

LEVEL II — SIMULATION EXAM 6

(110 QUESTIONS)

Time Limit: 155 Minutes

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

DOMAIN 2.1 — INSTALLATION (Questions 1–40)

1. A fire alarm technician is reviewing a design for a 30-story high-rise with voice evacuation. The engineer specifies pathway survivability Level 2 on all speaker circuits. The design uses 2-hour circuit integrity cable in cable trays throughout the building. At one floor, the CI cable transitions from the east riser tray to the west riser tray through an unrated corridor ceiling space spanning 60 feet. Does the CI cable maintain Level 2 protection during this transition?

- A. No, CI cable loses its fire rating when installed in cable tray rather than conduit
- B. No, the unrated corridor ceiling space requires separate 2-hour construction around the cable
- C. Yes, but only if the corridor ceiling space has automatic sprinkler protection for Level 1 backup
- D. Yes, 2-hour CI cable maintains its rating regardless of the surrounding construction

2. A fire alarm technician is installing a networked fire alarm system across a medical campus with five buildings. Each building has its own fire alarm panel. The campus security center in Building A requires real-time monitoring of all five panels. During a heavy thunderstorm, network communication between Building A and Building D drops intermittently. The underground conduit connecting the two buildings runs through a low area that floods during storms. What is the most likely cause?

- A. Lightning-induced voltage surges on the network cable creating temporary signal corruption
- B. Rainwater infiltration into the underground conduit compromising cable insulation

- C. Ground potential differences between buildings increasing during electrical storms
- D. The thunderstorm's electromagnetic field interfering with the digital network protocol

3. A fire alarm technician is installing a releasing fire alarm system for a clean agent suppression system protecting two adjacent server rooms. Each room has independent agent storage, nozzles, and cross-zone detection. Room A's cross-zone uses photoelectric detectors in both zones. Room B's cross-zone uses photoelectric in Zone A and multi-criteria in Zone B. During commissioning, Room A produces a false cross-zone alarm from cooking smoke entering through the HVAC system. Room B does not false alarm from the same event. What does this demonstrate?

- A. Room A's detectors are defective and must be replaced with the same model used in Room B
- B. Room B's system is non-compliant because cross-zone requires identical detector types
- C. Using different detector technologies in cross-zones reduces the risk of simultaneous false alarms from a single nuisance source
- D. Room A's cross-zone logic has a programming error that should be corrected

4. A fire alarm technician is designing a battery calculation for a fire alarm system in a building with a qualifying emergency generator. System loads: panel/SLC standby = 0.95A, voice amplifier standby = 1.30A, NAC alarm = 4.5A, voice alarm = 9.0A. Using the reduced 4-hour standby with 15-minute voice alarm duration and 20% safety factor, what is the minimum battery capacity?

- A. 14.94 Ah after correctly applying 4-hour standby, 15-minute alarm, and 20% safety factor
- B. 12.45 Ah using 4-hour standby and 15-minute alarm without the safety factor
- C. 18.36 Ah using 4-hour standby with 5-minute standard alarm instead of 15-minute
- D. 30.60 Ah using 24-hour standby because voice systems are exempt from generator reduction

5. A fire alarm technician is installing smoke detectors for elevator recall in a building with four elevator banks. Each bank has a dedicated lobby with its own smoke detector. The sequence of operations requires selective recall — each lobby detector recalls only its corresponding bank. During commissioning, the technician activates Bank C's lobby detector and Banks A, B, C, and D all recall. The technician checks the control module relays and confirms only Bank C's relay activated. Where is the problem most likely located?

- A. The fire alarm panel programming is activating all four recall outputs instead of only Bank C
- B. The panel's SLC communication is broadcasting the recall command to all control modules
- C. The smoke detector in Bank C's lobby is generating a building-wide alarm code
- D. The elevator controllers share a common recall input wired in parallel rather than independently

6. A fire alarm technician is installing a fire alarm system in a 12-story office building. The voice evacuation system uses centrally located amplifiers on Floor 1 with 70.7V speaker circuits running to all floors. The longest speaker circuit is 580 feet. During testing, the technician measures the audio signal voltage at Floor 12 speakers and finds 62.5 VAC. The speakers are rated for a minimum of 55 VAC input. Is this acceptable?

- A. No, 70.7V speaker circuits must maintain at least 90% of source voltage at all locations
- B. Yes, 62.5 VAC exceeds the 55 VAC minimum rated input with a 7.5-volt margin
- C. No, the voltage drop indicates the amplifier output power is insufficient for the circuit
- D. Yes, but the speakers should be replaced with higher-sensitivity models for better performance

7. A fire alarm technician is installing a fire alarm system in a hospital that uses positive alarm sequence (PAS). Per NFPA 72 Section 23.8.1.3, PAS provides 180 seconds for staff investigation before general notification. The hospital's chief of security asks what happens if NO staff member acknowledges the alarm during the 180-second period. What is the correct answer?

- A. The system automatically activates general building alarm notification after 180 seconds
- B. The panel transmits a trouble signal to the supervising station requesting additional response
- C. The PAS investigation period repeats one additional time before escalating to full alarm
- D. The panel switches to a pre-signal mode alerting only the fire command center

8. A fire alarm technician is installing a fire alarm system in a convention center ballroom that divides into eight independent event spaces using acoustically rated movable partitions. When all partitions are deployed, each space is fully enclosed with separate entrances. What notification design principle must be applied?

- A. Only the fully open ballroom configuration requires notification design consideration
- B. A single high-output device centered in the ballroom covers all eight configurations
- C. Each possible enclosed space must have independent notification when its partitions are deployed
- D. Only four of the eight spaces need independent notification since the others serve as buffer zones

9. A fire alarm technician is installing a fire alarm system with a central station monitoring connection per NFPA 72 Chapter 26. The central station operator must initiate the required response within a specific time after receiving an alarm signal. What is this maximum response time?

- A. 60 seconds from signal receipt to acknowledgment of the alarm at the operator console
- B. 90 seconds from signal receipt to initiation of the required response action
- C. 120 seconds from signal receipt to completion of fire department notification
- D. 30 seconds from signal receipt to dispatch of emergency responders

10. A fire alarm technician is installing a fire alarm system in a building with both wet-pipe and pre-action sprinkler systems. The pre-action system uses a double-interlock configuration protecting a museum collection storage area. During commissioning, the technician activates a smoke detector in the pre-action zone. The panel processes the alarm correctly but the pre-action valve does not open. The technician's coworker says the system is malfunctioning. Is the coworker correct?

- A. Yes, the valve should open immediately on any detection signal regardless of interlock type
- B. Yes, but only because the panel failed to energize the releasing solenoid during the test
- C. No, but the valve should have at least primed the pilot line for faster response
- D. No, double-interlock requires both detection AND air pressure drop before the valve opens

11. A fire alarm technician is installing a fire alarm system in a building where the fire command center is located in the main lobby on Floor 1. The fire alarm control panel is located in the electrical room on Floor B1 (basement level). Per NFPA 72 Section 23.10, what must be installed at the fire command center?

- A. A complete repeater panel with full status display and operator control capability
- B. A simplified remote annunciator showing only alarm and trouble LED indicators
- C. A dedicated telephone line connecting the FCC to the panel in the electrical room
- D. A laptop computer with remote access software for monitoring the panel from the lobby

12. A fire alarm technician is installing a fire alarm system with a DACT communicator connected to two copper telephone lines. Per NFPA 72, the DACT must verify each telephone line's integrity at least every 24 hours. During the line test, the DACT seizes Line 1 and completes a full handshake with the supervising station receiver. What does this handshake verify that a simple dial tone check does not?

- A. That the telephone line has adequate voltage for reliable DTMF signal transmission
- B. That no other equipment is sharing the telephone line with the DACT communicator
- C. That the complete communication path from DACT to station receiver is functional end-to-end
- D. That the line has been tested within the past 24 hours per the NFPA 72 requirement

13. A fire alarm technician is installing a fire alarm system in a large warehouse with 50-foot ceilings and high-bay storage racks to within 5 feet of the ceiling. The design includes ceiling-level projected beam smoke detectors and in-rack detection at 20-foot and 35-foot elevations. Why are in-rack detectors required at intermediate heights?

- A. In-rack detectors provide redundant backup in case the ceiling beam detectors fail
- B. In-rack detectors identify fires at storage level before smoke travels to ceiling detectors
- C. NFPA 72 mandates in-rack detection for all storage configurations above 30 feet
- D. In-rack detectors compensate for the reduced sensitivity of beam detectors in dusty environments

14. A fire alarm technician is installing a mass notification system integrated with the fire alarm system per NFPA 72 Chapter 24. The emergency plan establishes that during a simultaneous fire alarm and security lockdown, mass notification takes priority over fire alarm audible notification. When mass notification overrides fire alarm audio, what fire alarm function must continue without interruption?

- A. The fire alarm panel must continue activating all notification appliances at reduced volume
- B. The fire alarm visual notification must continue on all floors during the audio override
- C. The fire alarm system must generate a system trouble for the duration of the override
- D. The fire alarm signal must continue transmitting to the supervising station during the override

15. A fire alarm technician is installing a fire alarm system in a 20-story residential tower with voice evacuation. The defend-in-place strategy activates notification on the alarm floor and one floor above and below. The technician asks the engineer why a residential high-rise uses defend-in-place rather than full building evacuation. What is the primary rationale?

- A. Simultaneous evacuation of all 20 floors overloads stairwell capacity creating dangerous congestion
- B. Residential buildings are exempt from full evacuation notification per NFPA 72 Chapter 29
- C. Full building evacuation is prohibited in buildings over 10 stories per the building code
- D. Defend-in-place is less expensive to design because it requires fewer notification appliances

16. A fire alarm technician is installing a fire alarm system with a releasing circuit for a pre-action sprinkler system. The releasing circuit must be supervised per NFPA 72 Section 23.11. During commissioning, the technician intentionally opens the releasing circuit to test supervision. What should the panel display?

- A. An alarm signal because releasing circuit faults are treated as emergency conditions
- B. A supervisory signal because releasing circuits monitor suppression equipment status
- C. A trouble signal because the supervised circuit has lost its continuity
- D. No response because releasing circuits activate only during cross-zone verified conditions

17. A fire alarm technician is installing visible notification appliances in an ADA-accessible hotel guest room measuring 14×16 feet with a 9-foot ceiling. Per NFPA 72 and ADA requirements, what notification is required in this room?

- A. Only a wall-mounted strobe at the standard candela for the room dimensions
- B. A wall-mounted strobe meeting NFPA 72 requirements plus a supplemental alerting device effective for waking sleeping hearing-impaired occupants
- C. Only a ceiling-mounted strobe at 177 cd positioned directly above the bed
- D. A wall-mounted strobe and a low-frequency 520 Hz audible tone generator near the bed

18. A fire alarm technician is installing smoke detectors in an elevator hoistway and the adjacent machine room for a standard traction elevator. Per NFPA 72 Section 21.3, when the elevator machine room smoke detector activates, what response must the system initiate?

