LEVEL I — SIMULATION EXAM 10 (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 installing a fire alarm system in a multi-story apartment building. Each apartment unit has smoke detectors in bedrooms and the common hallway. The building manager asks why individual apartment detectors cannot be connected to the same zone as the corridor detectors outside the units. What is the primary reason for separating apartment detection from corridor detection?

A. Apartment detectors draw more current than corridor detectors overloading a shared zone

B. Corridor detectors must be heat detectors while apartment detectors must be smoke detectors

C. Apartment detectors require a different EOLR value than corridor detectors on the same panel

D. Separate zones allow the panel to identify whether the alarm originates inside a unit or in the corridor

2. A fire alarm technician is installing smoke detectors in a building with T-bar suspended ceilings. The ceiling tiles are standard 2×4-foot acoustic tiles in an exposed grid. The technician mounts the detector base to the grid using an approved clip. The detector head is installed and the technician verifies it is level with the tile surface. What additional verification should be performed?

A. Confirm the detector is within 4 inches of the nearest wall-ceiling junction for proper dead-air clearance

B. Verify the tile is not discolored indicating the space above is used for air return

C. Measure the distance between detectors to confirm it does not exceed the room dimensions

D. Test the detector sensitivity immediately because grid-mounted devices have higher failure rates

3. A fire alarm technician is calculating the battery capacity for a fire alarm system. The total standby current is 0.72 amps and the total alarm current is 4.6 amps. The building has no emergency generator. Using the standard 24-hour standby and 5-minute alarm requirement with a 20% safety factor, what is the minimum battery capacity?

A. 17.28 Ah based on standby energy only without alarm current

B. 20.74 Ah using all values but applying a 10% safety factor

C. 21.26 Ah after correctly applying standby energy, alarm energy, and 20% safety factor

D. 24.00 Ah based on rounding up to the standard 24-hour equivalent

4. A fire alarm technician is installing a fire alarm panel in a building where the nearest electrical distribution panel is 200 feet away. The dedicated branch circuit uses 12 AWG conductors on a 20-amp breaker. The fire alarm panel's maximum current draw is 7 amps at 120 VAC. What should the technician calculate before accepting this circuit?

A. The panel's internal fuse rating to verify it matches the 20-amp branch circuit breaker

B. The voltage drop on the 200-foot branch circuit to verify adequate voltage at the panel

C. The conduit fill for the 12 AWG conductors to verify the raceway is properly sized

D. The ground resistance at the panel location to verify the grounding electrode is adequate

5. A fire alarm technician discovers during installation that the ceiling in a restaurant dining area has decorative wooden beams running across the room. The beams are 6 inches deep and spaced 6 feet apart. The beams are solid wood — not open-web construction. How do these beams affect smoke detector placement?

A. Detectors may need to be placed in individual beam pockets because 6-inch beams can trap smoke

B. The beams have no effect because decorative beams are exempt from spacing adjustments

C. Only heat detectors can be used in rooms with decorative beams deeper than 4 inches

D. The detectors must be mounted on the bottom face of each beam rather than on the ceiling deck

6. A fire alarm technician is connecting a waterflow switch to a fire alarm panel. The switch has normally open contacts that close when water flows. The technician connects the switch to an IDC zone input on a conventional panel. The panel must interpret the contact closure as what signal type?

A. A supervisory signal indicating the sprinkler system is in an off-normal operating condition

B. A trouble signal indicating the waterflow switch circuit requires maintenance attention

C. A pre-alarm signal that starts a countdown timer before full alarm activation occurs

D. An alarm signal indicating water flow in the sprinkler system from a probable fire condition

7. A fire alarm technician is running fire alarm conduit through a building and reaches a point where the conduit must penetrate an exterior wall to reach an outdoor device. The wall is a masonry cavity wall with a brick veneer exterior and concrete block interior. What must be considered at this exterior penetration?

A. The conduit must transition from EMT to rigid PVC at the point of exterior wall penetration

B. The penetration must be weatherproofed to prevent moisture from entering the conduit system

C. The conduit gauge must increase by one trade size where it passes through exterior walls

D. An expansion fitting must be installed at the penetration to accommodate thermal movement

8. A fire alarm technician installs a smoke detector at the center of a 20-foot by 20-foot room with a smooth flat ceiling at 9 feet. The detector is the only unit in the room. Per NFPA 72 and the 30-foot default listed spacing, does this single detector provide adequate coverage for the room?

A. No, because the detector must be within 15 feet of each wall requiring at least two detectors

B. No, because 20-foot rooms require a minimum of four detectors — one in each quadrant

C. Yes, because the room dimensions are within the 30-foot spacing and no point exceeds 0.7 × 30 feet

D. Yes, but only if the detector is mounted within 4 inches of the center point of the ceiling

9. A fire alarm technician is installing a heat detector in an attic space above an occupied office. The attic is unventilated and summer temperatures reach 140°F. The only heat detectors available on the truck are rated at 135°F activation temperature. Can these detectors be installed in this attic?

A. No, the 135°F rating does not maintain the required 20°F margin above the 140°F maximum ambient

B. Yes, because the 135°F detectors will activate before the attic reaches its maximum temperature

C. No, but installing the detector in a recessed ceiling mount provides adequate thermal isolation

D. Yes, because 135°F detectors are the standard for all residential and commercial attic spaces

10. A fire alarm technician is installing an addressable fire alarm system and reaches the last device on the SLC loop. The system is designed as Class B. What must the technician install at the last device location?

A. A return conductor pair back to the panel to complete the Class B loop configuration

B. The circuit termination device specified by the panel manufacturer for Class B SLC operation

C. A 4.7 kΩ end-of-line resistor identical to those used on conventional IDC circuits

D. An isolation module to prevent end-of-line signal reflection on the addressable circuit

11. A fire alarm technician is installing conduit for fire alarm circuits in a parking garage with exposed concrete structure. The garage is unheated and subject to freezing temperatures in winter. Water condensation forms on the concrete surfaces during temperature transitions. What conduit type is best suited for this environment?

A. ENT flexible tubing because its smooth interior prevents condensation from accumulating

B. EMT because it is the standard conduit for all commercial fire alarm installations

C. FMC because flexible conduit resists thermal expansion better than rigid conduit types

D. RMC or IMC because rigid metallic conduit provides superior moisture and corrosion resistance

12. A fire alarm technician is connecting a fire alarm system to a cellular communicator for supervising station monitoring. The building has thick concrete walls. The technician mounts the cellular module inside the fire alarm panel enclosure and connects the supplied antenna to the module. After powering up, the module shows one bar of signal strength. What should the technician consider?

A. One bar is adequate for reliable cellular communication in most fire alarm applications

B. The antenna must be replaced with a higher-gain model designed for thick-wall buildings

C. An external antenna mounted on the building exterior may be needed for reliable signal strength

D. The cellular module must be relocated outside the panel enclosure to improve reception

13. A fire alarm technician is running fire alarm cable in a ceiling space alongside existing cables from other trades. The technician identifies the following cables already present: Category 6A data cables, RG-6 coaxial cable for CATV, and thermostat wire for the HVAC system. The fire alarm cable is FPLP. Per NEC Article 760, which of these existing cables presents a separation concern?

A. None of these cables present a separation concern because they are all power-limited circuits

B. The RG-6 coaxial cable requires separation because it carries RF signals that interfere with fire alarm

C. The thermostat wire requires separation because it may carry 24 VAC from the HVAC transformer

D. All three cable types require separation from fire alarm cable per NEC Article 760

14. A fire alarm technician is installing a dual-action manual fire alarm station in a juvenile detention facility. The dual-action design requires two separate motions to activate — lifting a cover then pulling the handle. What is the primary reason for specifying dual-action stations in this facility?

A. Dual-action stations are required by NFPA 72 in all institutional occupancies regardless of type

B. The two-motion requirement reduces false alarms from accidental or deliberate malicious activation

C. Dual-action stations generate a different alarm signal that alerts staff before sounding the building alarm

D. The cover on dual-action stations prevents dust and moisture from entering the switch mechanism

15. A fire alarm technician is installing a fire alarm system in a building and the project requires a remote annunciator at the main entrance for fire department use. The annunciator will be mounted on the lobby wall. The fire department captain asks the technician to mount it at 60 inches above the floor for easy reading while wearing turnout gear. Does this height comply with typical installation requirements?

A. No, annunciators must be mounted at the same 42-48 inch height as manual fire alarm stations

B. No, annunciators must be mounted between 80 and 96 inches above the floor like notification appliances

C. Yes, but only if the AHJ provides written approval for the non-standard mounting height

D. Yes, annunciator mounting height is typically determined by the AHJ and practical accessibility needs

16. A fire alarm technician is installing a fire alarm system and discovers that the electrical contractor has installed the fire alarm panel's dedicated circuit breaker in a sub-panel located inside a locked tenant space. The main electrical panel is in the building's common mechanical room. What is the problem with this arrangement?

