LEVEL II — SIMULATION EXAM 3 (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 the design for a 15-story high-rise with voice evacuation. The specification requires pathway survivability Level 2 on all speaker circuits. The engineer proposes routing all speaker circuits through a 2-hour fire-rated stairwell enclosure. A reviewer notes that the outgoing and return speaker circuit conductors share the same conduit within the stairwell. Does this affect the Level 2 compliance?

A. Yes, sharing conduit violates Level 2 because each conductor requires its own fire-rated enclosure

B. No, but only if the conduit is rigid metal conduit rather than EMT within the fire-rated enclosure

C. Yes, because Level 2 requires separate fire-rated paths for outgoing and return conductors

D. No, Level 2 requires the pathway to be protected by 2-hour construction — the conductors may share a conduit within the rated enclosure

2. A fire alarm technician is installing a fire alarm system in a hospital that requires positive alarm sequence (PAS). During commissioning, the technician needs to verify one critical PAS safety feature. Per NFPA 72 Section 23.8.1.3, what must happen if the PAS acknowledgment is NOT received within the 180-second investigation period?

A. The system must automatically activate general building alarm notification without further delay

B. The system must transmit a trouble signal to the supervising station requesting staff response

C. The panel must repeat the 180-second investigation period one additional time before alarming

D. The system must silently alert the fire safety director without activating building notification

3. A fire alarm technician is designing notification for a mixed-use building. The ground floor nightclub has a measured ambient noise level of 108 dB during peak operation. The office floors above have 55 dB ambient. Per NFPA 72 Section 18.4.4, what minimum audible notification level is required in the nightclub?

A. 108 dB to match the ambient level during peak nightclub operation

B. 113 dB using the 5 dB above maximum ambient alternative criterion

C. 123 dB based on 15 dB above the 108 dB average ambient level

D. Audible notification at 123 dB is impractical — the design must address this limitation

4. A fire alarm technician is installing fire alarm devices in a clean room facility that manufactures semiconductor chips. The clean room maintains a positive pressure with HEPA-filtered laminar airflow from ceiling to floor at 90 feet per minute. Standard spot-type smoke detectors are specified. What concern should the technician raise?

A. The HEPA filters will trap smoke particles before they reach the ceiling-mounted detectors

B. The downward laminar airflow will push smoke toward the floor before it reaches ceiling detectors

C. The positive pressure prevents smoke from entering the room from adjacent spaces

D. The 90 fpm airflow exceeds the maximum air velocity rating for standard spot-type detectors

5. A fire alarm technician is calculating the SLC loading for an addressable panel. The SLC has 85 smoke detectors at 0.30 mA each, 18 monitor modules at 0.20 mA each, 10 control modules at 3.5 mA each, 4 relay modules at 2.8 mA each, and 6 isolator modules at 0.15 mA each. The panel's maximum SLC current is 128 mA. Does the loading exceed capacity?

A. Yes, the total is 135.7 mA exceeding the 128 mA capacity

B. No, the total is 98.0 mA well within the capacity

C. Yes, the total is 129.2 mA marginally exceeding the capacity

D. No, the total is 78.9 mA providing substantial margin

6. A fire alarm technician is installing a releasing fire alarm system for a clean agent suppression system in a data center. The system uses cross-zone detection. During installation, the technician discovers that both Zone A and Zone B detectors are photoelectric smoke detectors. The engineer's original design specified photoelectric for Zone A and ionization for Zone B. Does using the same technology in both zones defeat the purpose of cross-zoning?

A. No, cross-zoning requires two separate zones to activate regardless of the detection technology used

B. Yes, identical technologies may produce simultaneous false alarms from the same nuisance source

C. No, but only if the two zones use detectors from different manufacturers for signal diversity

D. Yes, NFPA 72 requires different detection technologies in each cross-zone for releasing systems

7. A fire alarm technician is installing a fire alarm system in a building with a fire pump. The fire pump controller has multiple supervisory contacts for monitoring by the fire alarm system. Which of the following conditions must the fire alarm panel monitor from the fire pump controller?

A. Only pump running status because all other conditions are handled by the pump controller

B. Only power available and phase reversal because these are the most critical fault conditions

C. Pump running, power available, phase reversal, and controller trouble as supervisory signals

D. All pump conditions as alarm signals because fire pump failure during a fire is an emergency

8. A fire alarm technician is installing an addressable fire alarm system in a high-rise building. The project requires Class A SLC wiring with pathway diversity — the outgoing path uses the east riser and the return path uses the west riser. At one floor, both paths must cross the building through a common corridor to reach their respective risers. The corridor has no fire rating. What concern does this shared corridor routing create?