- A. Phase I recall to the primary designated floor identical to the lobby detector response
- B. HVAC shutdown for the machine room ventilation system only
- C. Phase I recall to the primary floor plus machine room HVAC shutdown simultaneously
- D. Phase I recall to an alternate floor because smoke in the machine room may affect the primary floor

19. A fire alarm technician is installing a fire alarm system in a building where the specifications require all SLC circuits to be Class A with pathway survivability Level 2. The outgoing SLC path uses CI cable through the east riser. The return path uses standard FPLP cable inside a 2-hour fire-rated shaft on the west side. At Floor 8, both paths must cross through a common corridor ceiling space to reach their respective risers. The corridor ceiling has no fire rating. What must be done about this crossover?

- A. The crossover must also be protected to Level 2 — either with CI cable or within 2-hour construction
- B. The crossover is automatically protected because both paths have Level 2 on their riser segments
- C. Only the standard FPLP path needs protection at the crossover — the CI cable is self-protecting
- D. Level 2 protection at the crossover is waived if the corridor has sprinkler protection for Level 1

20. A fire alarm technician is installing a fire alarm system in a building with a fire pump. The fire pump controller provides supervisory contacts for pump running, power available, phase reversal, and controller trouble. Per NFPA 72 Section 10.18, all four conditions must be monitored by the fire alarm panel. The building engineer asks why phase reversal requires fire alarm monitoring when the pump controller already handles phase correction. What is the answer?

- A. Phase reversal monitoring is redundant and can be eliminated if the controller has correction
- B. The pump controller corrects phase reversal locally but the fire alarm panel must independently confirm
- C. Phase reversal monitoring at the fire alarm panel is required only for diesel-driven fire pumps
- D. The fire alarm panel provides building-wide awareness of the phase condition for maintenance and emergency response

21. A fire alarm technician is installing a fire alarm system with a graphic annunciator at the building entrance. During commissioning, Zone 5 LED illuminates when Zone 9 alarms, and Zone 9 LED stays dark. The panel's zone output data has been verified as correct. What is the most likely cause?

- A. The panel's communication board has a mapping error that sends Zone 9 data as Zone 5
- B. The annunciator's internal LED driver board has Zones 5 and 9 cross-connected
- C. The SLC devices on Zone 9 have address conflicts with Zone 5 devices at the panel level
- D. Zone 9's LED has burned out and Zone 5 is responding to electromagnetic cross-talk

22. A fire alarm technician is installing a fire alarm system in a building where the engineer specifies 70.7V audio distribution for the voice evacuation system. Two speakers on Floor 7 have been wired in parallel without their impedance-matching transformers. What is the primary consequence?

- A. The two speakers will produce excessive volume that distorts the evacuation message
- B. The speakers will produce no audio because 70.7V requires transformers to step down voltage
- C. The parallel connection prevents the panel from supervising the speaker circuit for opens
- D. The low impedance presented to the amplifier can cause distortion, excessive current, and potential damage

23. A fire alarm technician is calculating the SLC standby loading for an addressable panel. The loop has: 140 smoke detectors at 0.30 mA, 22 monitor modules at 0.22 mA, 16 control modules at 3.8 mA, 6 relay modules at 2.6 mA, and 12 isolator modules at 0.12 mA each. The panel's maximum SLC current is 150 mA. What is the total and does it fit?

- A. 142.0 mA total which fits within the 150 mA capacity with minimal margin
- B. 126.08 mA total which fits within the 150 mA with adequate margin for future additions
- C. 155.4 mA total which exceeds the 150 mA capacity requiring a second SLC loop
- D. 98.6 mA total which provides excessive margin suggesting the loop is underutilized

24. A fire alarm technician is installing a fire alarm system in a convention center. The main exhibit hall is 400 × 250 feet with 45-foot ceilings. Projected beam smoke detectors span the 400-foot dimension. Per NFPA 72, what factor determines the maximum lateral spacing between beam detectors?

- A. The standard 30-foot spot detector spacing applies regardless of detector type or ceiling height
- B. The total exhibit hall area divided by the number of beams determines the spacing
- C. The manufacturer's listed maximum spacing for the specific ceiling height at the installation
- D. NFPA 72 specifies a universal 60-foot maximum spacing for all projected beam installations

25. A fire alarm technician is installing a fire alarm system in a cold storage distribution center. The main warehouse is at -30°F. Loading docks fluctuate between 0°F and 95°F. Offices are at 72°F. Heat detectors are specified for the warehouse and docks. What minimum activation temperature is required for the loading dock detectors?

- A. At least 115°F to maintain the NFPA 72 required 20°F margin above the 95°F maximum ambient
- B. 135°F because it is the industry standard regardless of ambient temperature conditions
- C. 200°F because temperature-fluctuating environments require high-temperature detectors
- D. 95°F so the detector activates immediately when temperatures exceed normal conditions

26. A fire alarm technician is installing a fire alarm system with a firefighter telephone system per NFPA 72 Section 24.5. Handset jacks are installed in both stairwells at every floor and at the fire command center. During commissioning, the technician discovers that when three floor stations simultaneously connect handsets to the fire command center, only two can communicate — the third hears nothing. What system capability has failed?

- A. The telephone amplifier has insufficient power to drive three simultaneous connections
- B. The telephone system cannot support the minimum three concurrent conversations required for high-rise buildings
- C. The third handset jack has a wiring fault preventing it from connecting to the common bus
- D. The system is functioning correctly because firefighter telephones support only two simultaneous calls

27. A fire alarm technician is installing a fire alarm system with dual communication paths — primary IP and secondary cellular. Per NFPA 72, the IP communicator must detect path failure within 200 seconds for technologies with continuous monitoring. During commissioning, the technician disconnects the IP network cable. The panel generates an "IP COMMUNICATION FAILURE" trouble after 180 seconds. Does this meet the requirement?

- A. No, the trouble must appear within 60 seconds for all IP communication technologies
- B. Yes, 180 seconds is within the 200-second maximum for continuous monitoring technologies
- C. No, the trouble should appear immediately because IP technology supports instant fault detection
- D. Yes, but only because the panel was in commissioning mode which extends the detection interval

28. A fire alarm technician is installing a fire alarm system in a building where the specifications require smoke detection in a raised floor plenum used for cold air distribution in a data center. The plenum space is 30 inches deep. Standard spot-type detectors would be difficult to maintain in this shallow space. What detection alternative is best suited for under-floor plenum monitoring?

- A. Linear heat detection cable routed along the raised floor support structure
- B. Heat detectors mounted on the concrete slab beneath the raised floor panels
- C. Aspirating detection with sampling pipes routed through the under-floor plenum space

D. Conventional smoke detectors mounted upside-down on the underside of the raised floor panels

29. A fire alarm technician is installing a fire alarm system in a hospital. The fire safety plan calls for defend-in-place on patient care floors. The sequence of operations shows that a smoke detector alarm on Floor 4 activates notification on Floor 4 only. Floors 3 and 5 receive no notification. A reviewer asks whether the floors above and below should also be notified. What determines the correct notification scope?

A. The building's approved fire safety plan determines the notification scope — it may include adjacent floors or not

B. NFPA 72 always requires notification on the alarm floor plus one above and one below

C. Only the alarm floor receives notification in all defend-in-place hospital configurations

D. The fire department determines the notification scope during each individual alarm event

30. A fire alarm technician is installing a fire alarm system in a building with three sprinkler risers. Each riser has a waterflow switch and a tamper switch. The design groups all three waterflow switches on one alarm zone and all three tamper switches on one supervisory zone. A fire captain reviewing the plans requests individual zones for each waterflow switch. What is the advantage of individual waterflow zones?

A. Individual zones reduce the panel's signal processing time for faster alarm response

B. Individual zones allow the panel to activate zone-specific notification for the affected riser area

C. Individual waterflow zones are required by NFPA 72 for all buildings with multiple risers

D. Individual zones identify which specific riser has water flow, directing responders to the correct area

31. A fire alarm technician is installing a fire alarm system in a performing arts center. The main theater has a fly gallery with combustibles curtains and rigging at 80 feet above the stage floor. The design specifies aspirating smoke detection with sampling pipes at four elevations: 20, 40, 60, and 80 feet. What determines the spacing of these sampling elevations?

A. NFPA 72 specifies fixed 20-foot intervals for all aspirating system installations in atriums

- B. The building's thermal stratification analysis identifies where smoke layers are likely to form at different fire sizes
- C. The aspirating system manufacturer determines spacing based on maximum sampling pipe length
- D. Equal spacing from floor to ceiling is always used regardless of the building's thermal characteristics

32. A fire alarm technician is installing a fire alarm system in a building with an emergency generator. Per NEC Article 700, the automatic transfer switch must transfer the fire alarm panel from normal to generator power within a specific time. What is this maximum transfer time?

- A. 30 seconds for all emergency loads except fire alarm which has a 60-second allowance
- B. 60 seconds as a universal standard for all NEC Article 700 emergency systems
- C. 10 seconds per NEC Article 700 for all emergency system loads including fire alarm
- D. 120 seconds because fire alarm panels have battery backup bridging the transition

33. A fire alarm technician is installing a fire alarm system in a building where the architect specifies white smoke detectors and white horn/strobes to match the ceiling. Per NFPA 72, which device type has a mandatory color requirement?

- A. Manual fire alarm stations must be red per NFPA 72 — other devices have no color mandate
- B. All fire alarm devices must be red for universal identification per NFPA 72 Section 18.3
- C. Horn/strobe devices must be red while detectors may be any manufacturer-standard color
- D. Only devices in corridors must be red — devices in rooms may match the room décor

34. A fire alarm technician is installing a fire alarm system with a pre-action sprinkler system using single-interlock configuration. The fire alarm releasing circuit controls the pre-action valve solenoid. Per NFPA 72 Section 23.11, the releasing circuit must be supervised. If the supervised releasing circuit develops an open fault during normal operation, what must the panel do?

- A. Immediately open the pre-action valve as a precautionary safety measure
- B. Transmit an alarm signal to the supervising station indicating a critical system failure

- C. Disable all detection in the pre-action zone to prevent an unmonitored release event
- D. Generate a trouble signal indicating the releasing circuit integrity is compromised

35. A fire alarm technician is installing a fire alarm system with a releasing circuit for a clean agent system in an occupied data center. The system includes cross-zone detection, a 20-second pre-discharge countdown, and an abort switch. Per NFPA 72, who determines whether the 20-second countdown provides adequate evacuation time?

- A. The countdown adequacy depends on a code minimum of 30 seconds for all clean agent systems
- B. The room size, exit locations, travel distance, and expected occupant count determine adequacy
- C. The clean agent manufacturer specifies the countdown based on agent discharge characteristics
- D. The AHJ alone determines the countdown duration based on their fire response time

36. A fire alarm technician is installing a fire alarm system in a building that requires smoke control. The sequence of operations requires stairwell pressurization and floor-level smoke exhaust upon smoke alarm. During commissioning, the technician activates a smoke detector on Floor 10. Stairwells pressurize but Floor 10 exhaust does not activate. The control module relay for the exhaust shows activation (audible click). What should be investigated?

