouble that appears suddenly after a heavy rainstorm strongly suggests water infiltration into the fire alarm system's wiring infrastructure. Rainwater entering through a roof leak, a compromised exterior wall penetration, or a ceiling-level water intrusion can reach SLC junction boxes or device locations, creating a low-resistance path between a conductor and ground.
48. A — The smoke detector activated correctly, the panel processed the alarm and sent the recall command, and the control module relay closed as commanded (the technician heard the click). The fault lies downstream of the control module — in the wiring between the module's relay output contacts and the elevator controller's recall input, or in the elevator controller itself.

49. D — The most practical approach is to coordinate with school administration and place the system on test status to prevent building-wide alarm activation during detector testing. This allows testing to proceed during school hours without triggering full evacuation alarms that would disrupt classes. The supervising station must also be notified that the system is on test.
50. B — An intermittent trouble that appears and clears on its own suggests a marginal condition that crosses the trouble threshold periodically. A data logger or recording voltmeter captures the electrical conditions on the circuit continuously, including during the trouble event, providing diagnostic data that cannot be obtained through spot measurements during routine visits.
51. A — Rapid voltage drop during a battery load test indicates the batteries cannot sustain the required load. Continuing the test risks dropping below the panel's minimum operating voltage, potentially causing the system to shut down. The technician should end the test, document the failure, and recommend battery replacement. Batteries that fail to maintain voltage under load are no longer capable of meeting NFPA 72 secondary power requirements.
52. C — NFPA 72 Section 14.2 requires that deficiencies found during inspection or testing be reported to the building owner or their designated representative. The building owner has the responsibility for maintaining the fire alarm system and must be informed of any conditions that impair system performance so that corrective action can be initiated.
53. D — NFPA 72 Section 18.4.4.1 requires audible notification to be at least 15 dB above the average ambient sound level. With an average ambient of 55 dB, the minimum required level is  $55 + 15 = 70$  dB. The measured 78 dB exceeds this minimum by 8 dB. In non-sleeping areas, the requirement is based on ambient noise — not a fixed minimum regardless of ambient conditions.
54. B — A device communication failure means the panel cannot receive alarm signals from address 112. Whatever area that device protects has no automatic fire detection coverage while the device remains offline. A fire in that area would not be detected by the fire alarm system. This is a significant impairment that must be investigated and corrected promptly.
55. A — A strobe that appears noticeably dimmer than other devices on the same NAC circuit suggests the device may be receiving lower voltage due to its position on the circuit or an additional resistance in the wiring at that location. The technician should measure the voltage at the dim strobe and compare it to the voltage at other devices on the circuit. If the voltage is significantly lower, a wiring issue or excessive voltage drop at that location must be investigated.
56. C — When the supervising station receives a signal coded as the wrong event type, the most likely cause is incorrect event code programming in the panel's communication module. The module transmits a digital code that the station interprets according to its database. If the code assigned to "fire alarm" in the panel does not match what the station expects for "fire alarm," the signal is misidentified.