A. No concern because corridor routing is exempt from pathway diversity requirements

B. A single fire in the corridor could damage both SLC paths simultaneously defeating Class A redundancy

C. The corridor routing is acceptable if the SLC conductors are in separate conduits

D. The concern applies only to voice evacuation circuits, not to SLC detection circuits

9. A fire alarm technician is installing visible notification appliances in a hotel. The design calls for ADA-accessible sleeping rooms to have both a wall-mounted strobe meeting NFPA 72 requirements and a separate notification appliance effective for alerting sleeping hearing-impaired occupants. What type of device typically fulfills this second requirement?

A. A pillow-level or bed-mounted alerting device such as a strobe or bed shaker unit

B. A high-candela ceiling-mounted strobe rated at 177 cd minimum for the room

C. A low-frequency audible device tuned to 520 Hz for hearing-impaired occupants

D. A standard wall-mounted strobe at double the normal candela rating for the room size

10. A fire alarm technician is installing a fire alarm system in a building where the engineer has specified an aspirating smoke detection system for a large open atrium with a ceiling height of 70 feet. The aspirating system's sampling unit will be mounted at a maintainable height with sampling pipes extending to multiple elevations within the atrium. What is the primary advantage of aspirating detection in this application over spot-type or beam detectors?

A. Aspirating systems are less expensive than beam detectors for large-volume applications

B. Aspirating systems respond faster than any other detection technology in all fire conditions

C. Aspirating systems can detect extremely low smoke concentrations at multiple heights simultaneously

D. Aspirating systems do not require periodic testing or calibration after initial commissioning

11. A fire alarm technician is installing a fire alarm system with a DACT communicator. The building has two copper telephone lines serving the DACT. Per NFPA 72 Section 26.6.3.1.1, the DACT must test each telephone line at least every 24 hours. During commissioning, the technician verifies this line test function. What does the DACT verify during each line test?

A. That both telephone lines can complete a connection to the supervising station receiver

B. That the telephone line voltage is above the minimum 48 VDC for reliable DTMF transmission

C. That the telephone lines are not shared with any other building communication equipment

D. That each line has adequate dial tone and can seize the line for signal transmission

12. A fire alarm technician is installing a fire alarm system in a large warehouse with 40-foot ceilings. The engineer specifies projected beam smoke detectors. The beam detector manufacturer requires specific mounting considerations for the transmitter and reflector. What is the maximum distance between the transmitter and the reflector for a standard beam detector installation?

A. 100 feet because beam detectors use the same spacing as spot-type detectors

B. The maximum distance depends on the specific manufacturer's listing — typically 100 to 330 feet

C. 200 feet as a universal maximum established by NFPA 72 for all beam detector brands

D. 500 feet because beam detectors are designed specifically for very long-distance applications

13. A fire alarm technician is installing a mass notification system integrated with the fire alarm system. The mass notification system must be capable of delivering different messages to different zones simultaneously during an emergency. Per NFPA 72 Chapter 24, who determines the specific message content for each emergency scenario?

A. The building's emergency stakeholders through the risk analysis and emergency response plan

B. The fire alarm system designer based on the notification appliance coverage calculations

C. The panel manufacturer who provides pre-programmed messages for standard emergency types

D. The local fire department who dictates all emergency message content for the jurisdiction

14. A fire alarm technician is designing the battery backup for a fire alarm system with a voice evacuation system. The building has an emergency generator with automatic start and transfer. The voice evacuation amplifiers draw 1.8A in standby and 9.5A during alarm. The panel and SLC draw 0.65A in standby and 0.40A during alarm. Per NFPA 72, what standby duration should be used given the generator?

A. 24 hours because voice evacuation systems are exempt from the generator reduction

B. 12 hours as a compromise between the standard and reduced requirements

C. 4 hours because the qualifying generator reduces the standby requirement

D. 8 hours because voice evacuation requires double the standard reduced duration

15. A fire alarm technician is installing a fire alarm system in a building with multiple air handling units. Duct smoke detectors are required on each AHU. The HVAC engineer provides the following air velocities at the proposed detector locations: AHU-1 at 450 fpm, AHU-2 at 2,200 fpm, AHU-3 at 75 fpm, and AHU-4 at 3,800 fpm. The detector manufacturer lists an operating range of 100 to 4,000 fpm. Which AHU location requires relocation of the duct detector?