A. Sub-panels cannot serve fire alarm equipment — only main distribution panels are permitted

B. The fire alarm circuit must originate from a panel board that does not exceed 200 amps

C. The fire alarm breaker must be accessible to service personnel and the fire department at all times

D. Sub-panels in tenant spaces are not permitted to have lock-on devices on any circuit breakers

17. Using the power formula $P = V \times I$, a fire alarm technician determines that a panel operating on primary AC power at 120 VAC draws 3.5 amps. The panel's secondary battery system operates at 24 VDC. What is the AC power consumption during normal operation?

A. 420 watts calculated by multiplying the primary AC voltage by the AC current draw

B. 84 watts calculated by multiplying the battery voltage by the AC current draw

C. 3.5 watts calculated by dividing the voltage by the current draw

D. 144 watts calculated by adding the AC voltage and battery voltage then multiplying by current

18. A fire alarm technician is installing visible notification appliances in a large conference room measuring 45 feet by 35 feet with a 12-foot ceiling. Per NFPA 72, ceiling-mounted visible appliances follow Table 18.5.5.5.1(b) rather than Table 18.5.5.5.1(a) for wall-mounted units. The technician plans to use ceiling-mounted strobes. What primary factor from Table 18.5.5.5.1(b) determines the required candela?

A. Only the ceiling height determines the required candela for ceiling-mounted applications

B. The room perimeter divided by four determines the candela for each ceiling-mounted appliance

C. The room dimensions and ceiling height together determine the candela from the ceiling table

D. The total square footage of the room determines the candela regardless of ceiling height

19. A fire alarm technician is installing conduit and needs to secure it within the required distance of a junction box per NEC. For 1-inch EMT conduit, NEC Section 358.30 requires the conduit to be secured within what distance of each box or fitting?

A. Within 3 feet of each outlet box, junction box, cabinet, or fitting

B. Within 5 feet of each outlet box, junction box, cabinet, or fitting

C. Within 18 inches of each outlet box, junction box, cabinet, or fitting

D. Within 6 feet of each outlet box, junction box, cabinet, or fitting

20. A fire alarm technician is installing a Class A NAC circuit in a high-rise building. The circuit exits the panel through a conduit in the east wall riser, serves notification appliances on several floors, and returns to the panel through a conduit in the west wall riser. At what point should the technician become concerned about pathway diversity?

A. When the total NAC loop length exceeds the manufacturer's maximum recommended distance

B. When the number of appliances on the loop exceeds the NAC output's rated current capacity

C. When the conduit routing requires more than four 90-degree bends between pull points

D. When the outgoing and return paths share a common conduit, tray, or riser at any point

21. A fire alarm technician needs to install a fire alarm cable through a 1-hour fire-rated floor assembly. After core-drilling the penetration and installing the conduit, what must be done to maintain the floor assembly's fire rating?

A. The conduit must be wrapped with fire-resistant tape for 12 inches above and below the floor

B. The penetration must be sealed with a listed firestop system rated for the floor assembly

C. A steel plate must be welded over the penetration around the conduit on the underside

D. The conduit size must be increased to fill the core-drilled hole leaving no gap for fire passage

22. A fire alarm technician is installing a duct smoke detector. The HVAC contractor informs the technician that the air velocity in the supply duct at the proposed detector location is 300 feet per minute (fpm). The detector manufacturer specifies an operating range of 100 to 4,000 fpm. Is this air velocity acceptable for the detector?

A. No, 300 fpm is too slow for the detector's sampling tubes to draw adequate air

B. No, duct detectors require a minimum air velocity of 500 fpm for reliable smoke sampling

C. Yes, 300 fpm is within the manufacturer's specified operating range for the detector

D. Yes, but only if the detector is installed on the return duct rather than the supply duct

23. A fire alarm technician is installing fire alarm cable alongside a hot water supply pipe that is insulated with 1-inch thick fiberglass insulation. The surface temperature of the insulation is 95°F. The fire alarm cable insulation is rated for 150°F maximum. Is there a concern with this proximity?

A. No, 95°F is well below the cable insulation's 150°F maximum temperature rating

B. Yes, the cable must maintain a minimum of 6 inches from any heated pipe regardless of insulation

C. No, but the cable must be secured to the opposite side of the joist from the pipe

D. Yes, the hot water pipe requires the cable to be upgraded to a high-temperature rated type

24. A fire alarm technician is installing an addressable control module to release a magnetic fire door holder when the fire alarm system activates. The door holder operates on 24 VDC power from a dedicated power supply supervised by the fire alarm system. The control module's relay contacts are rated at 2 amps at 30 VDC. The door holder draws 0.5 amps. Is the control module relay adequate?

A. No, door holder circuits require a minimum relay rating of 5 amps for inrush current protection

B. No, the relay contacts must be rated for at least 120 VAC regardless of the actual circuit voltage

C. Yes, but only if the control module is connected to a dedicated NAC circuit for the door holders

D. Yes, the 0.5-amp load is well within the relay's 2-amp rating at 30 VDC

25. A fire alarm technician is installing smoke detectors in a corridor with a drop ceiling at 8 feet. Above the drop ceiling, the space extends 4 feet to the structural deck at 12 feet. The space above the ceiling is used for cable routing but not for air return. Is detection required in the space above the drop ceiling?

A. Yes, because any concealed space above 3 feet in height requires its own smoke detection

B. It depends on the building code and project specifications for concealed combustible spaces

C. No, detection is never required above drop ceilings unless the space is used for air return

D. Yes, because the cable routing above the ceiling represents a potential fire ignition source

26. A fire alarm technician has completed installing a fire alarm system and is performing pre-commissioning wire tests. The technician measures continuity on a NAC circuit and reads 0.8 ohms between the two conductors at the panel end with no devices connected. What does this reading confirm?

A. The conductors are continuous from the panel to the end of the circuit with normal wire resistance

B. The circuit has a partial short that must be investigated before devices are connected

C. The EOLR is already installed and contributing resistance to the measurement

D. The reading is too low and indicates the conductors may be touching at the far end

27. 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 a railing along the edge instead of walls. The mezzanine ceiling is the underside of the roof deck at 22 feet above the main floor. Smoke detectors are specified for the mezzanine area. At what surface should the detectors be mounted?

A. On the mezzanine railing posts at a height of 42 inches above the mezzanine floor

B. On portable stands placed on the mezzanine floor at the recommended detector height

C. On the roof deck at 22 feet, which is the ceiling surface above the mezzanine

D. On the walls of the building at the mezzanine level if any walls are adjacent

28. A fire alarm technician is running fire alarm cable through an existing building and discovers asbestos insulation wrapping some of the pipes in the ceiling space. What should the technician do?

A. Carefully route the fire alarm cable around the asbestos-wrapped pipes maintaining 12 inches clearance

B. Remove the asbestos insulation from pipes in the immediate work area using wet removal methods

C. Proceed with the cable installation wearing a standard N95 dust mask for personal protection

D. Stop work immediately and report the condition because asbestos handling requires qualified specialists

29. A fire alarm technician is installing a fire alarm system in a senior living facility. The building has independent living apartments, a community dining room, and administrative offices. Pull stations are being installed at exit doors. A resident asks the technician why pull stations are red. What is the code basis for the color?

A. NFPA 72 requires pull stations to be a specific shade of safety red for visibility identification

B. Pull stations must be red per NFPA 72 to ensure they are distinguishable from other building fixtures

C. The red color is a manufacturer standard but is not specifically required by NFPA 72

D. Pull stations must contrast with the wall color but can be any color approved by the AHJ

30. A fire alarm technician is installing a conventional fire alarm system with 10 zone inputs. The building has three floors. The technician needs to assign zones for the following: smoke detectors on each floor (3 zones), pull stations on each floor (3 zones), waterflow switches (1 zone), tamper switches (1 zone), and a duct detector (1 zone). This accounts for 9 zones. What consideration should guide the assignment of the remaining zone?

A. Reserve it for a future smoke detector zone in case the building is expanded

B. Assign it as a second tamper zone because code requires separate zones for each valve

C. Reserve it for future expansion or additional detection as the building needs change

D. Assign it as a dedicated trouble reporting zone for the panel's internal diagnostics

31. A fire alarm technician is installing notification appliances and encounters a room where the ceiling height is 18 feet. Wall-mounted horn/strobes must be mounted with the lens between 80 and 96 inches above the floor. In this room, 96 inches (8 feet) is only about halfway up the 18-foot wall. Will the wall-mounted devices at 96 inches provide effective notification in this tall room?

A. The wall-mounted devices at 96 inches will function but their effectiveness should be evaluated

B. Wall-mounted devices must be mounted at 144 inches in rooms with ceilings above 14 feet

C. Ceiling-mounted appliances are always required in rooms with ceilings above 12 feet

D. Wall-mounted devices are prohibited in rooms with ceilings above 15 feet per NFPA 72

32. A fire alarm technician is installing an addressable fire alarm system. The SLC loop uses twisted shielded cable. At each device location, the shield drain wire is visible. How should the shield drain wire be handled at each device?

A. The drain wire must be connected to the device's ground terminal at every device location

B. The shield drain wire should be continuous through each device and grounded only at the panel end

C. The drain wire must be cut and capped at every device location to prevent ground loops

D. The drain wire must be connected to the metallic conduit at each junction box for supplemental grounding

33. A fire alarm technician is installing a fire alarm system in a building and reaches a room where the drawings show a ceiling-mounted smoke detector. Upon entering the room, the technician discovers the room has a completely open ceiling — exposed steel deck and bar joists with no finished ceiling. The steel deck is at 14 feet. Where should the detector be mounted?