- A. The smoke detector because it may not generate the correct signal for exhaust activation
- B. The panel programming because the exhaust output may not be linked to the Floor 10 zone
- C. The wiring between the control module relay and the Floor 10 exhaust fan controller
- D. The stairwell fans because they may be consuming excessive power preventing exhaust startup

37. A fire alarm technician is installing a fire alarm system in a nursing home. The facility uses defend-in-place on resident floors. When a smoke detector activates on a resident floor, what is the typical initial notification response?

- A. Notification activates on the alarm floor only — staff manage resident relocation within the building
- B. Full building notification activates because nursing home residents require maximum warning

- C. Only the nursing station receives an electronic alert with no building notification for 5 minutes
- D. Notification activates on all floors simultaneously but at reduced volume to prevent panic

38. A fire alarm technician is installing a fire alarm system with a DACT and a cellular communicator providing dual paths. The building owner asks whether the DACT can be eliminated since the cellular communicator provides faster and more reliable communication. Per NFPA 72, what determines the required number of communication paths?

- A. One communication path is always sufficient if it meets the technology requirements for the station type
- B. The number of paths is determined by the building code and the type of supervising station service
- C. Two paths are always required regardless of building type, size, or supervising station category
- D. The communication technology type and the supervising station contract determine the path requirements

39. A fire alarm technician is installing a fire alarm system in a museum. The main gallery has a 60-foot ceiling with a glass skylight. The design calls for aspirating smoke detection with sampling pipes at three elevations. Standard spot detectors are also installed at the ceiling level as backup. What unique advantage does the aspirating system provide in this application?

- A. Aspirating systems detect extremely low smoke concentrations that spot detectors cannot sense
- B. Aspirating detection can detect smoke at multiple heights simultaneously through stratification layers
- C. The aspirating sampling unit can be located outside the gallery for easier maintenance access
- D. All three advantages — very early detection, multi-height sampling, and remote unit placement — apply

40. A fire alarm technician is installing a fire alarm system in a building where the sequence of operations specifies that a kitchen hood suppression system activation triggers full building alarm notification, supervising station signal, and HVAC shutdown. The kitchen suppression releasing panel has normally open alarm contacts. The technician connects these contacts to a monitor module on the fire alarm panel's SLC. During commissioning, the technician simulates a suppression activation by closing the contacts. The panel generates an alarm. What responses should the panel initiate per the sequence?

- A. Only supervising station signal because kitchen suppression activations are supervisory events
- B. Only local kitchen notification because the suppression system has already addressed the fire
- C. Building notification, station signal, and HVAC shutdown per the approved sequence of operations
- D. No additional response because the suppression system operates independently from fire alarm

DOMAIN 2.2 — MAINTENANCE AND INSPECTION (Questions 41–78)

41. A fire alarm technician is performing annual testing on a releasing fire alarm system. The agent solenoid has been disconnected and a substitute load installed. The technician tests cross-zone logic, the 25-second pre-discharge countdown, and the abort switch. All function correctly. What additional test must be performed on the releasing circuit?

- A. The releasing circuit supervision must be verified by opening the circuit and confirming the panel generates a trouble signal
- B. The agent solenoid must be reconnected and activated to verify physical discharge capability
- C. The substitute load must be replaced with a calibrated test instrument to measure release voltage
- D. The cross-zone logic must be tested a second time with the zones activated in reverse order

42. A fire alarm technician tests emergency control functions in a 15-story building. A smoke detector on Floor 7 activates. Horn/strobes activate on Floors 6, 7, and 8. Elevators recall. HVAC shuts down. The supervising station receives the alarm. However, magnetically held fire doors on Floor 7 do not release while doors on Floors 6 and 8 release correctly. What should be investigated?

- A. The smoke detector because it may generate a signal type that does not trigger Floor 7 doors
- B. The panel programming because Floor 7 door release may not be linked to the Floor 7 zone
- C. The NAC circuit because Floor 7 doors may be powered from a different circuit than Floors 6 and 8
- D. The control module outputs, wiring, and power supply specific to the Floor 7 door holders

43. A fire alarm technician tests the positive alarm sequence (PAS) feature. The technician activates a smoke detector. The 180-second investigation period begins. At 120 seconds, a second detector in a different zone activates. Per NFPA 72, what must happen?

- A. The investigation period extends by 180 seconds for the second zone activation
- B. PAS must immediately cancel and general alarm notification must activate
- C. The investigation period restarts using the second activation as the new reference
- D. The second activation has no effect because the investigation is already in progress

44. A fire alarm technician is performing sensitivity testing on a 6-year-old analog addressable system with 350 detectors. The panel report shows 10 detectors between 3.9% and 4.8% obscuration/ft (above the 3.7% max) and 6 detectors between 0.1% and 0.4% (below the 0.5% min). How many detectors require corrective action?

- A. Only the 10 high-reading detectors because low readings indicate better detection capability
- B. Only the 6 low-reading detectors because they pose the greatest operational risk
- C. All 16 out-of-range detectors — both high and low readings require investigation and correction
- D. All 350 detectors must be cleaned because 16 out-of-range units indicates building-wide contamination

45. A fire alarm technician tests a fire alarm system's elevator recall. Three elevators serve the building. The technician activates the lobby detector. All three elevators recall. Elevator 1 arrives and opens doors. Elevator 2 arrives and opens doors. Elevator 3 arrives at the recall floor but the doors do not open. What should be documented?

- A. All three elevators passed because they all traveled to the designated recall floor
- B. Only Elevators 1 and 2 passed — the fire alarm interface failed for Elevator 3's door operation
- C. The fire alarm interface passed — all recall signals were sent — and the door issue is an elevator deficiency
- D. The fire alarm interface passed for all three elevators but the Elevator 3 door failure is a separate deficiency to document

46. A fire alarm technician tests the AC power supervision. AC power is disconnected. The panel transfers to battery. After 3.5 hours, no AC power trouble signal has appeared. Per NFPA 72 Section 10.6.9, what is the maximum permitted delay?

- A. 3 hours — the 3.5-hour delay exceeds the maximum and must be investigated
- B. 6 hours — the 3.5-hour delay is within the extended allowance for modern panels
- C. 24 hours — matching the battery standby duration for consistency
- D. No delay — the trouble must appear immediately upon primary power loss

47. A fire alarm technician discovers during inspection that a smoke detector in a hospital corridor has been covered with a nitrile glove by nursing staff during an adjacent renovation. The glove has been in place for eight weeks. What must be documented?

- A. Nitrile gloves are thin enough to permit smoke entry and the detector remains functional
- B. The covering is an acceptable temporary measure during active renovation work
- C. The detector has been disabled for eight weeks leaving the corridor unprotected — a significant impairment
- D. The glove should remain until the renovation is complete to prevent nuisance alarms

48. A fire alarm technician tests communication paths. The system has primary IP and secondary cellular. IP test — successful. The technician disconnects IP and tests cellular. After 200 seconds, the panel generates "IP COMMUNICATION FAILURE." The cellular test signal then transmits successfully. What has been verified?

- A. Only the IP path functions correctly — the cellular test was conducted under abnormal conditions
- B. Both paths function and the panel's 200-second IP supervision timing meets the NFPA 72 requirement
- C. The cellular path has an unacceptable 200-second delay before it can transmit
- D. The IP supervision timing should be 60 seconds and the 200-second result indicates a fault

49. A fire alarm technician tests a double-interlock pre-action sprinkler system. The technician activates a smoke detector. The panel processes the alarm. The pre-action valve does not open. Is this correct?

- A. No, the valve should open on detection to fill the piping in anticipation of sprinkler activation
- B. No, the detection signal should energize the pilot solenoid for faster valve response
- C. Yes, but only because the system was placed in test mode before the detector activation
- D. Yes, double-interlock requires both detection AND air pressure drop before the valve opens

50. A fire alarm technician discovers during inspection that the building's Record of Completion was last updated seven years ago. Since then, four renovations added 80 devices, removed 25 devices, added a second SLC loop, and modified the sequence of operations three times. What is the documentation status?

- A. The Record of Completion is severely out of date and must be updated to reflect the current system
- B. The annual testing records adequately document all modifications making the update optional
- C. The original Record remains valid because it establishes the initial compliance baseline
- D. A new Record is required only if the panel itself was replaced during the renovations

51. A fire alarm technician tests notification appliances. A wall-mounted speaker produces clear audio but at noticeably reduced volume compared to identical speakers on the same 70.7V circuit. Circuit voltage and impedance are normal. What is the most likely cause?

- A. The room acoustics absorb sound creating an apparent volume reduction
- B. The amplifier has a partial fault affecting only this specific speaker's output channel
- C. The speaker's internal wattage tap is set to a lower power setting than the other speakers
- D. The speaker wire to this device has a high-resistance splice reducing delivered power

52. A fire alarm technician tests a waterflow switch by opening the inspector's test valve on a wet-pipe system. Water flows continuously. After 100 seconds, no alarm appears at the panel. What should be documented?

- A. The test is still within limits — the technician should wait an additional 60 seconds
- B. The waterflow switch has failed — the alarm must appear within 90 seconds of sustained flow
- C. The retard delay setting must be checked and potentially adjusted before retesting
- D. The inspector's test connection may be located downstream of the waterflow switch

53. A fire alarm technician discovers during inspection that two corridor pull stations in an elementary school have been painted to match the hallway walls. The paint covers the housing, handle, and instruction labels. Both devices are now light blue. What must be documented?

- A. The pull stations function correctly if they activate during testing — the paint is cosmetic only
- B. Only the instruction labels need to be restored — the housing color is a design preference
- C. The school should repaint the devices red within 30 days to restore code compliance
- D. The painted pull stations must be replaced because paint obscures the required red color and labels

54. A fire alarm technician performs a battery load test. Starting voltage is 26.8 VDC. After the test duration under full alarm load, ending voltage is 24.8 VDC. The manufacturer's minimum end-voltage is 20.4 VDC. Do the batteries pass?

- A. Yes, 24.8 VDC is well above the 20.4 VDC minimum with a 4.4-volt margin
- B. No, the 2.0-volt drop indicates insufficient capacity for sustained alarm operation
- C. Yes, but the batteries should be preventively replaced within 6 months due to the drop rate
- D. No, batteries must maintain their starting voltage throughout the entire test duration

55. A fire alarm technician tests visible notification in a hospital corridor. Two strobes are visible from the same location — one on each end of an 80-foot corridor. During testing, both flash but approximately 0.5 seconds apart. The devices are on different NAC circuits. What code requirement is violated?

- A. The flash rate requirement because 0.5-second offset creates a rate exceeding 2 flashes per second
- B. The candela requirement because unsynchronized strobes reduce effective coverage
- C. The synchronization requirement — all visible appliances in the same field of view must flash together
- D. The mounting height requirement because improperly mounted strobes cannot synchronize

56. A fire alarm technician tests the HVAC shutdown interface. A duct detector activates, the panel processes the alarm, the control module relay closes, but the AHU does not shut down. What should be investigated?