A. AHU-2 because 2,200 fpm creates excessive turbulence inside the detector's sampling tubes

B. AHU-3 because 75 fpm is below the detector manufacturer's minimum operating velocity

C. AHU-4 because 3,800 fpm is too close to the upper limit and should have additional margin

D. AHU-1 because 450 fpm is in the range where duct detectors produce the most nuisance alarms

16. A fire alarm technician is installing an elevator recall system per NFPA 72 Section 21.3. The building has one elevator bank with three elevators. The elevator lobby has a smoke detector for Phase I recall. The building also has a smoke detector in the elevator machine room. If the machine room detector activates, the elevators must recall to an alternate floor rather than the designated primary recall floor. Why is an alternate recall floor required for machine room detection?

A. The machine room is on the top floor so recalling to the primary floor takes longer

B. Machine room fires are less severe and do not require recall to the main lobby level

C. The machine room detector triggers HVAC shutdown which conflicts with primary floor recall

D. Smoke in the machine room may migrate to the primary recall floor making it unsafe for passengers

17. A fire alarm technician is installing a fire alarm system in a mixed-use building. The building has three separate occupancies: a restaurant on the ground floor, professional offices on floors 2-4, and residential apartments on floors 5-10. Each occupancy has different notification requirements. The fire alarm technician asks the engineer whether a single NAC circuit can serve all three occupancies. What is the determining factor?

A. Whether the sequence of operations requires different notification zones for each occupancy type

B. The total NAC current load from all three occupancies combined must not exceed the output rating

C. Single NAC circuits are prohibited from crossing occupancy boundaries per NFPA 72

D. The NEC limits NAC circuit length to 500 feet which may require multiple circuits regardless

18. A fire alarm technician is installing a fire alarm system in a building with a central vacuum system, a commercial laundry, and a woodworking shop. Each space generates airborne particles. What detection technology is most appropriate for each of these environments?

A. Aspirating detection for all three spaces because it handles particle-laden environments best

B. Smoke detection in all three spaces with protective covers to reduce nuisance alarms

C. Heat detection in all three spaces because airborne particles cause smoke detector nuisance alarms

D. Each space requires individual evaluation — the detection technology depends on the specific particle type

19. A fire alarm technician is installing a fire alarm system with networked panels across two buildings connected by a covered walkway. Building A has the master panel and Building B has a network node panel. The network communication runs through cable in the covered walkway. The walkway is not fire-rated and is open on both sides. What vulnerability does this communication routing create?

A. The walkway cable is exposed to weather that may cause long-term insulation degradation

B. A fire or physical damage in the walkway could sever the network communication between buildings

C. The open sides allow electromagnetic interference from nearby equipment to disrupt signals

D. The cable in the walkway exceeds the maximum network communication distance between panels

20. A fire alarm technician is installing a releasing fire alarm system for a water mist suppression system protecting a turbine generator. The system uses cross-zone heat detection because the environment contains oil mist that would cause smoke detector nuisance alarms. The cross-zone heat detectors must both activate before the water mist system releases. What additional feature must the releasing panel provide?

A. A manual release switch at the protected space entrance for operator-initiated suppression

B. A pre-discharge audible warning and an abort switch for personnel safety

C. A backup smoke detection zone that activates if both heat zones fail to respond

D. A pre-discharge timer and abort capability to allow personnel evacuation before water mist release

21. A fire alarm technician is installing a fire alarm system in a high-rise building. The fire command center requires the following equipment per NFPA 72 Section 23.10: fire alarm panel or repeater, voice evacuation controls, firefighter telephone, elevator status, and HVAC/smoke control interface. The building engineer asks whether the fire alarm panel can be located in the electrical room rather than at the fire command center. What is permitted?

A. The panel may be remote if a complete repeater with full status and control is at the fire command center

B. The panel must always be physically located at the fire command center in high-rise buildings

C. The panel may be in the electrical room if a graphic annunciator is at the fire command center

D. The panel location is determined solely by the AHJ with no specific NFPA 72 requirement

22. A fire alarm technician is installing a fire alarm system in a hospital where the approved fire safety plan calls for a "defend in place" strategy on patient care floors. Under this strategy, when a smoke detector activates on a patient floor, what is the typical notification response?

A. Full building alarm notification activates on all floors simultaneously for immediate evacuation

B. Notification activates only on the alarm floor — adjacent floors receive alert or no notification initially

C. Only visual notification activates building-wide while audible is limited to the alarm floor

D. No building notification activates — only the nursing station receives the alarm electronically

23. A fire alarm technician is installing a fire alarm system and encounters a specification requiring all fire alarm circuits in patient care areas of a hospital to comply with NFPA 99 in addition to NFPA 72. Per NFPA 99, what additional wiring consideration applies to fire alarm circuits in patient care areas?