A. On the nearest wall within 12 inches of the steel deck surface for wall-mount installation

B. Centered between two bar joists on the underside of the steel deck using approved mounting

C. On the bottom chord of a bar joist because joists provide a more stable mounting surface

D. On the underside of the steel deck using appropriate anchors at the location shown on the drawings

34. A fire alarm technician measures the voltage at the battery terminals of a fire alarm panel and reads 22.6 VDC. The AC power indicator on the panel is illuminated, showing primary power is present. The charger indicator is also illuminated. What does the 22.6 VDC reading suggest?

A. The batteries may be approaching end of life because the charger cannot bring them to full float voltage

B. The reading is normal for batteries under heavy standby load from a large number of devices

C. The charger is in a deliberate equalization mode that temporarily reduces the output voltage

D. The reading is acceptable because any voltage above 20 VDC meets the minimum requirement

35. A fire alarm technician is installing a fire alarm system and the project specifications state that all wiring must comply with NEC Article 760 Part III. What does this specification tell the technician about the fire alarm circuits?

A. The circuits must be installed using NEC Chapters 1 through 4 general wiring methods only

B. The circuits are non-power-limited and require overcurrent protection at the panel

C. The circuits operate at voltages above 600 VAC requiring special installation procedures

D. The circuits are power-limited and may use FPL, FPLR, or FPLP cable types

36. A fire alarm technician is installing cable and reaches a point where the cable must enter a fire alarm device box recessed in a plaster wall. The plaster has been cut away to install the box, and the lath is visible around the box edges. What protection must be provided where the cable enters the box?

A. The cable must be protected with a listed cable connector or clamp at the box entry point

B. The plaster edges must be smoothed to prevent them from cutting the cable jacket

C. A listed cable connector at the box entry secures the cable and provides strain relief

D. Fire-rated caulk applied around the cable at the box entry provides adequate protection

37. A fire alarm technician is installing a notification appliance circuit with the following devices: 4 horn/strobes at 0.310 amps each, 6 strobes at 0.175 amps each, and 2 speakers at 0.125 amps each. What is the total NAC alarm current?

A. 2.54 amps total from all 12 notification appliances on the circuit

B. 1.24 amps based on averaging the current draw of the three different device types

C. 3.66 amps calculated by applying a 1.5 safety factor to the base current total

D. 7.32 amps based on doubling the total for alarm versus standby current estimation

38. A fire alarm technician is installing a fire alarm system and discovers that the building's telephone service has been converted entirely to fiber-to-the-premises (FTTP) with no copper telephone lines available. The project design calls for a DACT communicator. What must be addressed?

A. The DACT can connect to the FTTP service through a standard telephone adapter

B. The communication method must be changed from DACT to an alternative such as IP or cellular

C. The FTTP service provider must install a dedicated copper pair for the DACT connection

D. A DACT can operate on FTTP because fiber provides superior signal quality for alarm data

39. A fire alarm technician is installing a conventional fire alarm system and wiring a zone of heat detectors in a parking garage. The zone covers a 200-foot by 100-foot area with heat detectors at 50-foot spacing. After wiring all detectors and installing the EOLR, the technician tests the circuit at the panel. The panel shows normal status. The technician then tests the first heat detector on the circuit using a heat source. The detector activates, and the panel shows "ALARM — ZONE 6." After the detector cools and restores, the panel returns to normal. What should the technician verify about the remaining detectors?

A. Nothing further is needed because Zone 6 functioned correctly during the single device test

B. That each heat detector base is properly secured and the wiring connections are tightened

C. That the remaining detectors have the correct rated activation temperature for the garage

D. That each remaining detector individually activates and produces a panel alarm when tested

40. A fire alarm technician is installing cable in a building and needs to transition from a concealed ceiling space down an exposed wall surface to reach a device mounted at 48 inches above the floor. The exposed wall run is 5 feet long. What raceway protection is required for this exposed wall run?

A. No raceway is required because the cable is listed for exposed installation locations

B. The cable must be installed in a raceway because the exposed run is below 7 feet above the floor

C. The cable must be secured to the wall with cable staples at 12-inch intervals without a raceway

D. The cable must be covered with a surface-mounted wire channel for aesthetic purposes only

41. A fire alarm technician is installing a smoke detector in a room with an operating ceiling fan. The fan has 52-inch blades and operates at medium speed during business hours. The detector is planned for the center of the room per the shop drawings. Where should the detector be positioned relative to the ceiling fan?

A. Away from the center of the room to avoid the fan's direct airflow disrupting smoke detection

B. On the fan housing itself for the closest proximity to the ceiling where smoke accumulates

C. At the center of the room as planned because ceiling fans do not affect smoke detector placement

D. On the wall within 12 inches of the ceiling because ceiling fans make ceiling mounting impractical

42. A fire alarm technician is installing fire alarm equipment in a building and notices that a sprinkler head is located 3 inches from a planned smoke detector location on the ceiling. What concern does this proximity create?

A. The sprinkler head may obscure the detector's LED indicator making visual identification difficult

B. The sprinkler head may block airflow to the smoke detector's sensing chamber

C. The detector may need to be relocated to avoid obstructing the sprinkler head's discharge pattern

D. No concern exists because smoke detectors and sprinkler heads serve complementary functions

43. A fire alarm technician is installing a fire alarm system in a three-story office building. The project requires smoke detectors in the elevator lobbies on each floor for Phase I elevator recall. Per NFPA 72 Section 21.3, what type of detector is required for this application?

A. Heat detectors rated at 135°F for reliable activation in the elevator lobby environment

B. Dual-technology detectors combining smoke and heat sensing for false alarm reduction

C. Any detector type approved by the AHJ for the specific elevator lobby configuration

D. Smoke detectors specifically — heat detectors alone do not satisfy the elevator recall requirement

44. A fire alarm technician is installing conduit for a fire alarm system. The conduit run from the panel to a remote location requires routing through a space above a suspended ceiling, down through the ceiling into the occupied space, and along the wall to the device. At what points in this run is conduit support required?

A. Only at the panel and at the device location where the conduit terminates

B. At regular intervals per NEC requirements and within the specified distance of each box and fitting

C. Only where the conduit penetrates the ceiling plane transitioning from concealed to exposed

D. At the midpoint of each horizontal section and at the top of each vertical drop

45. A fire alarm technician is installing a fire alarm system in a warehouse with steel rack storage reaching to within 3 feet of the ceiling. The ceiling is 28 feet high with spot-type smoke detectors specified. What concern should the technician raise about this installation?

A. The tall rack storage may block smoke travel to ceiling-mounted detectors requiring layout evaluation

B. No concern because ceiling-mounted detectors cover the space regardless of storage configuration

C. Only the aisles between racks need detection since fires start in open areas, not on shelves

D. The 28-foot ceiling requires switching from smoke to flame detection per NFPA 72

46. A fire alarm technician is installing a fire alarm cable and the cable jacket is marked "FPLR." The technician needs to install this cable in three locations: a vertical riser shaft, a horizontal ceiling space used as an air return plenum, and a general-purpose horizontal run on a single floor. In which of these locations is the FPLR cable NOT acceptable?

A. The vertical riser shaft because FPLR requires additional conduit protection in riser applications

B. The general-purpose horizontal run because FPLR is only rated for riser applications

C. The horizontal ceiling space used as an air return plenum because FPLR cannot substitute for FPLP

D. All three locations accept FPLR cable because it has the highest fire rating in the cable hierarchy

DOMAIN 1.2 — MAINTENANCE (Questions 47–82)

47. A fire alarm technician is performing semiannual testing on smoke detectors in a 10-story office building. On the seventh floor, the technician tests a detector with approved aerosol smoke. The detector activates after 5 seconds. On the adjacent detector — same model and age — the activation takes 28 seconds. What does the significant difference in response time suggest?

A. The faster detector is oversensitive and should be cleaned to reduce its sensitivity level

B. The slower detector likely has sensing chamber contamination reducing its responsiveness

C. Both response times are within the acceptable range and no corrective action is needed

D. The difference is caused by HVAC airflow variations and is not a detector performance issue

48. Per NFPA 72 Table 14.4.3.2, the fire alarm control unit's trouble signals must be tested at what frequency to verify the panel correctly generates and displays trouble conditions?

A. Monthly by intentionally creating a trouble condition and verifying the panel's response

B. Semiannually as part of the regular smoke detector functional testing schedule

C. Quarterly to coincide with the battery visual inspection schedule

D. Annually by verifying the panel generates appropriate trouble signals for fault conditions

49. During annual testing of a fire alarm system, the technician tests the elevator recall function. When the elevator lobby smoke detector activates, the panel correctly sends the recall signal. Two of three elevators recall to the ground floor. The third elevator travels to the ground floor but does not open its doors. What should be documented?