- A. The duct detector because it may generate an incorrect signal type
- B. The wiring between the control module relay contacts and the AHU shutdown input
- C. The panel programming because the output may not be linked to the duct detector zone
- D. The SLC communication because the module may not have received the activation command

57. A fire alarm technician tests a tamper switch on an OS&Y valve. After two full revolutions from fully open, the supervisory signal appears. Per NFPA 72, does this pass?

- A. Yes, activation within two revolutions meets the NFPA 72 requirement
- B. No, the switch must activate after only one revolution for OS&Y valves specifically
- C. Yes, but only for OS&Y valves — butterfly valves have stricter requirements
- D. No, the standard requires activation within one and a half revolutions maximum

58. A fire alarm technician tests the voice evacuation system's live microphone from the fire command center. Audio is heard on Floors 1-10 but not on Floors 11-20. The pre-recorded message plays correctly on all 20 floors. What is the most likely cause?

- A. The amplifiers serving Floors 11-20 have a fault that blocks live audio but passes recorded
- B. The fire command center microphone has insufficient output for the upper floor speaker load
- C. The speaker circuits on Floors 11-20 have frequency response limitations affecting live audio
- D. The live microphone routing is programmed to broadcast only to Floors 1-10 rather than all floors

59. A fire alarm technician discovers during annual testing that the fire alarm panel's event log reached capacity five months ago and has been overwriting the oldest entries. Building management was unaware. What should be documented?

- A. The log capacity is adequate because five months of history provides sufficient data
- B. Five months of historical data has been permanently lost — the log must be downloaded and cleared
- C. The panel must be replaced with a model having larger event log storage capacity
- D. The full log has no operational impact because the panel functions independently

60. Per NFPA 72 Table 14.4.3.2, what is the required functional testing frequency for smoke detectors?

- A. Annually as part of the comprehensive system functional test and inspection
- B. Quarterly to coincide with the building's standard maintenance schedule
- C. Semiannually using approved aerosol smoke or a calibrated test source
- D. Monthly to ensure continuous reliable detection throughout the premises

61. A fire alarm technician discovers that a building renovation removed a corridor wall, combining two separate fire alarm zones into one open space. Detectors from both zones remain in place and function correctly. What should be recommended?

- A. The zone configuration should be evaluated against the current floor plan and adjusted if needed
- B. Both zones must be immediately combined into a single zone at the panel
- C. Only the as-built drawings need updating — the zone configuration can remain unchanged
- D. The zones should remain separate because they were designed as distinct zones originally

62. A fire alarm technician performs annual sensitivity testing. Three detectors read 4.0%, 4.3%, and 4.5% (above the 3.7% max). Two detectors read 0.3% and 0.4% (below the 0.5% min). How many require corrective action?

- A. Only the three high-reading detectors because the two low readings indicate better sensitivity
- B. Only the two low-reading detectors because they may fail to detect smoke at threshold levels
- C. All 5 out-of-range detectors require investigation — readings both above and below limits need action
- D. All five detectors must be replaced — cleaning cannot restore detectors this far out of range

63. A fire alarm technician discovers that a tenant has mounted a large decorative panel directly over a corridor horn/strobe, completely blocking both the horn and strobe. What must be documented?

- A. The horn output travels around obstacles and only the strobe obstruction matters
- B. The decorative panel obstructs both audible and visible output and must be removed
- C. The device is functional if it activates during testing regardless of the obstruction
- D. Building management can apply for an AHJ variance to keep the decorative installation

64. A fire alarm system has primary IP and secondary cellular communication. "IP COMMUNICATION FAILURE" has been active for 45 days. Cellular functions normally. What should be documented?

- A. The cellular backup provides full monitoring so the IP failure is not operationally significant
- B. The IP failure should be repaired at the owner's convenience during the next quarterly visit
- C. The system has lost communication redundancy for 45 days — a significant impairment requiring correction
- D. No documentation is needed because the system continues to operate with cellular monitoring

65. A fire alarm technician tests a horn/strobe. The temporal-three pattern sounds correctly. The strobe flashes at approximately 0.8 flashes per second. Per NFPA 72, what should be documented?

- A. The strobe fails because NFPA 72 requires 1 to 2 flashes per second and 0.8 is below minimum
- B. The strobe passes because any flash rate below 2 per second is within acceptable limits
- C. The flash rate is irrelevant as long as the candela output meets room requirements
- D. The strobe rate is acceptable for healthcare but fails for commercial occupancies

66. A fire alarm technician tests a fire alarm panel's response to a tamper switch activation. The panel generates an alarm signal instead of a supervisory signal. The switch contact closure is confirmed at the panel terminals. What is the most likely cause?

- A. The tamper switch requires a different EOLR value than alarm circuits on the panel
- B. The panel cannot distinguish alarm from supervisory on the same zone input type
- C. The tamper switch wiring polarity is reversed causing misclassification at the panel
- D. The tamper switch input is programmed as an alarm zone rather than supervisory

67. A fire alarm technician discovers during inspection that the fire alarm panel room is used for storing paint, chemicals, and boxes. Working clearance in front of the panel is 18 inches. What code requirements are being violated?

- A. Only the chemical storage is a concern — other items and the clearance are acceptable
- B. Both the storage and inadequate clearance violate NEC Article 110 working space requirements
- C. The room may be used for storage if chemicals are in sealed containers per OSHA
- D. Only the 18-inch clearance violates code — storage in electrical rooms is permitted if neat

68. A fire alarm technician performs a battery load test. Starting voltage is 27.0 VDC. After the test duration under full alarm load, ending voltage is 19.2 VDC. The manufacturer's minimum end-voltage is 20.4 VDC. What must be documented?

- A. The batteries passed because 19.2 VDC exceeds the industry-wide minimum of 18 VDC
- B. The test is inconclusive and must be repeated after the batteries are fully recharged
- C. The batteries can remain in service for 30 days while replacements are scheduled
- D. The batteries failed — 19.2 VDC is below the manufacturer's 20.4 VDC minimum

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

- A. The detector has been removed from its approved ceiling location and is non-functional for detection at desk height
- B. The detector at desk height may detect smoke faster because smoke eventually fills the entire room
- C. The relocation is acceptable if building staff provide written justification for the change
- D. The detector should be raised to at least 60 inches for improved coverage at the desk level

70. A fire alarm technician is testing a releasing fire alarm system. After verifying cross-zone logic, countdown, abort switch, and releasing circuit supervision with a substitute load, what additional test remains?

- A. The releasing solenoid must be reconnected to verify physical discharge
- B. The cross-zone test must be repeated with zones activated in reverse sequence
- C. The pre-discharge audible and visual warning appliances must be verified for adequate output
- D. The panel's supervising station communication during a release event must be tested

71. Per NFPA 72 Table 14.4.3.2, what is the minimum testing frequency for supervisory devices such as tamper switches?

- A. Monthly to ensure sprinkler valve positions remain correct
- B. Annually as part of the comprehensive system functional test
- C. Semiannually to match the smoke detector testing schedule
- D. Quarterly to coincide with the building's maintenance program

72. A fire alarm technician discovers during inspection that a building's fire command center graphic annunciator has four burned-out LED indicators for Zones 3, 7, 12, and 18. All other LEDs function. What must be documented?

- A. The burned-out LEDs are cosmetic and do not affect fire alarm system operation
- B. Only Zone 3 needs repair because it covers the main lobby where firefighters enter
- C. The annunciator must be replaced entirely because individual LED repair is not feasible
- D. The burned-out LEDs prevent firefighters from identifying alarms in those zones and must be repaired

73. A fire alarm technician discovers during testing that a building renovation enclosed a corridor smoke detector behind a new wall. The detector continues communicating with the panel. What must be documented?

- A. The detector must be relocated to the occupied corridor and the concealed space evaluated for detection needs
- B. The detector can remain because it continues to communicate normally with the panel
- C. The panel programming should be updated to reflect the detector's new concealed location
- D. The concealed detector covers both the corridor and the space behind the wall

74. Per NFPA 72 Table 14.4.3.2, releasing device circuits must be functionally tested at what frequency?

- A. Semiannually because releasing circuits are critical life safety components
- B. Monthly to ensure the suppression system is always ready to respond
- C. Annually as part of the comprehensive releasing system functional test
- D. Only during initial acceptance testing with no periodic retesting required

75. A fire alarm technician tests the stairwell pressurization interface. When a detector activates, pressurization fans start. On Floor 5, the stairwell door requires significantly more force to open. On Floor 15, the door opens normally with no resistance. What should be documented?

- A. Fan activation alone confirms the interface test passed — door resistance is the mechanical engineer's concern
- B. Both observations should be documented because inconsistent pressurization suggests a duct or damper issue
- C. Some floor-to-floor variation in door resistance is expected and both floors pass
- D. Only the Floor 5 observation needs documentation because it confirms positive pressure

76. A fire alarm technician tests a fire alarm system's access control interface. When the alarm activates, magnetically locked egress doors must unlock. The technician activates a detector: 16 of 18 locks release, but 2 remain locked. What must be investigated?

- A. The fire alarm panel programming because the two locks may not be included in the response
- B. The access control system firmware which may need updating for fire alarm compatibility
- C. The NAC circuits because the locks may be inadvertently wired to the notification circuit
- D. The control module outputs, wiring, and power supply to the two non-releasing locks

77. A fire alarm technician discovers during annual testing that the panel clock shows 1:30 PM when actual time is 3:15 PM — a 105-minute discrepancy. What must be documented?

- A. The 105-minute discrepancy compromises event log accuracy and the clock must be corrected
- B. Time discrepancies under 2 hours are within acceptable tolerance for fire alarm panels
- C. The clock error affects only the display and has no impact on system operation
- D. The panel's internal clock module must be physically replaced because software cannot correct it

78. A fire alarm technician tests the fire alarm system's communication link using a DACT with two telephone lines. Line 1 test — successful. The technician disconnects Line 1 and tests Line 2. The station does not receive the Line 2 signal. What must be documented?

- A. Both lines passed because the DACT only requires one functional line for compliance
- B. Line 2 cannot be tested independently — the DACT must select lines automatically
- C. Line 2's failure was caused by disconnecting Line 1 and the test method was incorrect
- D. Line 2 failed and must be investigated and repaired to restore dual-path redundancy

DOMAIN 2.3 — SUBMITTAL PREPARATION AND SYSTEM LAYOUT (Questions 79–100)

79. A fire alarm voltage drop calculation shows a NAC using 14 AWG copper ($3.14 \Omega/1000 \text{ ft}$), round-trip distance 800 feet, alarm current 2.4 amps. What is the end-of-circuit voltage on a 24 VDC system?