57. B — A resistance reading of 1.2 ohms on a conventional IDC — far below the expected EOLR value of thousands of ohms — indicates a short circuit between the two conductors. Many conventional panels interpret this low-resistance condition as a device activation because it mimics the electrical change produced when a conventional detector shorts across the IDC to signal an alarm.
58. D — Twelve detectors on the same floor consistently failing functional testing — while detectors on other floors of the same model and age pass — strongly suggests a floor-specific environmental cause. The eighth floor may have higher dust, cooking fumes from a nearby kitchen, or HVAC conditions that have contaminated the detectors. Cleaning or replacing the affected detectors and addressing the environmental cause is required.
59. C — Since the communication module shows "online" status, the module itself may be functioning but the pathway it uses to reach the station may be impaired. The most efficient next step is to verify the communication pathway — test the telephone line for dial tone and connectivity, check the network connection for IP communicators, or verify cellular signal for cellular modules.
60. A — NFPA 72 Table 14.4.3.2 requires smoke detector sensitivity testing within one year of installation and every alternate year thereafter. After the initial first-year test, the schedule follows every other year — year 3, year 5, year 7, and so on. This alternate-year cycle monitors the gradual sensitivity drift caused by dust accumulation and aging.
61. D — When reconnecting only the first half of the circuit causes the ground fault to return, the fault is located on that first half — between the panel and the midpoint junction box. If the fault were on the second half, reconnecting only the first half would not reproduce the trouble. The technician should now divide the first half again to narrow the fault location further.
62. B — The conference room has a specific intelligibility deficiency caused by acoustic conditions — likely excessive reverberation from hard surfaces creating echoes that distort the voice message. NFPA 72 requires voice messages to be intelligible throughout all notification zones. The conference room deficiency must be documented and corrected — potentially by adding speakers, changing speaker placement, or installing acoustic treatment.
63. A — NFPA 72 Table 14.4.3.2 requires sensitivity testing within one year of installation and every alternate year thereafter. With tests completed at year one and year three, the next test is due at year five. The alternate-year cycle continues from the initial test: year 1, year 3, year 5, year 7, and so on throughout the detector's service life.
64. D — The second-floor door holders release correctly, confirming the detection, panel processing, and control module outputs are functioning for the local floor. The third-floor door holders not releasing for a second-floor alarm is most likely a programming deficiency — the panel programming does not include the third-floor door holder control modules in the response matrix for second-floor alarm inputs.

65. C — With 122 VAC measured at the panel's incoming power terminals — which is within normal utility voltage range — the primary power is physically present and connected. The panel's trouble signal for "AC Power Failure" despite adequate voltage at the terminals indicates that the panel's internal AC power monitoring circuitry may have a component failure. The monitoring circuit, its connections, and associated components should be investigated.
66. B — NFPA 72 Table 14.4.3.2 requires emergency control functions — including elevator recall, HVAC shutdown, door release, and all other programmed interfaces — to be functionally tested annually. Each interface must be physically verified during testing: the elevator must actually recall, the AHU must actually shut down, and the doors must actually release and close.
67. A — The new wall creates a separate room that no longer has smoke detection coverage. The existing detector on the other side of the wall cannot detect smoke in the newly enclosed space because the wall blocks smoke travel. A new smoke detector must be installed in the newly created room to maintain complete detection coverage per NFPA 72.
68. D — Water pressure fluctuations and surges — caused by sprinkler system testing on other floors, municipal water supply pressure variations, or fire pump cycling — can cause brief paddle movement in waterflow switches. These momentary movements trigger the switch contacts, generating a signal that clears when the paddle returns to its normal position. A retard delay adjustment may help prevent these nuisance activations.
69. A — The DACT's programming contains the supervising station's telephone number. When the number changes, the DACT continues dialing the old number, which is now disconnected. The technician must reprogram the DACT with the new telephone number and verify successful signal transmission to the monitoring station at the new number.
70. B — Smoke detectors are generally not appropriate for open-air parking garages because vehicle exhaust fumes produce particles that trigger frequent nuisance alarms. The exhaust particulates are indistinguishable from smoke particles to the detector's sensing chamber. Heat detectors or other detection technologies are typically more appropriate for this environment.
71. A — The Record of Completion must be updated whenever the fire alarm system is modified. Two major renovations adding over 50 devices represent significant system changes that must be documented. NFPA 72 Section 7.8.2 requires the Record of Completion to reflect the current system configuration. An outdated Record of Completion is a documentation deficiency.
72. B — If the tamper switch wiring is secure and the valve has been turned two full revolutions without generating a supervisory signal, the switch's mechanical adjustment may be incorrect. The switch must be positioned so that it detects valve wheel movement within two revolutions from fully open. The technician should verify the switch's physical adjustment relative to the valve stem position.