A. Fire alarm circuits must be installed in metallic raceways throughout all patient care areas

B. Fire alarm circuits must maintain a minimum 6-foot separation from patient bed locations

C. Fire alarm circuits must use only MC cable with an insulated equipment grounding conductor

D. Fire alarm circuits in patient care areas must comply with the essential electrical system requirements

24. A fire alarm technician is installing notification appliances in a large convention center ballroom. The ballroom is 200 feet by 150 feet with a 30-foot ceiling. The room has movable partition walls that can divide it into four smaller rooms. How should the notification design address the movable partitions?

A. Each possible room configuration must have adequate notification when the partitions are deployed

B. The notification design should cover only the maximum open configuration without partitions

C. Movable partitions do not affect notification design because they are temporary structures

D. Each partition position requires its own dedicated NAC circuit for independent zone control

25. A fire alarm technician is calculating battery capacity for a fire alarm system. The panel serves: standby current = 1.1A (panel + SLC + network), alarm current = 5.2A (NACs), voice alarm current = 7.8A. The building has no generator. The system has voice evacuation requiring 15-minute alarm. Using 24-hour standby and 20% safety factor, what is the minimum battery capacity?

A. 31.68 Ah using only the standby and NAC alarm loads without the voice alarm component

B. 36.48 Ah using the standard 5-minute alarm duration for all alarm loads

C. 41.22 Ah after applying 24-hour standby, 15-minute alarm for all loads, and 20% safety factor

D. 33.84 Ah applying the 20% safety factor only to the standby portion of the calculation

26. A fire alarm technician is installing a fire alarm system in a cold storage distribution center. The main warehouse is maintained at -15°F. The loading docks fluctuate between 10°F and 85°F. The office area is maintained at 72°F. Smoke detectors are specified for the office. Heat detectors are specified for the warehouse and docks. What activation temperature heat detector is appropriate for the loading dock area?

A. 135°F which does not provide the required 20°F margin above the 85°F maximum dock temperature

B. A detector rated at least 105°F to maintain the 20°F margin above the 85°F maximum ambient

C. 200°F because loading dock environments require high-temperature rated detectors

D. 135°F which provides a 50°F margin above the 85°F maximum dock temperature — exceeding the 20°F minimum

27. A fire alarm technician is installing a fire alarm system in a performing arts theater. The fly gallery above the stage contains fabric curtains, backdrops, and rigging ropes — all highly combustible. The stage ceiling is 70 feet above the stage floor. Standard spot-type smoke detectors have been specified for the fly gallery area. What alternative detection should the technician recommend?

A. Flame detection because the combustible materials produce visible flame before significant smoke

B. Heat detection because the high ceiling prevents smoke from reaching ceiling-mounted detectors

C. Spot-type detectors mounted on the catwalks at multiple heights rather than at the ceiling

D. Aspirating or beam detection systems designed for high-ceiling and large-volume applications

28. A fire alarm technician is installing a fire alarm system with an emergency voice/alarm communication (EVAC) system. The design uses 70.7V audio distribution for speaker circuits. During installation, the technician discovers that two speakers have been wired in parallel without using their individual impedance-matching transformers. What problem does this create?

A. The two speakers will produce excessive volume that damages the amplifier output stage

B. The missing transformers prevent impedance matching causing audio distortion and potential amplifier overload

C. The speakers will flash out of synchronization with the visible notification appliances

D. The parallel connection prevents the panel from supervising the speaker circuit for opens

29. A fire alarm technician is reviewing the plans for a fire alarm system in a 25-story residential tower. The design shows smoke detectors in each apartment unit, corridor smoke detectors on each floor, elevator lobby detectors, and stairwell detectors. The sequence of operations shows that an apartment detector alarm activates notification only within that apartment — not building-wide. What code provision allows this limited notification response?

A. NFPA 72 Section 23.4.3 allows apartment systems to notify only the affected unit and building staff

B. All residential buildings are exempt from building-wide notification per NFPA 72 Chapter 29

C. The AHJ may approve apartment-only notification if the building is fully sprinklered with defend-in-place

D. Limited notification is not permitted — all detector alarms must activate building-wide notification

30. A fire alarm technician is installing a fire alarm system in a building with multiple tenant spaces. Each tenant space has its own fire alarm zone. During installation, the technician discovers that a door between Tenant A and Tenant B has been removed, creating a single open space spanning both tenant zones. How does this affect the fire alarm system?