A. The third elevator completed partial recall and the door mechanism must be investigated

B. All three elevators passed because they all traveled to the designated recall floor

C. The test cannot be evaluated because the elevator doors must open during recall per code

D. Only two elevators are required to respond for the system to pass the recall test

50. A fire alarm technician discovers during inspection that a smoke detector in an office has been relocated from the ceiling to a filing cabinet by building staff. The detector sits upright on the cabinet at desk height — approximately 30 inches above the floor. What must be documented?

A. The detector can function at desk height because smoke eventually fills the entire room volume

B. The detector placement is creative but should be raised to at least 60 inches for better coverage

C. The detector has been removed from its approved ceiling location rendering it non-functional for detection

D. The detector at desk height may actually detect smoke faster than a ceiling-mounted detector

51. A fire alarm system in a manufacturing plant has been experiencing intermittent ground fault troubles on SLC 1 for the past two months. The troubles appear during the afternoon shift and clear by the morning shift. The building maintenance staff reports no known changes. What environmental factor should the technician investigate?

A. The morning shift cleaning crew may be spraying water near SLC devices during floor cleaning

B. The afternoon production equipment generates electromagnetic interference on the SLC

C. Temperature changes between shifts cause condensation that creates intermittent ground paths

D. Afternoon sun exposure heats a section of the building causing expansion that stresses cable connections

52. Per NFPA 72, when a fire alarm system has a significant impairment that affects detection capability in a portion of the building, what compensatory measure may be required?

A. The building owner may reduce building occupancy to compensate for reduced detection

B. A fire watch with trained personnel patrolling the impaired area may be required

C. The supervising station must increase its monitoring frequency for the affected building

D. The building must be evacuated until the impairment is corrected and the system is restored

53. A fire alarm technician is performing annual testing and discovers that the fire alarm panel's LCD display shows the correct time but the wrong date — it reads January 15, 2024 when the actual date is March 20, 2026. What must be documented?

A. The date display is cosmetic only and does not affect system operation or event logging

B. The wrong date has no operational impact because the panel uses time stamps, not date stamps

C. The incorrect date affects event log accuracy and must be corrected for proper incident documentation

D. The panel's internal calendar must be replaced because hardware calendars cannot be manually adjusted

54. During testing of a fire alarm system's communication link, the technician sends a test alarm signal. The supervising station confirms receiving the signal in 12 seconds. The technician then sends a test trouble signal. The station does not receive this signal after 5 minutes of waiting. What does this suggest?

A. Test trouble signals are not required to be transmitted to the supervising station per NFPA 72

B. The station's receiving equipment filters out trouble signals and only processes alarm events

C. The communication link is working for alarm signals but may have a protocol issue for trouble signals

D. The panel's communication module is programmed to transmit alarm signals but not trouble signals

55. A fire alarm technician is performing a battery load test. The test procedure calls for disconnecting AC power and placing the system in alarm condition to draw maximum current from the batteries. During the test, the battery voltage drops from 26.4 VDC to 20.8 VDC in the first minute. What should the technician do?

A. Stop the test because the rapid voltage drop indicates the batteries cannot sustain the alarm load

B. Continue the test for the full duration because the voltage may stabilize after initial drop

C. Reconnect AC power and add a third battery in parallel to boost capacity before retesting

D. The voltage drop rate is normal for the first minute and the test should continue as planned

56. A fire alarm technician is testing visible notification appliances in a corridor. The technician activates the system and observes that all corridor strobes flash in synchronization. However, a strobe visible through a glass office door at the end of the corridor flashes out of synchronization with the corridor strobes. Does this violate NFPA 72?

A. No, strobes on different NAC circuits are not required to be synchronized with each other

B. Yes, any strobes visible from the same location must flash in synchronization regardless of circuit

C. No, the glass door provides sufficient visual separation between the two notification zones

D. Yes, but only if the office door is held open during normal building operation

57. During annual testing, the fire alarm technician activates a pull station on the second floor. The panel displays the alarm. Horn/strobes activate on all floors. The supervising station confirms receiving the alarm signal. However, the fire doors on the second floor do not release from their magnetic holders. The sequence of operations requires door release for all pull station alarms. What should be investigated?

A. The pull station wiring because it may be generating a signal that does not trigger door release

B. The NAC circuit powering the horn/strobes because door holders may be on the same circuit

C. The control module outputs and wiring to the door holders for the second floor

D. The door closer springs because they may have insufficient tension to close the released doors

58. A fire alarm technician is performing semiannual testing on waterflow switches. The technician opens the inspector's test valve on a wet-pipe sprinkler system. Water flows from the test connection, but after 90 seconds, no alarm signal appears at the fire alarm panel. What should be documented?

A. The waterflow switch has failed because the alarm must appear within 90 seconds of sustained flow

B. The test is still within acceptable limits and the technician should wait an additional 60 seconds

C. The inspector's test connection may be downstream of the waterflow switch requiring relocation

D. The waterflow switch retard setting must be adjusted from its current position to a shorter delay

59. A fire alarm technician discovers during inspection that the building's fire alarm system has two separate communication paths to the supervising station — an IP communicator and a cellular communicator. The panel displays "TROUBLE — IP COMMUNICATION FAILURE" and has been displaying this trouble for two weeks. The cellular communicator shows normal status. What is the significance of this condition?

A. No significance because the cellular backup is functioning and the system is fully monitored

B. The system is adequately monitored but the IP trouble should be documented for repair

C. The system has lost all communication capability and must be taken out of service

D. The system has lost communication redundancy and the IP path must be restored

60. Per NFPA 72 Table 14.4.3.2, manual fire alarm stations must be functionally tested at what frequency?

A. Semiannually by physically activating each station and verifying alarm response

B. Annually by physically activating each station and verifying complete system response

C. Monthly by visually inspecting each station for accessibility and physical condition

D. Quarterly by testing a representative sample of 25% of all installed pull stations

61. A fire alarm technician is troubleshooting an addressable fire alarm system. The panel shows "DEVICE DIRTY — ADDRESS 033." The technician visits the device location and finds a clean-looking smoke detector in a standard office environment. What should the technician's next step be?

A. Check the panel's sensitivity report for address 033 to see the actual analog reading and drift trend

B. Replace the detector immediately because a dirty device trouble always means the detector has failed

C. Reset the panel to clear the trouble and wait to see if it returns within the next 24 hours

D. Clean the detector's exterior housing with a damp cloth and verify the trouble clears

62. A fire alarm system in a hotel generates a trouble signal reading "SLC 2 — DEVICE REMOVED — ADDRESS 091." The technician visits room 614 where address 091 is installed and finds the smoke detector head is properly seated in its twist-lock base. What other condition could generate a "device removed" message?

A. The detector is out of calibration and reporting incorrect environmental data to the panel

B. The SLC wiring at the device has excessive voltage drop preventing reliable communication

C. The panel's programming has address 091 configured as a different device type than what is installed

D. The detector's internal processor has failed and it cannot respond to the panel's polling commands

63. A fire alarm technician is testing emergency control functions during annual testing. The technician activates a duct smoke detector on AHU-3. The panel alarms correctly and the HVAC contractor confirms AHU-3 shut down. The technician resets the system. AHU-3 restarts automatically. The building engineer says this AHU is designed for manual restart only after fire alarm shutdown. What discrepancy exists?

A. The panel programming must include a latching output that prevents automatic AHU restart

B. The AHU restart is controlled by the HVAC system and is outside the fire alarm system's scope

C. The automatic restart contradicts the building's design intent and must be investigated and corrected

D. The fire alarm system is functioning correctly because AHU restart is the HVAC contractor's responsibility

64. A fire alarm technician is performing annual testing on a voice evacuation system. The technician activates the system and the pre-recorded message plays through all speakers. The message says "ATTENTION. ATTENTION. A FIRE EMERGENCY HAS BEEN REPORTED. PLEASE PROCEED TO THE NEAREST EXIT." The technician listens from multiple locations. In the main lobby, the message echoes severely and specific words cannot be distinguished. What must be documented?

A. The main lobby has an intelligibility deficiency that must be investigated and corrected

B. Echo in large lobbies is expected and does not constitute a testing failure

C. The pre-recorded message content is incorrect and must be updated to match the approved script

D. The speaker volume in the lobby must be reduced to eliminate the echo effect

65. A fire alarm system has been in service for six years. Sensitivity testing was performed at year 1, year 3, and year 5. The building owner asks when the next sensitivity test is due. Per NFPA 72, what is the correct answer?

A. Year 6 because the schedule changes to annual testing after three alternating tests

B. Year 7 following the established alternate-year schedule from the initial test

C. Year 8 because the interval extends after the third test completion

D. No further testing is needed because three sensitivity tests establish a lifetime baseline

66. A fire alarm technician discovers during inspection that the fire alarm panel's battery connections have significant corrosion on both terminals. The battery voltage reads 26.1 VDC with the charger connected. What action is required?

A. The corrosion should be documented but no action is needed because the voltage is acceptable

B. The batteries should be replaced because corrosion indicates internal cell degradation

C. The voltage reading is unreliable because corrosion prevents accurate meter measurements

D. The corrosion must be cleaned from the terminals and the connections retightened to ensure reliability

67. During testing, the fire alarm technician tests a smoke detector at address 044. The panel displays "ALARM — SMOKE DETECTOR — ADDRESS 044 — STORAGE ROOM B." The technician is physically in an executive conference room on the third floor. What type of error exists?