- A. 21.97 VDC providing generous margin above the 16 VDC minimum
- B. 17.97 VDC providing minimal margin above 16 VDC but technically compliant
- C. 15.97 VDC falling below the 16 VDC minimum requiring redesign
- D. 17.97 VDC — while compliant, the margin is thin and 12 AWG should be considered

80. A fire alarm battery calculation: panel/SLC standby = 0.88A, voice amplifier standby = 1.12A, NAC alarm = 3.6A, voice alarm = 7.8A. Building has a qualifying generator. Using 4-hour standby, 15-minute alarm, 20% safety factor. What is the minimum battery capacity?

- A. 24.00 Ah using 24-hour standby because voice systems are exempt from generator reduction
- B. 12.53 Ah after applying 4-hour standby, 15-minute alarm, and 20% safety factor
- C. 10.44 Ah using the correct durations but without applying the 20% safety factor
- D. 15.84 Ah using 4-hour standby with 5-minute standard alarm instead of 15 minutes

81. A fire alarm sequence of operations matrix shows a duct detector triggering HVAC shutdown only — no building notification, no elevator recall, no station signal. A reviewer flags the missing station transmission. What is the correct assessment?

- A. The duct detector signal should transmit to the supervising station even without building notification
- B. Duct detectors never transmit to the station because they are supervisory-class devices only
- C. The reviewer is incorrect — duct signals transmit automatically regardless of the matrix
- D. Station transmission is required only when the duct detector is programmed as an alarm input

82. A fire alarm conduit schedule shows 1-inch EMT containing ten 14 AWG THHN and eight 18 AWG THHN (18 total). NEC Annex C max for 14 AWG alone is 22 and for 18 AWG alone is 40. Since mixed sizes are present, how must fill be verified?

- A. Compare each size individually — since both are below their maximums, the installation passes
- B. Add the counts ($10+8=18$) and compare to the smaller Annex C maximum of 22
- C. Calculate total conductor area from Chapter 9 Table 5 and compare to the 40% fill limit
- D. Use the Annex C table for 14 AWG only since the larger conductor controls the fill

83. A fire alarm floor plan shows a 220-foot straight corridor with smoke detectors at 30-foot spacing. First detector at 10 feet from one end, then every 30 feet: 10, 40, 70, 100, 130, 160, 190, 220. That is 8 detectors with the last at the far end. Is this correct?

- A. No, the first detector must be within 15 feet of the end and the last must also be within 15 feet
- B. No, 9 detectors are required because the 30-foot spacing leaves gaps at the corridor transitions
- C. Yes, but the first detector at 10 feet leaves only a 10-foot end distance which wastes a detector
- D. Yes, 8 detectors with the first at 10 feet and last at the 220-foot end provide complete coverage

84. A fire alarm device schedule lists 194 devices on SLC 1 (max capacity 198). A renovation adds 12 new devices. How should the technician advise the project team?

- A. Add 4 devices to SLC 1 to reach 198 and place the remaining 8 on a new SLC loop
- B. All 12 new devices should go on a new SLC to preserve remaining capacity on SLC 1 for future flexibility
- C. Request a firmware update to extend SLC 1's capacity from 198 to 210 devices
- D. All 12 can be added to SLC 1 because 206 is within the manufacturer's extended tolerance

85. A fire alarm riser diagram shows remote NAC power supplies on Floors 6, 12, and 18 of a 24-story building. Each remote panel has its own batteries. What must be calculated separately for each?

- A. A separate battery calculation based on each remote panel's specific standby and alarm loads
- B. A combined battery calculation averaging loads across all three remote panels
- C. Only a voltage drop calculation from the main panel to each remote location
- D. A conduit fill calculation for the supervised communication circuit to each remote panel

86. A fire alarm specification requires the Record of Completion per NFPA 72. What must this document contain?

- A. Only the installer's license number and a signature certifying code-compliant installation
- B. Only the AHJ's inspection report and acceptance test pass/fail determination
- C. System specifications, circuit details, device counts, power supply data, and required signatures
- D. The original design calculations, submittal review correspondence, and the building permit

87. A fire alarm floor plan shows a 90-degree L-shaped corridor — 180 feet on the longer leg and 120 feet on the shorter leg. Detectors are at 30-foot spacing with a detector at the corner. Is the corner detector necessary?

- A. No, detectors along each leg provide coverage through the 90-degree direction change
- B. No, corner detectors create redundant coverage that wastes the project budget
- C. Yes, but only if the corridor width exceeds 10 feet at the corner intersection
- D. Yes, the corner detector ensures detection at the direction change where leg coverage may be limited

88. A fire alarm technician reviews a specification requiring all cable above suspended ceilings to be in conduit. The spaces are non-plenum. NEC does not require conduit for listed fire alarm cable in non-plenum spaces. What should the technician do?

- A. Ignore the specification because it exceeds minimum code requirements
- B. Install conduit as specified because the project specification is a contractual obligation
- C. Install conduit only in corridors and omit it in individual room ceiling spaces
- D. Request the AHJ to override the specification to reduce installation costs

89. A fire alarm voltage drop calculation for a 70.7V speaker circuit shows 59.8 VAC at the farthest speaker. The speaker minimum input is 55 VAC. Does the circuit pass?

- A. No, 70.7V systems must maintain 90% (63.6 VAC) at all speaker locations
- B. No, the speakers require exactly 70.7 VAC for proper impedance matching
- C. Yes, 59.8 VAC exceeds the 55 VAC minimum with a 4.8-volt margin
- D. Yes, but only if the amplifier output can be increased to compensate for line loss

90. A fire alarm as-built drawing shows 155 devices on SLC 1. Panel programming shows 163. The Record of Completion shows 150. What must be corrected?

- A. All three documents must be reconciled against a physical field count to show the same accurate number
- B. Only the Record of Completion needs updating because it has the most outdated count
- C. The panel programming is the definitive reference and other documents should match it
- D. Only the as-built drawings need updating because they are the primary field document

91. A fire alarm shop drawing shows a releasing system with cross-zone detection and a 15-second pre-discharge timer. The reviewing engineer notes the timer may not provide adequate evacuation time. What determines the appropriate delay?

- A. NFPA 72 specifies a fixed 30-second minimum for all occupied clean agent spaces
- B. The agent manufacturer specifies the delay based on the discharge rate and room volume
- C. The fire department determines the delay based on their estimated response time
- D. The room size, exit count, travel distance, and expected occupant count determine the required time

92. A fire alarm shop drawing shows two SLC loops: SLC 1 (Class B, Floors 1-5) and SLC 2 (Class A, Floors 6-20). A reviewer asks why the loops use different classifications. What is a valid rationale?

- A. NFPA 72 requires Class A above Floor 5 in all buildings taller than 6 stories
- B. The designer's risk assessment determined upper floors benefit from Class A fault tolerance due to longer egress
- C. Class B circuits are prohibited above Floor 5 per NEC Article 760 for life safety systems
- D. Both loops must use identical circuit classifications for consistent panel performance

93. A fire alarm shop drawing shows a NAC with 12 horn/strobes at 0.310A each, 6 speakers at 0.150A each, and 4 strobes at 0.185A each on a 3.0-amp NAC output. What is the total load?

- A. 3.72 amps from only the horn/strobes at their rated alarm current
- B. 5.36 amps based on doubling the total for inrush current estimation
- C. 4.86 amps total from all devices which exceeds the 3.0-amp output rating
- D. 3.54 amps which is the minimum possible load configuration for these devices

94. A fire alarm specification requires acceptance testing per NFPA 72 before the certificate of occupancy. The spec requires 7 business days' advance notice to the AHJ. The general contractor requests testing in 3 days. How should the fire alarm contractor respond?

- A. Maintain the 7-day notice requirement and schedule the test with proper AHJ notification
- B. Conduct testing in 3 days and submit results to the AHJ for retroactive approval
- C. Contact the AHJ to request an expedited waiver of the notification requirement
- D. Perform a preliminary test in 3 days and schedule the formal AHJ test with proper notice

95. A fire alarm floor plan shows a conference room measuring 40×30 feet with a 10-foot ceiling. One wall-mounted strobe at 30 cd is shown on the 40-foot wall. Per NFPA 72 Table 18.5.5.5.1(a), a 30 cd strobe covers rooms up to 28×28 feet. Both dimensions of this room exceed 28 feet. Is this arrangement adequate?

- A. No, the room requires a strobe rated for at least the next table increment matching both dimensions
- B. Yes, the 30 cd strobe covers rooms up to 40×40 feet per the extended coverage column
- C. No, but adding a second 15 cd strobe on the opposite wall solves the coverage deficit
- D. Yes, because the 30-foot dimension is close enough to the 28-foot maximum for practical compliance

96. A fire alarm technician reviews as-built drawings showing 168 devices on SLC 1. A physical count reveals 175 devices. Panel programming confirms 175. What documentation action is required?

- A. The 7-device discrepancy is within acceptable tolerance — no update needed
- B. The as-built drawings must be updated to accurately reflect the 175 devices installed
- C. Only the panel programming needs adjustment to match the 168-device drawing count
- D. Both the drawings and Record of Completion must be updated to reflect 175 devices

97. A fire alarm battery calculation: standby = $0.58\text{A} \times 24\text{hr} = 13.92\text{ Ah}$, alarm = $4.8\text{A} \times 0.083\text{hr} = 0.398\text{ Ah}$, subtotal = 14.318 Ah , $\times 1.20 = 17.18\text{ Ah}$. The drawing specifies 18 Ah batteries. Is this adequate?

- A. Yes, 18 Ah exceeds the calculated minimum of 17.18 Ah with approximately 0.82 Ah margin
- B. No, 18 Ah is too close to the minimum and the next standard size of 26 Ah should be used
- C. Yes, but only if the building has a qualifying emergency generator reducing the standby
- D. No, the 20% safety factor must be applied to each component separately, not the subtotal

98. A fire alarm sequence of operations for a hospital shows smoke detector alarms on patient floors trigger alarm-floor-only notification while pull station alarms trigger all-building notification. Both trigger elevator recall and station signal. Is this valid for a defend-in-place hospital?

- A. No, all alarm types must produce identical building-wide notification responses
- B. No, smoke detectors must trigger broader notification than manually activated devices
- C. Yes, defend-in-place hospitals may have differentiated responses per the approved fire safety plan
- D. Yes, but only if the hospital's patient census is below 300 occupants per floor

99. A fire alarm as-built drawing captures the panel's dedicated branch circuit: 20A breaker, 12 AWG conductors, 160-foot run, labeled, lock-on device, no GFCI/AFCI. What additional detail should be documented?

- A. The voltage measurement at panel terminals for baseline comparison during future service
- B. The circuit breaker manufacturer and catalog number for replacement identification
- C. The electrician's name and license number for warranty and liability documentation
- D. The conduit type, size, and routing path from the electrical panel to the fire alarm panel

100. A fire alarm shop drawing shows a fire alarm system with remote NAC power supply panels on Floors 5, 10, and 15. Each panel has its own batteries and serves NAC circuits for its floor zone. What is the primary purpose of these remote panels?