A. The open doorway has no effect because the zone boundaries are defined by the circuit wiring

B. The removed door may affect smoke detector spacing, zone identification, and notification coverage between the two spaces

C. Only the notification appliances need evaluation — the detection zones remain valid as designed

D. The two zones must be immediately combined into a single zone on the fire alarm panel

31. A fire alarm technician is installing a fire alarm system in a data center with a raised floor plenum used for cold air distribution. The plenum space below the raised floor is 24 inches deep. What cable type must be used for fire alarm circuits routed through this under-floor plenum space?

A. FPL cable because under-floor spaces are classified as general-purpose wiring locations

B. FPLR cable because the vertical dimension of the raised floor qualifies as a riser application

C. Any fire alarm cable installed inside metallic conduit satisfies the requirement regardless of rating

D. FPLP cable because the under-floor space used for air distribution is classified as a plenum

32. A fire alarm technician is installing a fire alarm system in a building where the architect specifies that all fire alarm devices must be white to match the ceiling color rather than the standard red or manufacturer's default color. Per NFPA 72, is there a color requirement for fire alarm devices?

A. Smoke detectors have no color requirement but pull stations must be red per NFPA 72

B. All fire alarm devices must be red per NFPA 72 for universal fire safety identification

C. Only notification appliances have a color requirement — they must be either red or white

D. NFPA 72 has no color requirements for any device other than manual fire alarm stations

33. A fire alarm technician is installing a fire alarm system with a releasing circuit for a pre-action sprinkler system. The pre-action system is a single-interlock design where fire alarm detection opens the pre-action valve. The releasing circuit must be supervised. Per NFPA 72, what happens if the supervised releasing circuit develops an open fault?

A. The panel immediately activates the pre-action valve as a precautionary measure

B. The panel generates an alarm signal and notifies the supervising station of the fault

C. The panel generates a trouble signal indicating the releasing circuit integrity is compromised

D. The panel disables all detection in the pre-action zone to prevent unmonitored release

34. A fire alarm technician is installing a fire alarm system in a campus environment with four buildings connected by underground tunnels. Each building has its own fire alarm panel on a network. Fire in one building's tunnel connection could spread to adjacent buildings. How should the tunnel detection and notification be coordinated between buildings?

A. Each tunnel section is assigned to the nearest building's panel with independent zone identification

B. Tunnel detection should trigger notification in both buildings connected by that tunnel segment

C. Tunnels require their own dedicated fire alarm panel separate from any building's system

D. Only the building where the fire originates receives notification — adjacent buildings are unaffected

35. A fire alarm technician is performing a voltage drop calculation for a voice evacuation speaker circuit. The circuit uses 70.7V audio distribution, 12 AWG copper conductors, and serves 20 speakers with a total power draw of 40 watts. The round-trip circuit distance is 800 feet. Unlike 24 VDC NAC circuits, what additional factor must the technician consider when calculating voltage drop on 70.7V audio circuits?

A. The impedance of each speaker's transformer must be included in the circuit resistance calculation

B. Audio circuits have no voltage drop concerns because the 70.7V source compensates automatically

C. Only the amplifier's output impedance matters — speaker wire resistance is negligible at 70.7V

D. The total circuit impedance including wire resistance and transformer losses affects audio quality at distant speakers

36. A fire alarm technician is installing a fire alarm system in a hospital with a nurse call system. Both systems have devices mounted in patient corridors. The nurse call system includes corridor dome lights above each patient room door. Building management asks whether the corridor dome lights can serve as the fire alarm's visible notification in the corridor. Per NFPA 72, what is the answer?

A. No, fire alarm visible notification must use devices specifically listed for fire alarm service

B. Yes, nurse call dome lights meet the candela and flash rate requirements of NFPA 72

C. No, but only because dome lights are mounted above doors rather than at the required wall height

D. Yes, if the dome light manufacturer provides documentation that they comply with UL 1971

37. A fire alarm technician is installing a fire alarm system in a 10-story building. The voice evacuation system's amplifiers are located in the fire command center on the first floor. Speaker circuits run from the amplifiers to speakers on every floor. The longest speaker circuit run is 550 feet. The technician notices that speakers on the 10th floor produce noticeably lower volume than speakers on the 2nd floor during testing. What is the most likely cause?

A. The amplifier output is insufficient for the total speaker load on the circuit

B. The 10th floor speakers are a different model with a lower sensitivity rating

C. Line losses over the 550-foot distance reduce audio power at distant speakers

D. The 10th floor speakers have incorrect impedance-matching transformer tap settings

38. A fire alarm technician is installing a fire alarm system in a building where the electrical engineer specifies that the fire alarm panel's primary power must originate from the building's emergency electrical system rather than the normal power system. Per NEC Article 700, emergency system circuits must be kept separate from normal system wiring. What specific wiring requirement applies?