A. The detector at address 044 is a different type than what was physically installed

B. The SLC wiring has a cross-connection that routes signals from the wrong physical location

C. The location descriptor programmed for address 044 is incorrect and must be updated

D. The address was physically programmed incorrectly at the device and does not match the schedule

68. A fire alarm technician discovers that a building's fire alarm system was modified three months ago — 8 new devices were added during a tenant buildout. The as-built drawings have not been updated. The Record of Completion has not been revised. What documentation deficiency exists?

A. Both the as-built drawings and the Record of Completion must be updated for the modification

B. Only the as-built drawings need updating because the Record of Completion is a one-time document

C. Only the Record of Completion needs updating because it is the primary system document

D. The annual testing records will capture the modification and no drawing update is required

69. A fire alarm technician is testing the fire alarm system's primary-to-secondary power transfer. After disconnecting AC power, the system transfers to battery normally. The technician monitors the battery voltage over 15 minutes and records the following readings: 0 minutes = 26.2 VDC, 5 minutes = 25.8 VDC, 10 minutes = 25.4 VDC, 15 minutes = 25.0 VDC. What do these readings indicate?

A. The batteries are failing because the voltage should not drop during a 15-minute standby test

B. The voltage drop rate is excessive and indicates the batteries are approaching end of life

C. The panel is drawing alarm current rather than standby current during the transfer test

D. The gradual voltage decline is normal for batteries under standby load and the batteries appear healthy

70. A fire alarm technician is inspecting a fire alarm system and discovers that a smoke detector has been installed directly above a permanently mounted space heater on the wall below. The space heater produces a continuous updraft of warm air across the detector. What concern does this installation create?

A. The warm air does not affect detection because heated air rises faster carrying smoke to the detector

B. The warm updraft can carry dust and particles into the detector causing nuisance alarms or dirty device faults

C. The heater's electromagnetic field interferes with the detector's photoelectric sensing element

D. The installation is acceptable because detectors are rated for ambient temperatures up to 120°F

71. A fire alarm technician is performing annual testing and tests a horn/strobe device. The horn sounds the temporal-three pattern correctly. The strobe flashes at 1.5 flashes per second. The technician records both as passing. Should the strobe be recorded as passing?

A. Yes, 1.5 flashes per second is within the NFPA 72 requirement of 1 to 2 flashes per second

B. No, the strobe must flash at exactly 1 flash per second to comply with NFPA 72

C. Yes, but only if the strobe is the only visible appliance in its field of view

D. No, the strobe must flash at exactly 2 flashes per second to comply with NFPA 72

72. A fire alarm technician discovers during inspection that the fire alarm panel room is being used to store cleaning supplies, including mop buckets, brooms, and chemical cleaning agents. The panel has 24 inches of clear space in front. What must be documented?

A. The storage does not affect the panel as long as 24 inches of clearance is maintained

B. The chemical cleaning agents present a corrosion risk to the panel's electronic components

C. The storage and inadequate clearance violate NEC working space requirements for electrical equipment

D. Only the chemical agents must be removed; the cleaning tools may remain in the room

73. A fire alarm system event log shows that the panel has been receiving "DEVICE COMMUNICATION FAILURE" troubles for address 088 every day at approximately 2:15 PM. Each trouble clears within 5 minutes. No other devices on the SLC show communication issues. What is the most likely cause?

A. The panel's polling algorithm has a timing conflict with address 088 at that time of day

B. Another building system activates at 2:15 PM creating electromagnetic interference at device 088

C. The detector at address 088 has a thermally sensitive component that fails during peak afternoon heat

D. An environmental condition at the device location causes communication interference at that specific time

74. Per NFPA 72, what is the maximum delay permitted before the fire alarm panel must annunciate a trouble signal for primary AC power loss?

A. 3 hours to prevent nuisance trouble signals from brief power interruptions

B. 1 hour as a compromise between prompt reporting and nuisance avoidance

C. 30 minutes for panels in commercial buildings with 24-hour occupancy

D. Immediate annunciation with no delay permitted for any power interruption

75. A fire alarm technician is testing a tamper switch on an OS&Y valve. The technician turns the valve wheel one full revolution from the fully open position. No supervisory signal appears. The technician turns one additional revolution (two total from fully open). The supervisory signal appears. Per NFPA 72, does this tamper switch pass the functional test?

A. No, the tamper switch should have activated after the first revolution from fully open

B. Yes, the switch activated within two revolutions which meets the NFPA 72 requirement

C. No, tamper switches must activate within one-half revolution of the valve wheel

D. Yes, because the code permits up to three revolutions for OS&Y valves specifically

76. A fire alarm technician is testing the fire alarm system's communication link. The system uses a cellular communicator. The technician transmits a test signal and calls the supervising station. The station confirms receiving the signal but reports a 3-minute delay between transmission and receipt. Is this delay acceptable?

A. Yes, cellular communication delays of up to 5 minutes are within normal operating parameters

B. No, alarm signals should be received within 90 seconds for all communication technologies

C. The delay should be investigated because cellular signals are typically received within seconds

D. Yes, but only during peak network traffic periods when cellular towers are heavily loaded

77. A fire alarm technician is performing annual testing on a fire alarm system in a hotel. The technician tests the 75 dB at the pillow requirement in a sleeping room. With the notification appliance activated, the sound level meter reads 73 dB at the pillow location. The meter has a stated accuracy of ±1.5 dB. What should be documented?

A. The reading passes because the meter accuracy allows for a true value up to 74.5 dB

B. The reading of 73 dB does not meet the 75 dB minimum and must be documented as a deficiency

C. The test is inconclusive and must be repeated with a more precise sound measurement instrument

D. The reading passes because 73 dB is within the acceptable 5% tolerance of the 75 dB requirement

78. A fire alarm system in a school generates nuisance alarms from a smoke detector in the art room approximately once per week. The alarms occur during ceramics class when the kiln is operating. What is the most appropriate corrective action?

A. Relocate the smoke detector to the opposite side of the room away from the kiln

B. Install a protective cover over the detector to filter kiln emissions from the sensing chamber

C. Remove the smoke detector and rely on the corridor detection for the art room coverage

D. Replace the smoke detector with a heat detector or multi-criteria detector appropriate for the environment

79. During a fire alarm inspection, the technician discovers that the building's fire alarm panel has an active trouble signal for "GROUND FAULT — IDC 5" that has been present for approximately 6 months. The building owner acknowledges the trouble and says the system is "working fine otherwise." What must be documented?

A. The unresolved ground fault is a code deficiency that must be repaired to maintain system integrity

B. The building owner's acknowledgment constitutes acceptable documentation of the condition

C. The ground fault can remain if the panel continues to process alarm signals normally

D. Ground faults on IDC circuits are informational only and do not require corrective action

80. A fire alarm technician is troubleshooting a conventional fire alarm panel that shows "TROUBLE — ZONE 3." The technician measures the resistance at the Zone 3 panel terminals and reads approximately 47 kΩ. The specified EOLR for this panel is 4.7 kΩ. What is the most likely cause?

A. The Zone 3 wiring is intact but the EOLR has been replaced with a much higher value resistor

B. The panel's Zone 3 input board has drifted and can no longer accurately read the circuit resistance

C. A wrong-value EOLR has been installed — likely a 47 kΩ resistor instead of the specified 4.7 kΩ

D. The high resistance reading indicates an open circuit because the panel cannot see the EOLR

81. A fire alarm technician is testing notification appliances and discovers that one ceiling-mounted speaker in a voice evacuation system produces a loud buzzing hum instead of the pre-recorded evacuation message. All other speakers produce clear audio. What is the most likely cause?

A. The amplifier serving that speaker zone has a ground loop producing 60 Hz hum

B. The individual speaker has a failed voice coil or a damaged cone producing distorted output

C. The speaker circuit has a polarity reversal that causes destructive interference with the audio signal

D. The pre-recorded message file has a corrupt audio segment that affects only that specific speaker

82. Per NFPA 72, sensitivity testing of smoke detectors is required within one year of installation and at what interval thereafter?

A. Annually to coincide with the comprehensive system functional test schedule

B. Every three years following the initial test per the extended maintenance schedule

C. Semiannually to match the functional testing frequency for smoke detectors

D. Every alternate year following the initial test per Table 14.4.3.2

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

83. A fire alarm shop drawing includes a voltage drop calculation showing that a NAC circuit using 14 AWG conductors will deliver 17.8 VDC at the farthest appliance. The appliances are listed for 16 to 33 VDC operation. The engineer reviews the calculation and marks it "Approved as Noted" with a comment recommending 12 AWG conductors for additional margin. What should the contractor do?

A. Install 12 AWG conductors per the engineer's recommendation to provide additional voltage margin

B. Install 14 AWG conductors because 17.8 VDC meets the minimum and the approval stands

C. Request a formal revision to change the specification from 14 AWG to 12 AWG before proceeding

D. Average the 14 AWG and 12 AWG voltage results and select whichever size is closest to 20 VDC

84. A fire alarm riser diagram shows a notation "NAC BOOSTER — FLOOR 8" with a symbol representing a remote power supply connected to the main panel by a supervised circuit. What is the purpose of this NAC booster?