- A. To serve as backup control panels in case the main first-floor panel fails during a fire
- B. To provide local NAC power reducing voltage drop and distributing current capacity across floors
- C. To amplify the SLC signal for addressable devices far from the main panel
- D. To convert the panel's 24 VDC output to 70.7 VAC for voice evacuation speakers

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a subcontractor pulled fire alarm cable using excessive tension on 15 cable runs totaling 2,200 feet. The cable manufacturer's maximum pulling tension may have been exceeded. What must the supervisor require before connecting any devices?

- A. Megger testing on all 15 cable runs to verify insulation integrity before any devices are connected
- B. Visual inspection of the cable jacket at each pull point is sufficient to identify pulling damage
- C. The cable can be connected immediately — any damage will be found during functional testing
- D. The subcontractor must provide written certification that proper pulling technique was followed

102. A fire alarm contractor is coordinating acceptance testing for a building with elevator recall, HVAC shutdown, stairwell pressurization, smoke control, and door holder release. Which trade contractors must participate?

- A. Only the fire alarm contractor attends because the test covers fire alarm equipment exclusively
- B. The general contractor solely coordinates and attends the test on behalf of all trades
- C. The elevator, HVAC, controls, and door hardware contractors must be present to verify their equipment
- D. Only the AHJ and fire alarm contractor need to attend — other trades submit results separately

103. A fire alarm project manager receives a change request to convert from horn/strobe to voice evacuation at 85% completion. The change requires amplifiers, speaker circuits, intelligibility analysis, and panel reconfiguration. What is the correct response?

- A. Install speakers on remaining areas and keep horn/strobes in completed areas as a hybrid system
- B. Reject the change because voice evacuation conversion at 85% is technically impossible
- C. Absorb the cost difference to maintain the client relationship and avoid a change order
- D. A formal change order documenting the engineering revision, cost, and schedule impact must be processed

104. A fire alarm contractor discovers the electrical contractor installed an AFCI/GFCI breaker on the fire alarm dedicated circuit. What is the correct course of action?

- A. Accept the breaker because AFCI/GFCI provides superior electrical protection for the panel
- B. Notify the general contractor to direct the electrical contractor to replace it with a standard breaker and lock-on device
- C. Replace the breaker directly since the fire alarm contractor has authority over fire alarm compliance
- D. Contact the building owner to authorize the additional cost of the breaker replacement

105. A fire alarm contractor receives 400 smoke detectors — 375 with one date code and 25 with a different date code. All are the same model listed for the panel. Should the contractor be concerned?

- A. No, date code variations are normal in large orders and do not affect compatibility or performance
- B. Yes, the 25 different units must be installed on a separate SLC loop from the 375
- C. Yes, all detectors on the same loop must have identical date codes for consistent firmware
- D. No, but the 25 units should be placed in non-critical areas as a precautionary measure

106. A fire alarm technician resolves a ground fault by tightening a loose wire nut in a junction box. The technician asks whether a written service report is needed for this minor repair. What is the correct guidance?

- A. Reports are needed only when devices are replaced or panel programming is changed
- B. An informal email to building management is adequate for minor repairs under 30 minutes
- C. Every service activity must be documented in a written report regardless of repair scope
- D. Reports are required only when the repair resolves an active alarm condition at the panel

107. A fire alarm project's field technicians created messy but accurate installation markup drawings during construction. The project is nearing closeout. What should the contractor do?

- A. Submit the messy field markups as-is because they accurately represent installed conditions
- B. Submit the original shop drawings since the installation followed the approved design
- C. Have technicians recreate as-built drawings from memory to produce clean documentation
- D. Create clean professional as-built drawings accurately incorporating all field markup information

108. Per NFPA 72, what minimum documentation must the fire alarm contractor deliver to the building owner at project closeout?

- A. Only the panel manufacturer's operating manual and warranty registration
- B. As-built drawings, Record of Completion, sequence of operations, and operating instructions
- C. Only the as-built drawings and the AHJ's acceptance test letter
- D. The original bid documents, submittal correspondence, and internal testing worksheets

109. A fire alarm contractor schedules acceptance testing for a hospital. Infection control requires 72-hour advance notice before aerosol testing in patient care areas. The general contractor requests testing in 48 hours. How should the contractor proceed?

- A. Provide the 72-hour notice and coordinate patient care testing per infection control requirements
- B. Proceed with all testing in 48 hours because fire code compliance overrides hospital protocols
- C. Test only non-patient areas within 48 hours and skip patient areas entirely
- D. Use alternative non-aerosol methods exclusively in patient care areas without advance notice

110. A fire alarm project supervisor is scheduling acceptance testing. The AHJ requires 10 business days' advance notice. The general contractor demands testing in 4 days. How should the supervisor respond?

- A. Conduct a preliminary test in 4 days and submit results to the AHJ for review
- B. Perform testing without the AHJ and provide video documentation for their records
- C. Request the AHJ waive the notice period due to the project's critical timeline
- D. Maintain the 10-day notice requirement and reschedule with proper AHJ notification

LEVEL II — SIMULATION EXAM 6: ANSWER KEY AND EXPLANATIONS

1. D — Two-hour circuit integrity cable maintains its fire rating based on the cable's own construction — not the surrounding environment. CI cable is tested and listed to maintain circuit integrity for 2 hours during direct fire exposure regardless of whether it is installed in conduit, cable tray, or open air. The unrated corridor ceiling space does not diminish the CI cable's 2-hour rating.
2. B — Intermittent communication drops during heavy storms in a system with underground conduit through a low-lying area strongly indicates rainwater infiltration into the conduit. Water entering through unsealed joints, damaged sections, or compromised handhole entries contacts the cable insulation and creates intermittent paths that disrupt the digital network signal between buildings.
3. C — Room A's cross-zone used identical photoelectric detectors in both zones — cooking smoke triggered both zones simultaneously because both technologies respond identically to the same nuisance source. Room B used different technologies (photoelectric and multi-criteria) — the multi-criteria detector's algorithm filtered the cooking smoke as a nuisance source, preventing the second zone from activating. Different technologies reduce simultaneous false alarm risk.
4. A — Standby = $(0.95 + 1.30) \times 4 = 9.0$ Ah. Alarm = $(4.5 + 9.0) \times 0.25 = 3.375$ Ah. Subtotal = 12.375 Ah. With 20% safety factor: $12.375 \times 1.20 = 14.85$ Ah, approximately 14.94 Ah with rounding. The generator reduces standby to 4 hours while voice evacuation requires 15-minute alarm duration.
5. D — The fire alarm panel's control module relay activated only for Bank C — confirming the panel programming and control module are correct. All four banks recalling despite only Bank C's relay activating indicates the elevator controllers share a common recall input wired in parallel. When one relay closes, all four controllers receive the recall signal simultaneously through the shared circuit.
6. B — The speakers are rated for a minimum input of 55 VAC. The measured 62.5 VAC at Floor 12 exceeds this minimum by 7.5 volts, ensuring the speakers operate within their listed parameters. The voltage drop from 70.7 VAC to 62.5 VAC represents normal line loss over the 580-foot circuit length.
7. A — NFPA 72 Section 23.8.1.3 requires that if the PAS acknowledgment is not received within the 180-second investigation period, the system must automatically activate general building alarm notification without further delay. This automatic escalation ensures occupants are notified even if staff fail to investigate the alarm condition.

8. C — When acoustically rated floor-to-ceiling partitions divide the ballroom into eight enclosed spaces, each space is isolated from the others. Sound and light from notification appliances in one enclosed space cannot reach occupants in adjacent spaces. Each possible enclosed configuration must have its own notification appliances providing independent coverage.
9. B — NFPA 72 Section 26.3.4 requires the central station to initiate the required response actions — including fire department notification — within 90 seconds of receiving an alarm signal. This 90-second window encompasses signal receipt, operator processing, account verification, and dispatch initiation.
10. D — A double-interlock pre-action system requires two independent conditions before the valve opens: fire alarm detection activation AND a drop in supervisory air pressure indicating a sprinkler head has opened. Neither condition alone is sufficient. The valve correctly remained closed because only the detection interlock was satisfied.
11. A — NFPA 72 Section 23.10 requires the fire command center to have a complete fire alarm control panel or a complete repeater panel with full status display and operator control capability. A simplified annunciator, telephone line, or laptop computer does not satisfy this requirement. Firefighters must have full system visibility and control at the FCC.
12. C — A full DACT-to-station handshake verifies the complete communication path — from the DACT seizing the telephone line, through the telephone network, to the supervising station's receiver acknowledging receipt. A simple dial tone check only confirms the line is active locally but does not verify the call can reach the station or that the station's equipment can process the signal.
13. B — In-rack detectors at intermediate heights identify fires where they originate — among stored materials on shelves and pallets — before smoke must travel the full 50 feet to ceiling-level beam detectors. Early detection at the storage level provides significantly faster alarm response, enabling quicker suppression activation and reducing potential fire damage.
14. D — When mass notification overrides fire alarm audible notification, the fire alarm signal must continue transmitting to the supervising station for fire department dispatch. The override affects only in-building audio — not external alarm communication. Fire department response must continue regardless of which system controls the building's speakers.
15. A — Simultaneous evacuation of all 20 floors into the stairwells creates dangerous congestion that slows evacuation for everyone and can cause crush injuries at stairwell entrances and exits. Defend-in-place notifies only the affected floors, allowing controlled evacuation while the remaining floors shelter safely in their fire-rated compartments.
16. C — NFPA 72 Section 23.11 requires releasing circuits to be supervised for integrity. When a supervised releasing circuit loses continuity, the panel generates a trouble signal indicating the

circuit cannot deliver the release signal. This alert ensures building management knows the suppression interface is impaired and can take corrective action.

17. B — ADA-accessible sleeping rooms require both a wall-mounted strobe meeting NFPA 72 room coverage requirements and a supplemental alerting device effective for waking sleeping hearing-impaired occupants. A bed-mounted strobe or bed shaker directly alerts a sleeping person who cannot hear audible alarms or see a wall strobe with eyes closed.
18. D — When the elevator machine room smoke detector activates, elevators must recall to an alternate floor rather than the primary designated floor. Smoke in the machine room may migrate through the hoistway to the primary recall floor, making it unsafe for passengers. The alternate floor provides a safe exit point away from the smoke path.
19. A — The crossover through the unrated corridor ceiling space must also have Level 2 protection. CI cable maintains its rating through the crossing, but the FPLP cable leaving its 2-hour rated shaft loses Level 2 protection in the unrated space. Either CI cable must be used for the crossing or the ceiling space must be enclosed in 2-hour construction.
20. C — Phase reversal monitoring at the fire alarm panel provides building-wide supervisory awareness of the fire pump's electrical service condition. While the pump controller may correct phase reversal locally, the fire alarm panel's supervisory signal ensures building management, the monitoring station, and responding personnel are informed of the condition for investigation and documentation.
21. B — The panel sends correct zone data, but the annunciator displays Zone 9's alarm on Zone 5's LED. The most likely cause is a cross-connection on the annunciator's internal LED driver board where the wiring for Zone 5 and Zone 9 LED positions are swapped. The annunciator's internal connections must be corrected.
22. D — In a 70.7V audio system, impedance-matching transformers at each speaker convert the high-voltage line signal to the low impedance the speaker driver requires. Without transformers, parallel speakers present very low impedance directly to the amplifier, causing excessive current draw, severe audio distortion, and potential amplifier overload or permanent damage.
23. B — The total SLC standby current from all devices is approximately 126 mA, which is within the panel's 150 mA maximum with approximately 24 mA remaining for future device additions. The technician should document the loading calculation and note the available margin for any planned system expansion.
24. C — The manufacturer's listed maximum spacing for beam detectors at the specific ceiling height determines the allowable lateral distance between beams. NFPA 72 requires compliance with the manufacturer's listing — not standard spot detector spacing or a fixed universal value. The listing is based on tested performance at various ceiling heights.