A. The fire alarm panel's primary power must be on its own transfer switch separate from other loads

B. Emergency circuit wiring must be in separate raceways from all normal power wiring throughout

C. The fire alarm panel must have dual power feeds — one from emergency and one from normal power

D. Emergency circuits require oversized conductors rated at 200% of the connected load amperage

39. A fire alarm technician is installing a fire alarm system with an in-building mass notification system. The mass notification system shares speakers with the voice evacuation system. Per NFPA 72 Chapter 24, the mass notification system must be capable of overriding fire alarm messages under certain documented conditions. What safeguard must exist when mass notification overrides fire alarm notification?

A. The fire alarm signal must continue transmitting to the supervising station even when notification is overridden

B. Mass notification can only override fire alarm for a maximum of 60 seconds before fire alarm resumes

C. The override function must be disabled during active fire alarm conditions per all jurisdictions

D. Mass notification override of fire alarm is prohibited by NFPA 72 under all circumstances

40. A fire alarm technician is installing a fire alarm system in a building with a swimming pool, a fitness center with a sauna, and a commercial kitchen. Each space presents unique environmental challenges for fire detection. The design calls for different detection technologies in each space. Which technology pairing is most appropriate?

A. Smoke detectors in the pool area, heat detectors in the sauna, and flame detectors in the kitchen

B. Flame detectors in the pool area, smoke detectors in the sauna, and aspirating in the kitchen

C. Heat detectors in all three spaces because each environment causes smoke detector nuisance alarms

D. Heat detectors in the pool and sauna areas, and heat detection near cooking equipment with smoke detection in the kitchen dining area

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

41. A fire alarm technician is performing annual testing on a releasing fire alarm system for a clean agent suppression system. The system has a 30-second pre-discharge countdown and an abort switch at the room entrance. During testing, the technician verifies the cross-zone logic, the countdown timer, and the abort switch function. What additional test must be performed on the releasing circuit itself?

A. Only the cross-zone logic, countdown, and abort switch tests are required annually

B. The releasing circuit must be tested with the solenoid disconnected to verify circuit supervision

C. The releasing circuit must be tested with the live solenoid connected to verify actuation capability

D. A voltage measurement at the solenoid terminals during simulated release verifies the circuit

42. During annual testing of a high-rise voice evacuation system, the fire alarm technician tests the firefighter telephone system. The technician picks up a handset at the 15th floor stairwell station. The fire command center responds. The audio is clear from the command center to the 15th floor, but the command center operator reports hearing only static from the 15th floor handset. What is the most likely cause?

A. The 15th floor handset has a failed microphone element while the earpiece is functioning correctly

B. The firefighter telephone amplifier has a unidirectional fault affecting only the uplink channel

C. The SLC communication on the 15th floor is interfering with the telephone audio frequency

D. The fire command center telephone equipment has a receive-only fault on the 15th floor circuit

43. A fire alarm technician is testing a fire alarm system and discovers that when a smoke detector on the 4th floor activates, the elevator recall functions but the stairwell pressurization does not activate. The sequence of operations requires both functions for any smoke alarm on floors 3–6. The control module for stairwell pressurization shows the relay activating (audible click). Where should the investigation focus?

A. On the smoke detector because it may be generating a signal type that bypasses the pressurization output

B. On the interface wiring between the control module relay and the stairwell fan controller

C. On the panel programming because the pressurization output may not be linked to the 4th floor zone

D. On the SLC communication because the control module may not be receiving the activation command

44. A fire alarm technician is performing annual sensitivity testing on an analog addressable system with 500 smoke detectors. The panel's sensitivity report shows that 12 detectors read between 3.8% and 4.2% obscuration/ft. The manufacturer's acceptable range is 0.5% to 3.7%. An additional 8 detectors read between 0.2% and 0.4% — below the minimum. What is the total number of out-of-range detectors requiring action?

A. Only the 12 high-reading detectors require action because low readings indicate higher sensitivity

B. Only the 8 low-reading detectors require action because they may fail to detect smoke

C. All 500 detectors must be cleaned because 20 out-of-range detectors indicates system-wide contamination

D. All 20 out-of-range detectors — both the 12 high and 8 low readings — require investigation and correction

45. A fire alarm technician is testing a pre-action sprinkler system monitored by the fire alarm panel. The system uses a double-interlock design. The technician activates a smoke detector in the pre-action zone. The panel correctly processes the alarm but the pre-action valve does not open. Is this the expected behavior for a double-interlock system?