A. It amplifies the alarm signal tone for notification appliances located far from the panel

B. It provides additional NAC output capacity and power for notification appliances on upper floors

C. It converts the panel's 24 VDC output to 120 VAC for powering speakers on the eighth floor

D. It serves as a backup fire alarm control panel that takes over if the main panel fails

85. A fire alarm technician is reviewing as-built drawings for a fire alarm system that was installed three years ago. The drawings show 128 addressable devices on SLC 1. During the current inspection, the technician counts 136 devices physically installed on SLC 1. What documentation action is required?

A. The 8-device discrepancy is within acceptable tolerance and no update is needed

B. The technician should remove 8 devices to match the as-built drawings

C. The as-built drawings must be updated to reflect the current 136-device installed count

D. Only the panel programming needs updating because it tracks all device changes automatically

LEVEL I — SIMULATION EXAM 10: ANSWER KEY AND EXPLANATIONS

1. D — Separate fire alarm zones allow the panel to distinguish whether an alarm originates inside an individual apartment unit or in the common corridor. This distinction is critical for emergency responders who need to know whether to enter a specific unit or search the common areas. Combining apartment and corridor detectors on the same zone eliminates this location specificity.

2. A — The detector should not be within 4 inches of a wall-ceiling junction — it must be at least 4 inches away from any wall to avoid the dead air space. However, the additional verification the technician should perform is confirming the detector is NOT within 4 inches of the wall — verifying proper clearance from the dead air space at the wall-ceiling intersection per NFPA 72 Section 17.7.3.2.1.

3. C — Standby energy = 0.72 × 24 = 17.28 Ah. Alarm energy = 4.6 × 0.083 = 0.382 Ah. Subtotal = 17.662 Ah. With 20% safety factor: 17.662 × 1.20 = 21.19 Ah, approximately 21.26 Ah accounting for rounding in the alarm duration. Select the next available standard battery size above this calculated minimum.

4. B — A 200-foot branch circuit run can produce significant voltage drop on the 120 VAC supply, especially under the panel's 7-amp load. Using the wire resistance for 12 AWG conductors, the technician should calculate the voltage at the panel's input terminals to verify it remains within the manufacturer's specified minimum — typically 110 VAC. If the drop is excessive, a larger conductor size may be needed.

5. A — Solid wooden beams 6 inches deep can trap smoke in the pockets between beams, preventing it from traveling horizontally along the ceiling to reach detectors at standard spacing. Per NFPA 72 Section 17.7.3.2.4, beams deeper than 4 inches may require detectors to be placed within individual beam pockets. The technician must evaluate the beam depth and spacing against the code requirements.

6. D — Waterflow switches generate alarm signals — not supervisory signals — because water flow in the sprinkler system indicates a sprinkler head has activated in response to a probable fire condition. Tamper switches generate supervisory signals for valve position changes. The distinction is critical: alarm signals trigger full building notification and fire department dispatch, while supervisory signals alert building management.

7. B — When conduit penetrates an exterior wall, the penetration must be weatherproofed to prevent rain, moisture, and condensation from entering the conduit system and traveling to interior junction

boxes and devices. Water in the conduit system causes corrosion, ground faults, and circuit failures. Appropriate sealant, weatherproof fittings, and drainage provisions must be used at exterior penetrations.

8. C — A 20 × 20 foot room is within the default 30-foot listed spacing for a single spot-type smoke detector. The maximum distance from any point in the room to the center-mounted detector is approximately 14.1 feet (the diagonal from center to corner), which is less than the 21-foot maximum (0.7 × 30 = 21 feet). A single detector provides complete coverage.

9. A — NFPA 72 Section 17.6.3.1.3 requires heat detectors to have a rated activation temperature at least 20°F above the maximum expected ceiling temperature. With a maximum ambient of 140°F, the detector must be rated at least 160°F. A 135°F detector would activate from normal ambient conditions — not fire conditions — producing constant nuisance alarms. A higher-rated detector is required.

10. B — Class B SLC circuits on addressable panels typically require a circuit termination device at the last device — which may be an EOLR, a termination module, or another manufacturer-specified component. Unlike conventional IDC circuits that universally use EOLRs, addressable SLC termination requirements vary by manufacturer. The technician must install whatever termination device the specific panel manufacturer specifies.

11. D — Parking garages with moisture, temperature extremes, and potential corrosion from road salt and vehicle exhaust require robust conduit protection. Rigid Metal Conduit (RMC) or Intermediate Metal Conduit (IMC) provides superior moisture resistance, corrosion protection, and physical durability compared to EMT, ENT, or FMC in these harsh environments. Galvanized or PVC-coated RMC is the preferred choice.

12. C — Thick reinforced concrete walls significantly attenuate cellular radio signals. One bar of signal strength inside the panel enclosure may not provide reliable communication during all conditions. An external antenna mounted on the building exterior — connected to the cellular module via a coaxial cable — can provide significantly stronger signal strength for reliable alarm signal transmission.

13. A — Category 6A data cables, RG-6 coaxial, and thermostat wire are all typically classified as power-limited circuits under their respective NEC articles (725 and 820). NEC Article 760 permits power-limited fire alarm cables to share cable pathways with other power-limited cables. None of these cable types present a separation concern when sharing a ceiling space with FPLP fire alarm cable.

14. B — Dual-action pull stations require two distinct physical motions to activate — such as lifting a cover then pulling the handle. This design significantly reduces false alarms from accidental bumping and deliberate malicious activation, which are common in institutional environments where residents may attempt to trigger alarms. The two-motion requirement creates a deliberate barrier without preventing legitimate use.

15. D — Remote annunciator mounting height is typically determined by the AHJ and practical accessibility requirements for emergency responders. NFPA 72 does not specify a universal mounting height for annunciators. The fire department captain's request for 60 inches is reasonable and practical for firefighters reading the display while wearing gear. The AHJ's preference should be followed.

16. C — The fire alarm panel's dedicated branch circuit breaker must be accessible to fire alarm service technicians, building management, and emergency responders at all times — 24 hours a day. A breaker located in a locked tenant space that may be inaccessible outside business hours does not meet this requirement. The breaker must be relocated to the common mechanical room or other continuously accessible location.

17. A — Using the power formula $P = V \times I$: $P = 120$ VAC $\times$ 3.5 amps = 420 watts. This is the AC power drawn from the building's electrical system during normal operation. The battery voltage (24 VDC) is not part of the AC power calculation — it is a separate system that operates only during AC power failure.

18. C — NFPA 72 Table 18.5.5.5.1(b) for ceiling-mounted visible notification appliances uses both the room dimensions and the ceiling height to determine the required candela rating. Higher ceilings require higher candela because the light must travel a greater distance from the ceiling to reach occupants at floor level. Both factors must be considered for proper candela selection.

19. A — NEC Section 358.30 requires EMT conduit — including 1-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. Maximum support intervals between these points are 10 feet.

20. D — Class A wiring requires pathway diversity so that a single event cannot destroy both the outgoing and return paths simultaneously. If the two paths share a common conduit, cable tray, or riser at any point, a fire or physical damage at that shared location eliminates both communication paths. The technician should be concerned whenever the outgoing and return paths converge.

21. B — Any penetration through a fire-rated floor assembly must be sealed with a listed firestop system to maintain the floor's fire resistance rating. The firestop must be rated to match the floor assembly's rating — in this case, 1 hour. An unsealed penetration creates an opening for fire, smoke, and toxic gases to travel between floors, compromising the building's vertical compartmentalization.

22. C — The duct air velocity of 300 fpm falls within the detector manufacturer's specified operating range of 100 to 4,000 fpm. The detector's sampling tubes are designed to function across this range, drawing adequate air through the sensing chamber for reliable smoke detection. Air velocities within the manufacturer's specified range do not require any special accommodation.

23. A — The pipe insulation surface temperature of 95°F is well below the fire alarm cable's maximum insulation temperature rating of 150°F, leaving a 55°F margin. Standard fire alarm cable can safely be routed alongside this insulated pipe without risk of insulation degradation or conductor damage. No special cable type or additional separation is needed.

24. D — The door holder draws 0.5 amps at 24 VDC. The control module's relay contacts are rated at 2 amps at 30 VDC. The load is only 25% of the relay's rated capacity, providing a substantial margin. The relay can safely switch the door holder circuit without exceeding its rating or risking contact damage from overloading.

25. B — Whether detection is required in concealed spaces above drop ceilings depends on the building code requirements and the project specifications. The IBC and NFPA 72 address concealed space detection based on factors including the combustible content, the space height, and the occupancy classification. The building code and project-specific requirements determine whether detection is needed — it is not universally required or universally exempt.

26. A — A resistance reading of 0.8 ohms between the two conductors of a NAC circuit with no devices connected represents the normal wire resistance of the copper conductors over the circuit's length. This reading confirms the conductors are continuous from the panel to the end of the circuit with no open circuits. The low resistance is expected for copper conductors over a typical circuit distance.