25. A — NFPA 72 Section 17.6.3.1.3 requires heat detectors to be rated at least 20°F above the maximum expected ceiling temperature. The loading dock maximum is 95°F, so the minimum activation temperature is 115°F (95 + 20 = 115). Any detector rated at or above 115°F satisfies the code minimum.
26. D — The firefighter telephone system must support multiple simultaneous two-way conversations per NFPA 72 Section 24.5. If three floor stations connect handsets but only two can communicate, the system fails to meet the concurrent conversation requirement. The system's capacity — amplifier power, bus architecture, or channel count — must be investigated and corrected.
27. B — NFPA 72 Section 26.6.3.2 requires IP communication technologies with continuous monitoring to detect path failure within 200 seconds. The panel generated the trouble after 180 seconds, which is within the 200-second maximum. The system meets the supervision timing requirement.
28. C — Aspirating smoke detection with sampling pipes routed through the 30-inch raised floor plenum provides effective monitoring without the maintenance challenges of accessing standard detectors in a shallow confined space. The aspirating unit's sampling pipes draw air from throughout the plenum to a remotely mounted detection chamber that is easily accessible for servicing.
29. A — The building's approved fire safety plan determines the specific notification scope for defend-in-place hospitals. Some plans notify only the alarm floor, while others include one or two adjacent floors. The notification strategy is a design decision documented in the fire safety plan and approved by the AHJ — not a universal code mandate.
30. D — Individual waterflow zones identify which specific riser has water flow, directing emergency responders to the correct area of the building. With a single zone for all three waterflow switches, responders cannot determine which riser activated and must investigate all three areas — wasting critical response time.
31. B — Smoke stratification in tall spaces depends on fire size, heat output, and the building's thermal profile. A thermal stratification analysis identifies the specific elevations where smoke layers are likely to form based on temperature differentials within the space. Sampling pipes are placed at these predicted heights for detection regardless of where stratification occurs.
32. C — NEC Article 700.12(B) requires emergency system transfer switches to transfer load from normal to generator power within 10 seconds of utility failure. This rapid transfer minimizes the fire alarm panel's battery-only operation during the transition and ensures all emergency loads receive generator power promptly.
33. A — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. This is the only fire alarm device type with a mandatory code-specified color requirement. Smoke detectors, heat detectors, horn/strobes, and speakers may be any color specified by the project or manufacturer.

34. D — When a supervised releasing circuit develops an open fault, the panel detects the loss of circuit continuity and generates a trouble signal. This alerts building management that the releasing circuit cannot deliver the release signal to the pre-action valve solenoid. Detection continues to function, but the ability to open the valve is impaired until the circuit is repaired.
35. B — The pre-discharge countdown must provide adequate time for all occupants to evacuate based on the room's specific characteristics: physical dimensions, number and location of exits, maximum travel distance to the nearest exit, and the expected occupant count. These factors — not a fixed code value — determine whether the countdown is sufficient.
36. C — The stairwell pressurization activated correctly and the control module relay clicked (confirming command receipt and execution). The Floor 10 exhaust fans did not start despite the relay closure. The fault is downstream — in the wiring between the control module relay contacts and the exhaust fan controller, or in the fan controller's response to the relay input.
37. A — Defend-in-place nursing homes activate notification only on the alarm floor. Trained staff manage resident relocation within the building — typically moving residents horizontally to a safe smoke compartment on the same floor. Full building notification would cause unnecessary alarm and potentially dangerous movement of mobility-impaired residents on unaffected floors.
38. B — The number of communication paths required depends on the building code requirements and the type of supervising station service contracted. NFPA 72 Chapter 26 establishes different requirements for different station types. The technology type and the monitoring contract terms determine whether single-path or dual-path communication is required.
39. B — Aspirating smoke detection systems can sample air at multiple heights simultaneously through sampling pipes at different elevations within the 60-foot atrium. This multi-height capability ensures detection regardless of where smoke stratifies — a critical advantage in tall spaces where smoke may not reach ceiling-level detectors.
40. C — When the kitchen suppression system activates, the fire alarm panel should execute the full approved sequence of operations: building notification, supervising station signal transmission, and HVAC shutdown. The suppression activation confirms a fire condition requiring coordinated building-wide response per the approved sequence.
41. A — After verifying cross-zone logic, countdown timing, and abort switch function, the releasing circuit supervision must be tested. Opening the releasing circuit and confirming the panel generates a trouble signal verifies the panel actively monitors the circuit's integrity and would detect a wiring failure that could prevent agent release.
42. D — Horn/strobes activated on Floors 6-8, elevators recalled, HVAC shut down, and the station received the alarm — all confirming the panel's outputs function correctly. Floor 7 doors not releasing while Floors 6 and 8 release correctly indicates a fault specific to the Floor 7 door holders.

The control module outputs, interface wiring, and power supply to the Floor 7 holders must be investigated.

43. B — NFPA 72 Section 23.8.1.3 requires that if a second automatic alarm from a different zone occurs during the PAS investigation period, PAS must immediately cancel and general alarm notification must activate. A second zone provides independent confirmation of a genuine alarm condition.
44. C — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 10 high-reading detectors require cleaning. The 6 low-reading detectors are abnormally sensitive and must be investigated. All 16 out-of-range detectors require corrective action.
45. D — The fire alarm system correctly sent recall signals and all three elevators traveled to the designated floor. The fire alarm interface performed correctly for all three. Elevator 3's door not opening is an elevator mechanical deficiency separate from the fire alarm system. Both the successful interface and the door deficiency should be documented.
46. A — NFPA 72 Section 10.6.9 permits a maximum delay of 3 hours before annunciating an AC power failure trouble signal. The 3.5-hour delay exceeds this maximum by 30 minutes. The panel's AC power loss detection timing must be corrected to ensure the trouble appears within the 3-hour window.
47. C — A smoke detector covered with a nitrile glove has been effectively disabled for eight weeks. The glove prevents smoke from entering the sensing chamber, leaving the corridor without detection coverage. This is a significant impairment that must be documented immediately with the covering removed and compensatory measures evaluated.
48. B — Three functions were verified: the IP path transmitted successfully, the panel detected IP failure within 200 seconds (meeting NFPA 72 supervision timing), and the cellular backup transmitted successfully when the primary path was unavailable. Both communication paths and the supervision timing function correctly.
49. D — A double-interlock pre-action system requires both fire detection AND a drop in supervisory air pressure before the valve opens. Neither condition alone is sufficient. The valve correctly remained closed because only the detection interlock was satisfied — the air pressure interlock was not triggered.
50. A — Four major renovations over seven years — adding 80 devices, removing 25, adding a second SLC, and modifying the sequence three times — have fundamentally changed the system. The Record of Completion must reflect the current configuration per NFPA 72 Section 7.8. A seven-year-old document describing a substantially different system is a severe documentation deficiency.

51. C — When circuit voltage and impedance are normal but one speaker produces reduced volume, the speaker's internal wattage tap setting is the most likely cause. In 70.7V audio systems, each speaker has selectable tap settings determining power consumption. A lower tap produces proportionally lower volume.
52. B — NFPA 72 requires waterflow alarm signals to be received at the panel within 90 seconds of sustained flow. After 100 seconds with no alarm, the waterflow switch has failed its functional test. The switch, retard delay, wiring, and panel connection must all be investigated.
53. D — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. Painting pull stations light blue violates this requirement. Additionally, painting over instruction labels renders the devices unusable by occupants who cannot read operating instructions. The painted stations must be replaced.
54. A — The batteries ended the load test at 24.8 VDC — well above the manufacturer's 20.4 VDC minimum end-voltage. The 4.4-volt margin demonstrates adequate capacity to sustain the full alarm load for the required duration. The batteries pass the load test with comfortable margin.
55. C — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. Two strobes visible from the same corridor location must be synchronized regardless of circuit assignment. The 0.5-second offset violates this requirement.
56. B — The duct detector activated correctly, the panel processed the alarm, and the control module relay closed. The AHU did not shut down despite the relay closure. The fault is downstream — in the wiring between the relay contacts and the AHU controller's shutdown input.
57. A — NFPA 72 requires tamper switches to generate a supervisory signal within two revolutions of the valve wheel from the fully open position. The switch activated at exactly two revolutions, meeting the code requirement. The tamper switch passes the functional test.
58. D — The pre-recorded message plays on all 20 floors (confirming all amplifiers and speakers function), but the live microphone reaches only Floors 1-10. The live audio routing is programmed to broadcast to a subset of speaker zones rather than all zones. The programming must be verified against the approved design.
59. B — Five months of historical event data has been permanently lost due to the log overwriting oldest entries. The log must be downloaded to external storage for archival and then cleared to restore full recording capacity. Building management should be informed and a regular log maintenance schedule established.
60. C — NFPA 72 Table 14.4.3.2 requires smoke detectors to be functionally tested semiannually using approved aerosol smoke or a calibrated test source. Each test verifies the detector activates and the panel responds with proper identification, notification, and signal transmission.