73. A — NFPA 72 Table 14.4.3.2 requires all emergency control functions to be tested annually. Each function — elevator recall, HVAC shutdown, door release, suppression releasing, and all other programmed interfaces — must be physically activated and verified during the annual comprehensive system test.
74. B — Approximate maximum standby time = battery capacity ÷ standby current = 18 Ah ÷ 0.6 amps = 30 hours. This is the theoretical maximum before the batteries are fully depleted. In practice, the usable time is less because battery voltage drops below the panel's minimum operating voltage before the batteries are completely discharged. The building owner should be advised that charger repair is urgent.
75. B — NFPA 72 Section 17.7.3.2.1 requires that wall-mounted smoke detectors have the top of the detector within 12 inches of the ceiling. A detector mounted 24 inches below the ceiling places it well outside the smoke accumulation layer near the ceiling surface. Smoke may not reach a detector mounted this far below the ceiling, resulting in delayed or failed detection.
76. A — The panel's communication pathway supervision should detect a disconnected telephone line and generate a trouble signal. The absence of a trouble signal despite a physically disconnected line indicates that the panel's communication supervision monitoring may have a fault, the supervision feature may not be enabled, or the supervision polling interval may be excessively long. The technician must investigate and correct the supervision function.
77. C — The temporal-three pattern — three short pulses followed by a pause — is the nationally recognized fire alarm evacuation signal required by NFPA 72 Section 18.4.2 and ANSI/ISO 8201. A two-pulse pattern does not comply with this standard and must be corrected. The cause may be a panel programming error, a defective horn, or a timing circuit malfunction.
78. B — A wall-mounted space heater produces a rising column of warm air directly above it. A smoke detector mounted in this warm air column may experience false activations because the heated air can carry normal airborne particles — dust, cooking residue, aerosols — upward into the detector's sensing chamber at concentrations that trigger an alarm. The detector should be relocated away from the heater's thermal plume.
79. D — Accurate timestamps in the panel's event log are essential for incident investigation, regulatory compliance, and coordination with emergency response records and building access logs. A 45-minute discrepancy is significant enough to cause confusion during event reconstruction. The panel clock must be corrected to the accurate current time during the inspection visit.
80. A — A television covering 60% of the strobe lens significantly reduces the visible notification output below the device's rated candela. NFPA 72 requires visible notification appliances to be unobstructed so they can deliver their full rated light intensity throughout the protected space. The television must be relocated or the horn/strobe repositioned to eliminate the obstruction.

81. C — When the supervising station identifies the signal as coming from the wrong building, the most likely cause is an incorrect account number or building identification code programmed into the fire alarm panel's communication module. Each building has a unique account code that the station uses to identify the source. An incorrect code causes the station to associate the signal with the wrong property.
82. B — A "Device Dirty" trouble signal indicates the detector's sensing chamber has accumulated enough contamination to affect its sensitivity readings. NFPA 72 and the detector manufacturer require that dirty detectors be cleaned per the manufacturer's procedures and retested to verify the sensitivity returns to within the acceptable range. Detectors that cannot be restored after cleaning must be replaced.
83. D — An "Approved as Noted" disposition means the submittal is generally acceptable but contains specific items that must be corrected before the contractor proceeds with installation. The engineer's notes identify the required corrections. The contractor must incorporate all noted changes into the installation documents and may then proceed with construction. A resubmittal is typically not required for this disposition.
84. A — At 14.2 VDC, the voltage at the farthest appliance falls below the minimum listed operating voltage of 16 VDC. Appliances operating below their listed range may fail to produce rated output or may not operate at all. The NAC 3 circuit must be redesigned — using larger conductors, shorter runs, fewer devices, or a booster power supply — to bring the end-of-circuit voltage above 16 VDC.
85. C — A circuit shown on a floor plan forming a loop that leaves the panel and returns to it represents a Class A circuit configuration. The loop provides an alternate return path so that if a single open fault occurs anywhere on the circuit, signals can still reach all devices from the other direction. This fault-tolerant design is characteristic of Class A signaling line circuits in addressable fire alarm systems.