27. C — The ceiling surface above the mezzanine is the roof deck at 22 feet. Smoke detectors must be mounted on the ceiling surface of the space they protect. Even though the mezzanine is open to the floor below, the ceiling above the mezzanine area is the underside of the roof deck. However, the 22-foot height raises stratification concerns that should be evaluated for effective detection.

28. D — Asbestos is a regulated hazardous material that requires specialized handling by licensed abatement professionals per OSHA regulations. Fire alarm technicians are not qualified to work around, disturb, or remove asbestos-containing materials. Work must stop immediately and the condition reported so the building owner can arrange for qualified assessment and abatement before fire alarm work resumes.

29. B — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red in color. This specific color requirement ensures that pull stations are immediately recognizable and distinguishable from other wall-mounted building fixtures such as thermostats, light switches, and door hardware. The red color is a code requirement — not merely a manufacturer convention.

30. C — Reserving the unused zone input for future expansion is the most practical approach. Building modifications, tenant changes, and system upgrades frequently require additional detection zones. Having a spare zone available avoids the cost and complexity of replacing the panel or adding an expansion module when a new zone is needed. The reserved zone should be documented on the system drawings.

31. A — NFPA 72 requires wall-mounted visible notification appliances to be mounted with the lens between 80 and 96 inches above the floor. In an 18-foot room, mounting at 96 inches places the devices at approximately the wall midpoint. While the devices will function at this height, the technician should evaluate whether the audible and visible output effectively covers the entire room volume, particularly for occupants near the high ceiling.

32. B — Shield drain wires on shielded fire alarm cable should be continuous through the circuit and grounded at one point only — typically at the panel end. Grounding the shield at multiple points creates ground loops that can introduce electrical noise into the circuit. The continuous shield with single-point grounding provides effective electromagnetic interference protection without creating problematic ground loop currents.

33. D — When no finished ceiling exists, the smoke detector must be mounted on the underside of the steel deck — which is the actual ceiling surface of the room — at the location shown on the drawings. Appropriate mounting hardware (such as beam clamp adapters or deck-mounted bases) must be used to secure the detector base to the corrugated steel deck surface.

34. A — A float charge voltage of 22.6 VDC with the charger connected and operating is significantly below the expected range of 27.0–27.6 VDC for a 24V SLA battery system. The illuminated charger indicator suggests the charger is attempting to charge, but the batteries are not reaching float voltage. This typically indicates the batteries have degraded internally and can no longer hold a full charge — they are approaching end of life.

35. D — NEC Article 760 Part III covers power-limited fire alarm systems (PLFA). This designation tells the technician that the fire alarm circuits operate under power-limited conditions — meaning the voltage, current, and power are restricted to levels that reduce fire and shock risk. PLFA circuits may use FPL, FPLR, or FPLP cable types and follow the installation requirements specific to power-limited fire alarm wiring.

36. C — A listed cable connector (cable clamp) at the device box entry point provides two critical functions: it secures the cable to the box preventing it from being pulled out, and it provides strain relief that prevents tension on the cable from transferring to the internal wire connections. This is a standard NEC requirement for cable entries into device boxes.

37. A — Horn/strobes: 4 × 0.310 = 1.240 amps. Strobes: 6 × 0.175 = 1.050 amps. Speakers: 2 × 0.125 = 0.250 amps. Total = 1.240 + 1.050 + 0.250 = 2.540 amps. This total must be compared to the NAC output rating to verify the circuit is within capacity. Accurate load calculations prevent circuit overloading during alarm.

38. B — A DACT requires copper telephone lines to transmit alarm signals using DTMF tones over the analog telephone network. Fiber-to-the-premises service does not provide a copper telephone connection and cannot directly support DACT communication. The fire alarm communication method must be changed to an IP communicator, cellular communicator, or another approved alternative that does not depend on copper telephone service.

39. D — Testing a single detector on a multi-device zone confirms only that the panel responds to that one device. Each remaining heat detector must be individually tested to verify it activates and produces a panel alarm. Untested detectors may have wiring errors, incorrect temperature ratings, or defective elements that would only be discovered through individual device testing during acceptance testing.

40. B — NEC Article 760 requires fire alarm cable installed in exposed locations below 7 feet above the finished floor to be protected by a raceway. The 5-foot exposed wall run from the ceiling to the device at 48 inches is entirely below 7 feet. A raceway — such as EMT conduit or surface-mounted raceway — must protect the cable from physical damage in this exposed, accessible location.

41. A — Ceiling fans create airflow patterns that can disrupt the natural convection of smoke toward the ceiling and push smoke away from detectors placed in the direct airflow path. NFPA 72 recommends that smoke detectors not be placed in the direct discharge airstream of ceiling fans. The detector should be relocated away from the fan's primary airflow zone.

42. C — A smoke detector mounted within 3 inches of a sprinkler head may obstruct the sprinkler's water discharge pattern. When the sprinkler activates, it must distribute water in a defined pattern to suppress the fire. Any obstruction within this discharge pattern — including smoke detectors, cable, or conduit — reduces the sprinkler's effectiveness. The detector should be relocated to maintain adequate clearance.

43. D — NFPA 72 Section 21.3 specifically requires smoke detectors — not heat detectors — in elevator lobbies and hoistways for initiating Phase I elevator recall. Heat detectors alone do not satisfy this requirement because they respond too slowly to provide adequate warning for elevator passenger safety. Smoke detection provides the early warning needed to recall elevators before smoke fills the hoistway.

44. B — NEC requires conduit to be supported at regular intervals not exceeding the maximum specified for the conduit type (10 feet for most EMT sizes) and secured within the specified distance of each outlet box, junction box, cabinet, or fitting (3 feet for EMT). Both the interval and the box-proximity requirements must be met throughout the entire conduit run.

45. A — Steel rack storage reaching to within 3 feet of the 28-foot ceiling can block the horizontal travel of smoke along the ceiling surface to reach detectors. Smoke rising from a fire deep within the rack structure may not reach ceiling-mounted detectors in a timely manner because the racks create barriers to horizontal smoke movement. The detector layout must account for rack obstructions and may require in-rack detection.

46. C — FPLR (Fire Power-Limited Riser) cable is rated for vertical riser applications and general-purpose horizontal runs, but it is NOT rated for plenum spaces. Plenum spaces require FPLP (Fire Power-Limited Plenum) cable, which has superior fire-resistant properties. FPLR cannot substitute for FPLP in any plenum application. The cable substitution hierarchy only allows upward substitution — FPLP can replace FPLR, but not the reverse.

47. B — A significant difference in response time between identical detectors in the same environment strongly suggests the slower detector has contamination buildup in its sensing chamber. The 28-second activation versus the 5-second activation represents a meaningful performance gap. The slower detector should be cleaned per the manufacturer's procedures and retested, or replaced if cleaning does not restore normal response.

48. D — NFPA 72 Table 14.4.3.2 requires the fire alarm control unit's trouble signal functions to be tested annually. The test verifies that the panel correctly generates and displays trouble signals for various fault conditions — such as open circuits, ground faults, and power failures. This ensures the panel's supervisory monitoring functions remain operational.

49. A — Phase I elevator recall requires elevators to travel to the designated recall floor and open their doors so passengers can exit safely. An elevator that travels to the correct floor but does not open its doors has only partially completed the recall sequence. The door mechanism on the third elevator must be investigated and corrected to ensure passengers can exit during an actual emergency.

50. C — A smoke detector removed from its approved ceiling location and placed on a filing cabinet at desk height is not in a position to detect smoke effectively. Smoke rises to the ceiling and accumulates there — a detector at 30 inches above the floor will not sense smoke until the room is heavily filled. The detector has been effectively removed from service and must be reinstalled at its approved ceiling location.

51. D — Intermittent ground faults appearing during afternoon hours and clearing overnight suggest a thermally driven condition. Afternoon sun exposure heats a specific section of the building, causing thermal expansion in conduit, cable, and building materials. This expansion can stress cable insulation against sharp edges or conduit fittings, creating intermittent contact between a conductor and ground that clears when temperatures drop.

52. B — NFPA 72 Section 14.2.2 addresses system impairments. When a significant impairment affects detection capability, a fire watch with trained personnel patrolling the affected area may be required as a compensatory measure. The fire watch maintains surveillance in the unprotected area until the fire alarm system impairment is corrected and full detection capability is restored.

53. C — An incorrect date on the fire alarm panel affects the accuracy of the event log timestamps. During incident investigation, regulatory review, or legal proceedings, the event log serves as the official record of system activity. Incorrect dates create confusion when correlating fire alarm events with other building system logs, security camera footage, and emergency dispatch records. The date must be corrected.

54. D — The panel successfully transmitted an alarm signal that the station received, but the trouble signal was not received. This suggests the communication module may be programmed to transmit only certain signal types. The module's programming must be reviewed to ensure all required

signal types — alarm, trouble, and supervisory — are configured for transmission to the supervising station.

55. A — A voltage drop from 26.4 to 20.8 VDC in the first minute under alarm load represents a rapid decline that indicates insufficient battery capacity. Healthy batteries should sustain voltage well above the minimum operating threshold for the full required alarm duration. This rapid drop suggests the batteries cannot deliver the required current without significant voltage depression and must be replaced.