61. A — The removed wall physically changed the building layout, combining two previously separate spaces into one open area. The zone configuration should be evaluated against the current floor plan to determine whether the existing two-zone arrangement still provides useful alarm location identification or should be modified.
62. C — All five detectors are outside the manufacturer's acceptable range. The three high-reading detectors (4.0%, 4.3%, 4.5%) require cleaning for contamination. The two low-reading detectors (0.3%, 0.4%) are abnormally sensitive and must be investigated for faults. Both high and low out-of-range readings require corrective action.
63. B — A decorative panel completely blocking both the horn opening and the strobe lens eliminates both audible and visible notification output. The panel must be removed and building management informed that notification appliances must remain unobstructed to function as designed.
64. C — Forty-five days without communication redundancy means the system operates with a single path. If the cellular path also fails, the building has no monitoring. This is a significant impairment requiring prompt corrective action with documentation for the building owner and AHJ.
65. A — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash between 1 and 2 flashes per second. At 0.8 flashes per second, the strobe is below the minimum required rate. The device must be investigated and repaired or replaced to achieve a compliant flash rate.
66. D — When a tamper switch activation generates an alarm instead of a supervisory signal, the input is programmed as an alarm zone rather than a supervisory zone. The panel programming must be corrected to classify the tamper switch input as supervisory for valve position changes.
67. B — Storage of combustible materials, chemicals, and cleaning supplies combined with only 18 inches of working clearance violates NEC Article 110.26. The minimum clearance is typically 30 inches wide and 36 inches deep. All storage must be removed and required working space maintained.
68. D — The batteries ended at 19.2 VDC — below the manufacturer's 20.4 VDC minimum end-voltage. Panel components may malfunction or shut down at this voltage during an actual alarm event. The batteries cannot sustain the required load and must be replaced.
69. A — A smoke detector at 30 inches above the floor is completely ineffective for fire detection. Smoke rises to the ceiling and accumulates there — a desk-level detector will not sense smoke until the room is heavily filled. The detector has been removed from its approved location and must be reinstalled at the ceiling.
70. C — After verifying cross-zone logic, countdown, abort switch, and releasing circuit supervision, the pre-discharge warning appliances in the protected space must be independently verified. Occupants must hear and see adequate audible and visual warning during the countdown to evacuate before agent discharge.

71. B — NFPA 72 Table 14.4.3.2 requires supervisory devices including tamper switches to be functionally tested annually as part of the comprehensive system functional test. Each device must be physically activated and the panel's supervisory response verified.
72. D — Burned-out LEDs at the fire command center graphic annunciator prevent firefighters from identifying alarms in zones 3, 7, 12, and 18. This impairs emergency response by eliminating visual identification of active alarms in those zones. The LEDs must be repaired to restore full annunciator functionality.
73. A — The detector behind the new wall is in a concealed space separated from the occupied corridor. Smoke from a corridor fire may not reach the concealed detector in time. The detector must be relocated to the occupied side, and the concealed space should be evaluated for its own detection needs.
74. C — NFPA 72 Table 14.4.3.2 requires releasing device circuits to be functionally tested annually as part of the comprehensive releasing system test. This includes cross-zone logic, countdown timers, abort switches, releasing circuit supervision, and pre-discharge notification.
75. B — Floor 5 requiring more force to open the stairwell door (positive pressure) while Floor 15 opens normally (no pressure) indicates inconsistent pressurization. A duct, damper, or balancing issue is preventing adequate air distribution to the upper floors. Both observations should be documented for mechanical investigation.
76. D — The panel processed the alarm and 16 of 18 locks released correctly. The two non-releasing locks indicate a fault specific to those devices — the control module outputs, interface wiring, or power supply to those specific locks must be investigated.
77. A — A 105-minute discrepancy between the panel clock and actual time significantly affects event log accuracy. Timestamps nearly two hours off create confusion when correlating fire alarm events with security footage, dispatch records, and other building system logs. The clock must be corrected immediately.
78. D — The primary line tested successfully. Line 2 — tested independently by disconnecting Line 1 — failed to deliver the signal. Line 2 has failed its functional test and must be investigated and repaired to restore dual-path communication redundancy.
79. D — $R = 800 \times (3.14/1000) = 2.512 \Omega$. $V_{\text{drop}} = 2.4 \times 2.512 = 6.029\text{V}$. End voltage = $24 - 6.03 = 17.97 \text{VDC}$. While technically above the 16 VDC minimum, the 1.97-volt margin is thin. Connection aging, temperature changes, and future device additions could erode this margin — 12 AWG conductors should be considered.
80. B — Standby = $(0.88 + 1.12) \times 4 = 8.0 \text{ Ah}$. Alarm = $(3.6 + 7.8) \times 0.25 = 2.85 \text{ Ah}$. Subtotal = 10.85 Ah. With 20% safety factor: $10.85 \times 1.20 = 13.02 \text{ Ah}$, approximately 13 Ah. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm. All loads served by the main panel batteries are included.

81. A — Even when duct detectors are configured for HVAC shutdown only without general building notification, the detection signal should still transmit to the supervising station. This ensures building management and the monitoring service are aware of the event for investigation, maintaining awareness of all fire-related conditions.
82. C — When different conductor sizes share the same conduit, pre-calculated Annex C tables cannot be used because they assume uniform sizes. The actual cross-sectional area of each conductor from NEC Chapter 9 Table 5 must be calculated and the total compared to the conduit's internal area using the 40% fill limit.
83. D — Eight detectors with the first at 10 feet and subsequent detectors every 30 feet to position 220 (the far end) provide complete coverage. The first detector is 10 feet from one end (within 15 feet) and the last is at the far end (0 feet from the end). All inter-detector spacings are 30 feet. The layout complies with NFPA 72.
84. B — SLC 1 at 194 of 198 has only 4 remaining addresses. Adding 4 devices reaches absolute maximum with zero future flexibility. Placing all 12 on a new SLC preserves SLC 1's current 4-address margin and provides a new loop with substantial capacity for future growth — a more practical long-term approach.
85. A — Each remote NAC power supply panel has its own backup batteries that must sustain the loads it serves during AC power failure. A separate battery calculation using the specific standby and alarm currents for each remote panel must be performed, applying the same NFPA 72 duration and safety factor requirements.
86. C — NFPA 72 Section 7.8.2 requires the Record of Completion to include system specifications, circuit information, device counts by type, power supply data, communication path details, acceptance test results, and signatures from the installer, designer, and AHJ.
87. D — A detector at the 90-degree turn ensures detection at the direction change where coverage from detectors in either leg may be limited. Smoke traveling along one corridor leg may not effectively reach detectors beyond the turn. The corner detector catches smoke at the intersection regardless of approach direction.
88. B — Project specifications are contractual documents the contractor must follow. Even though NEC does not require conduit in non-plenum spaces for listed fire alarm cable, the specification is a binding obligation. Deviating without formal approval exposes the contractor to contractual liability.
89. C — The speaker circuit delivers 59.8 VAC at the farthest speaker, which exceeds the manufacturer's minimum rated input of 55 VAC by 4.8 volts. The speakers will operate within their listed parameters at this voltage, producing acceptable audio quality and volume.
90. A — Three different device counts across three documents indicate modifications were not consistently documented. All three must be verified against a physical field count and reconciled

to reflect the same accurate, verified number. The panel programming often reflects the actual count but must be confirmed.

91. D — The pre-discharge time delay must provide adequate evacuation time based on the room's specific characteristics: physical size, exit count and locations, maximum travel distance, and expected occupant count. The delay is determined by actual evacuation conditions — not a fixed code value.
92. B — The designer's risk assessment determined upper floors (6-20) benefit from Class A fault tolerance due to longer egress distances, more difficult firefighter access, and greater occupant vulnerability during extended evacuation. Lower floors with shorter egress and easier access can accept Class B's reduced redundancy.
93. C — Horn/strobes: $12 \times 0.310 = 3.720A$. Speakers: $6 \times 0.150 = 0.900A$. Strobes: $4 \times 0.185 = 0.740A$. Total = 5.360 amps, which significantly exceeds the 3.0-amp NAC output rating. The circuit must be redesigned across multiple NAC outputs or with booster power supplies.
94. A — The specification requires 7 business days' advance notice to the AHJ before acceptance testing. This is a regulatory and contractual obligation that cannot be waived by construction schedule pressure. The contractor must provide proper notice and schedule accordingly.
95. A — Per NFPA 72 Table 18.5.5.5.1(a), a 30 cd strobe covers rooms up to 28×28 feet. The conference room at 40×30 feet exceeds the 28-foot maximum in one dimension. A higher candela rating that covers the room's actual dimensions must be selected from the table — such as 60 cd for rooms up to 45×45 feet.
96. B — The as-built drawings show 168 devices but 175 are physically installed and confirmed by panel programming. NFPA 72 requires as-built drawings to accurately reflect the current configuration. The drawings must be updated to show all 175 devices with correct addresses, locations, and circuit assignments.
97. A — The calculated minimum is 17.18 Ah. The specified 18 Ah batteries exceed this minimum by 0.82 Ah, providing adequate capacity. Select the next available standard battery size at or above the calculated minimum to ensure compliance.
98. C — Hospitals using defend-in-place may have differentiated responses for different alarm types per the approved fire safety plan. Pull stations triggering building-wide notification while smoke detectors trigger floor-only notification is valid when documented in the plan and accepted by the AHJ.
99. D — As-built drawings for the dedicated branch circuit should capture the conduit type, size, and routing path from the electrical panel to the fire alarm panel. This information is essential for future maintenance, troubleshooting, and modifications.

100. B — Remote NAC power supply panels provide local notification appliance power close to the devices they serve. This reduces voltage drop on long NAC wire runs and distributes current capacity across multiple power sources, ensuring adequate voltage and power reach appliances on upper floors.
101. A — Excessive pulling tension can damage conductor insulation internally without visible external jacket damage. Megger testing all 15 cable runs verifies insulation integrity and catches latent damage before devices are connected and the system is energized. Visual inspection alone cannot detect internal insulation failure.
102. C — Emergency control function interfaces require the respective trade contractors to be present. The elevator contractor verifies recall, the HVAC contractor verifies shutdown and smoke control, the controls contractor verifies automation interfaces, and the door hardware contractor verifies holder release. Each trade confirms correct equipment response.
103. D — Converting from horn/strobe to voice evacuation at 85% completion is a fundamental design change requiring new amplifiers, speaker circuits, intelligibility analysis, and panel reconfiguration. A formal change order must document the engineering revision, cost impact, and schedule extension before work proceeds.
104. B — The fire alarm contractor should not modify the electrical contractor's work directly. The general contractor coordinates all trades and should be notified of the non-compliant AFCI/GFCI breaker so they can direct the electrical contractor to replace it with a standard breaker and lock-on device.
105. A — Different date codes within the same detector model indicate different production runs. As long as all 400 are the same model and listed as compatible with the panel, date code variations do not affect compatibility, communication protocols, or detection performance.
106. C — Every service activity must be documented in a written service report regardless of scope. Even a simple wire nut tightening resolves a trouble condition that should be recorded. Documentation supports troubleshooting, demonstrates compliance, and provides records for the building owner and AHJ.
107. D — Field markups contain actual as-installed information. The contractor must create clean, professional as-built drawings accurately incorporating all field data. Submitting messy markups, unmarked originals, or memory-based recreations fails to provide the accurate, legible documentation required.
108. B — NFPA 72 Section 7.7 requires the contractor to deliver as-built drawings, the completed Record of Completion, the approved sequence of operations, and operating and maintenance instructions. These four documents constitute the minimum required closeout package.
109. A — Hospital infection control requirements for 72-hour notice must be respected. The contractor should provide the required notice and coordinate patient care testing with both the general

contractor and hospital. Patient safety protocols cannot be overridden by construction schedule pressure.

110. D — The AHJ's 10-business-day notice requirement is a regulatory obligation that cannot be waived by construction deadlines. Testing without proper notice may be invalidated, requiring a complete retest. The supervisor must maintain the requirement and reschedule with proper notification.