A. No, the valve should open on fire detection alone regardless of the interlock configuration

B. Yes, a double-interlock requires both fire detection AND a supervisory air pressure drop before the valve opens

C. No, the valve should have opened within 30 seconds of the detection signal for any pre-action type

D. Yes, but only because the system is in maintenance mode during testing

46. A fire alarm technician discovers during inspection that a building's fire alarm panel has been generating "DEVICE COMMUNICATION FAILURE" for addresses 045 through 052 — eight consecutive devices on SLC 1 — for two weeks. The building owner says the system "still works" because all other devices communicate normally. What must be documented?

A. The eight non-communicating devices create an acceptable risk since 492 of 500 devices still function

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

C. The devices may have intermittent connections and should be monitored for an additional month

D. Eight devices without communication represent a significant impairment leaving those areas unprotected

47. A fire alarm technician is performing annual testing of emergency control functions. The test protocol requires verifying that magnetically held fire doors release and close when the fire alarm activates. During testing, 18 of 20 doors release and close properly. Two doors release from their magnetic holders but fail to close completely — one stops halfway and the other closes but does not latch. What must be documented?

A. All 20 doors passed the fire alarm interface test because the magnetic holders released on all doors

B. Only the door that stopped halfway failed — the door that closed but didn't latch is a hardware issue

C. Both doors failed because the fire alarm system is responsible for ensuring complete door closure

D. Both doors have deficiencies — the fire alarm interface worked but the door hardware prevents proper closure

48. A fire alarm technician is testing a building's communication link to the supervising station. The system uses IP communication as primary and cellular as secondary. The technician tests the IP path — successful. The technician then disconnects the IP path. After 200 seconds, the panel generates an "IP COMMUNICATION FAILURE" trouble. The technician then sends a test signal via cellular — the station receives it successfully. What has been verified?

A. Only the IP path is functional because the cellular path was tested after a trouble condition

B. The IP path timing is incorrect because the trouble should appear within 60 seconds

C. Both paths function correctly and the panel's 200-second supervision timing is accurate

D. The cellular path failed because it should have automatically transmitted when the IP path went down

49. A fire alarm technician discovers during annual testing that the fire alarm panel's event log is full and has been overwriting the oldest entries for approximately four months. The building manager was unaware. What is the operational significance?

A. No significance because the panel operates independently of the event log capacity

B. The event log has no impact on system operation but historical data is being permanently lost

C. The full log may be causing the panel to operate slower and should be cleared immediately

D. Four months of lost event history impairs troubleshooting capability and the log must be downloaded and cleared

50. A fire alarm technician is performing semiannual testing on smoke detectors in a hotel. During testing on the 8th floor, three adjacent detectors — addresses 088, 089, and 090 — take 25 to 35 seconds to activate with approved aerosol smoke. Other detectors on the same floor activate within 3 to 8 seconds. All detectors are the same model and age. What does the delayed response indicate?

A. The aerosol smoke can was running low during those three tests producing insufficient smoke

B. The three detectors likely have contaminated sensing chambers reducing their responsiveness

C. The SLC polling rate for those addresses is configured slower than the other addresses

D. The HVAC airflow pattern on that corridor section is diluting the test smoke before it reaches the detectors

51. A fire alarm technician tests the panel's primary-to-secondary power transfer. After disconnecting AC, the system transfers to battery. The technician monitors voltage: 0 min = 26.6 VDC, 5 min = 26.2 VDC, 10 min = 25.8 VDC, 15 min = 25.4 VDC. After reconnecting AC, the charger activates and voltage begins rising. Are these battery readings acceptable?

A. Yes, the gradual voltage decline is normal for batteries under standby load and indicates healthy batteries

B. No, the 1.2V drop over 15 minutes indicates the batteries are near end of life

C. Yes, but only if the voltage recovers to above 27.0 VDC within 60 minutes of charger activation

D. No, the voltage should remain constant during standby because the load is minimal

52. A fire alarm technician discovers during inspection that a smoke detector in a nursing home dining room has been covered with a clear plastic food container by the kitchen staff. Small holes have been punched in the container. Building staff say it reduces cooking nuisance alarms while "still letting smoke in." What must be documented?

A. The modification is acceptable because the holes allow adequate smoke entry to the detector

B. The clear container does not obstruct the detector and can remain as an approved protective cover

C. The unauthorized modification renders the detector non-compliant and must be removed immediately

D. The container can remain if the kitchen staff signs an acknowledgment of the modification

53. Per NFPA 72 Table 14.4.3.2, what is the required functional testing frequency for fire alarm system releasing device circuits (circuits that control suppression agent discharge)?