56. B — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. If the office strobe is visible through the glass door from the corridor, it is within the same field of view as the corridor strobes. The out-of-sync flashing violates the synchronization requirement regardless of whether the devices are on different NAC circuits.

57. C — The panel correctly processed the pull station alarm, activated notification appliances, and transmitted the alarm to the supervising station — confirming the panel's alarm processing and output functions are working. The door holders not releasing indicates a fault in the control module outputs, the wiring between the control modules and the door holders, or the door holder devices themselves on the second floor.

58. A — NFPA 72 requires waterflow alarm signals to be received at the panel within 90 seconds of sustained water flow. After 90 seconds with no alarm signal, the waterflow switch has failed its functional test. The switch, its wiring, and its connection to the fire alarm panel must be investigated. The retard delay setting should also be checked as it contributes to the total response time.

59. D — The system has lost one of its two communication paths. While the cellular communicator provides continued monitoring, the system no longer has communication redundancy. If the cellular path also fails, the building would have no communication to the supervising station. The IP path must be restored to maintain the designed level of communication reliability. The two-week duration makes this a pressing maintenance item.

60. B — NFPA 72 Table 14.4.3.2 requires manual fire alarm stations to be functionally tested annually. Testing involves physically activating each station — pulling the handle — and verifying the complete system response: panel alarm display, notification appliance activation, and signal transmission to the supervising station. The station is then reset with the appropriate key or tool.

61. A — A "Device Dirty" trouble indicates the detector's sensing chamber has accumulated contamination that is causing sensitivity drift. Before replacing the detector, the technician should check the panel's sensitivity report to see the actual analog reading and the drift trend over time. This data shows whether the detector is slightly dirty but serviceable with cleaning, or has drifted to a point requiring replacement.

62. D — When the detector head is physically seated in its base but the panel reports "device removed," the most likely cause is that the detector's internal processor has failed and can no longer respond to the panel's polling commands. The panel interprets the non-response as a removed device. The detector should be replaced with a new unit of the same model and the communication verified.

63. C — The building was designed for manual AHU restart after fire alarm shutdown to prevent automatic recirculation of potentially smoke-contaminated air. The observed automatic restart contradicts the approved design intent. The discrepancy must be investigated — the fault may be in the fire alarm control module programming, the HVAC controller programming, or the interface wiring between the two systems.

64. A — Voice evacuation messages must be intelligible throughout all notification zones per NFPA 72. A lobby where the message echoes severely and words cannot be distinguished fails the intelligibility requirement. The acoustics must be addressed through speaker repositioning, adding speakers, adjusting volume, or installing acoustic treatment. The deficiency must be documented and corrected.

65. B — NFPA 72 Table 14.4.3.2 requires sensitivity testing within one year of installation and every alternate year thereafter. Following the schedule: year 1, year 3, year 5, year 7, and so on. The next test after year 5 is due at year 7, continuing the consistent alternate-year cycle throughout the detector's service life.

66. D — Terminal corrosion creates resistance at the connection points, which can impede current flow from the charger to the batteries and from the batteries to the panel during power failure. The corrosion must be cleaned from both terminals using an approved method, the connections retightened, and the battery voltage rechecked to confirm proper charging. Battery replacement may also be warranted depending on age and condition.

67. C — The panel displays the correct device type (smoke detector) and the correct address (044), but the location descriptor reads "STORAGE ROOM B" when the detector is physically in an executive conference room. Only the location descriptor is incorrect. It must be updated in the panel programming to show the correct installed location for accurate alarm identification.

68. A — NFPA 72 Section 7.8 requires both the as-built drawings and the Record of Completion to be updated whenever the fire alarm system is modified. Adding 8 new devices constitutes a system modification that changes the installed configuration. Both documents must reflect the current system state to support future maintenance, troubleshooting, and code compliance verification.

69. D — A gradual voltage decline from 26.2 to 25.0 VDC over 15 minutes of standby discharge — a drop of 1.2 volts — is normal and expected. The batteries are consuming stored energy to power the system, and a steady, gradual decline indicates consistent discharge behavior. The voltage remains well above the minimum operating threshold. The batteries appear healthy and capable of sustaining the standby load.

70. B — A permanent updraft of warm air from a space heater continuously carries airborne dust, lint, and particles from the floor and lower room levels upward into the detector's sensing chamber. This accelerated particle delivery contaminates the sensing chamber faster than normal, causing the detector to drift toward dirty device thresholds and generate nuisance alarms. The detector should be relocated away from the heater's thermal plume.

71. A — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash at a rate between 1 and 2 flashes per second. At 1.5 flashes per second, the strobe is within the acceptable range. The technician correctly recorded it as passing. Flash rates below 1.0 or above 2.0 flashes per second would constitute a failure.

72. C — NEC Article 110.26 requires minimum working clearances in front of electrical equipment — typically 30 inches wide and 36 inches deep. The 24-inch clearance with cleaning supplies stored around the panel violates these requirements. Additionally, chemical cleaning agents in the same room present a corrosion risk. The storage must be removed and adequate clear space maintained.

73. D — A communication failure occurring at the same time every day for a single device strongly suggests an environmental condition specific to that device location at that time. Possible causes include afternoon sun exposure causing thermal expansion stress on a connection, HVAC equipment cycling that creates electromagnetic interference, or vibration from equipment that operates on a schedule — all conditions that occur at a specific daily time.

74. A — NFPA 72 Section 10.6.9 permits a maximum delay of 3 hours before the fire alarm panel must annunciate an AC power failure trouble signal. This delay prevents nuisance trouble signals during brief power interruptions such as momentary utility outages, switching events, and short-duration dips that resolve before the building's fire protection is meaningfully affected.

75. B — NFPA 72 requires tamper switches to generate a supervisory signal no more than two revolutions of the valve wheel from the fully open position. The switch activated at exactly two revolutions, which meets the code requirement. The switch is properly adjusted and passes the functional test. Activation at more than two revolutions would constitute a failure.

76. C — Cellular communication is typically very fast — signals are usually received within seconds. A 3-minute delay is abnormal for cellular communication and suggests a network issue, a weak signal that requires multiple retry attempts, or a problem with the cellular module's configuration. The delay should be investigated to ensure reliable communication during actual alarm events.

77. B — The measured reading of 73 dB falls below the NFPA 72 requirement of 75 dB at the pillow in sleeping areas. Even considering the meter's ±1.5 dB accuracy, the true value could range from 71.5 to 74.5 dB — neither end of this range reaches the 75 dB minimum. The deficiency must be documented and the notification system modified to achieve the required sound level.

78. D — The kiln produces heat, particles, and fumes that trigger nuisance alarms from smoke detectors during normal operation. Replacing the smoke detector with a heat detector or multi-criteria detector eliminates the nuisance alarms while maintaining fire detection coverage. Heat detectors are unaffected by kiln emissions, and multi-criteria detectors can distinguish kiln operations from actual fire conditions.

79. A — A ground fault that has persisted for 6 months is an unresolved code deficiency that compromises the circuit's supervision integrity. Ground faults can mask other fault conditions, cause unreliable alarm processing, and indicate insulation degradation that may worsen over time. The fault must be located and repaired to restore proper circuit supervision. The building owner's acceptance of the condition does not satisfy code requirements.

80. C — The resistance reading of 47 kΩ — exactly 10 times the specified 4.7 kΩ EOLR — strongly suggests a wrong-value resistor was installed. A 47 kΩ resistor is a standard resistor value that looks similar to a 4.7 kΩ resistor if the color bands are misread. The panel sees an unexpected resistance value and generates a trouble signal. The EOLR must be replaced with the correct 4.7 kΩ value.

81. B — When all other speakers produce clear audio but one speaker produces only a buzzing hum, the fault is localized to that individual speaker. A failed voice coil, a damaged or torn speaker cone, or a loose internal connection within the speaker can cause it to produce distorted output or hum instead of clear audio. The speaker must be replaced and the new unit tested for intelligible audio reproduction.

82. D — NFPA 72 Table 14.4.3.2 requires smoke detector sensitivity testing within one year of installation and every alternate year thereafter. The alternate-year schedule continues throughout the detector's service life: year 1, year 3, year 5, year 7, and so on. This periodic testing monitors the gradual sensitivity drift caused by dust accumulation and component aging.

83. A — An "Approved as Noted" disposition with a specific recommendation from the reviewing engineer carries contractual weight. The engineer has identified a concern — the 1.8-volt margin above the minimum with 14 AWG — and recommended 12 AWG for additional margin. The contractor should follow the engineer's recommendation and install 12 AWG conductors to provide a more robust voltage margin that accommodates real-world conditions.

84. B — NAC booster panels — also called remote power supply/NAC expander panels — provide additional NAC output capacity and power for notification appliances on upper floors. In tall buildings, the main panel's NAC outputs may have insufficient current capacity or the wire runs may produce excessive voltage drop. Remote boosters provide local NAC power near the appliances they serve.

85. C — The as-built drawings show 128 devices but 136 are actually installed — an 8-device discrepancy indicating modifications were made without updating the documentation. NFPA 72 Section 7.8 requires as-built drawings to accurately reflect the current installed system

configuration. The drawings must be updated to show all 136 devices with their correct addresses, locations, and circuit assignments.