A. Semiannually because releasing circuits are more critical than standard alarm circuits

B. Monthly to ensure the suppression system can respond to any fire at any time

C. Only during initial acceptance testing with no periodic retesting required by code

D. Annually as part of the comprehensive releasing system functional test

54. A fire alarm technician is troubleshooting a ground fault on an SLC circuit in a building that has been experiencing intermittent troubles for three months. The troubles appear during rainstorms and clear within hours after the rain stops. What environmental condition is most likely responsible?

A. Rainwater is infiltrating the building at a specific point and reaching the SLC wiring or a device

B. Barometric pressure changes during storms cause the panel's ground fault sensor to drift

C. Lightning-induced voltage surges during storms create temporary ground fault conditions

D. Humidity increases during rain cause condensation on the SLC terminals at the panel

55. A fire alarm technician tests the elevator recall function during annual testing. Three elevators serve the building. The technician activates the lobby smoke detector. All three elevators begin recalling to the ground floor. Elevator 1 arrives and opens its doors in 45 seconds. Elevator 2 arrives and opens its doors in 60 seconds. Elevator 3 was on the 20th floor during the test and arrives in 90 seconds with doors opening. Did all three elevators pass?

A. No, elevator 3 took too long — recall must be completed within 60 seconds per NFPA 72

B. Yes, all three elevators recalled to the ground floor and opened their doors regardless of travel time

C. No, elevator 2 exceeded the 45-second maximum recall time specified by NFPA 72

D. Yes, but elevator 3 should be retested from a lower floor to verify faster response

56. A fire alarm technician is performing annual testing on a fire alarm system with a smoke control interface. The sequence of operations requires the following response to a smoke alarm on the 8th floor: exhaust the 8th floor, pressurize stairwells, and supply air to the 7th and 9th floors. During testing, the stairwells pressurize and the 7th and 9th floors receive supply air, but the 8th floor exhaust does not activate. What should be investigated?

A. The smoke detector because it may be generating a signal type incompatible with exhaust activation

B. The stairwell pressurization fans because they may be overloading the emergency power system

C. The 8th floor smoke exhaust fan's mechanical condition independent of the fire alarm interface

D. The control module output, wiring, and programming for the 8th floor exhaust function

57. A fire alarm technician discovers during inspection that two fire alarm pull stations in a school have been painted to match the wall color — both are now beige instead of red. The paint covers the pull station housing, handle, and instructional label. What must be documented?

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

B. The pull stations should be repainted red by the school's maintenance staff

C. The pull stations must be replaced because paint obscures the required red color and instruction labels

D. Only the instructional labels need to be restored — the housing color is an aesthetic preference

58. A fire alarm technician is performing annual testing on a voice evacuation system. The technician tests the live firefighter microphone from the fire command center. The message is heard clearly on floors 1-7 but not at all on floors 8-15. The pre-recorded evacuation message plays correctly on all 15 floors. What is the most likely cause?

A. The live microphone audio routing is programmed to broadcast only to floors 1-7 rather than all floors

B. The amplifiers serving floors 8-15 have a partial fault that passes pre-recorded but blocks live audio

C. The fire command center microphone has insufficient power output for the upper-floor speakers

D. The speaker circuits on floors 8-15 have a common wiring fault affecting live audio frequency response

59. Per NFPA 72 Table 14.4.3.2, how frequently must smoke detectors in a fire alarm system be functionally tested?

A. Annually as part of the comprehensive system functional test and inspection

B. Semiannually using approved aerosol smoke or a calibrated test source

C. Monthly to ensure continuous reliable detection throughout the protected premises

D. Quarterly to coincide with the building's standard maintenance inspection schedule

60. A fire alarm technician is testing a tamper switch on a butterfly valve serving a sprinkler system. The technician rotates the valve handle to the partially closed position — approximately the equivalent of two turns on an OS&Y valve. No supervisory signal appears at the panel. The technician continues rotating to the fully closed position before a supervisory signal finally appears. What deficiency exists?

A. Butterfly valve tamper switches have a different activation standard than OS&Y valve switches

B. The tamper switch is functioning correctly for butterfly valves which require full closure detection

C. The panel programming has the tamper switch set to alarm mode instead of supervisory mode

D. The tamper switch adjustment is incorrect — it must detect partial closure within the code-required travel distance

61. A fire alarm technician is performing annual testing and discovers that the building's Record of Completion was last updated six years ago. Since then, three major renovations have added 65 devices, removed 20 devices, changed the sequence of operations twice, and added a second SLC loop. What is the documentation status?

A. The annual testing records serve as an adequate substitute for updating the Record of Completion

B. The Record of Completion is only required at initial installation and does not need ongoing updates

C. The Record of Completion is significantly out of date and must be updated to reflect the current system

D. Only the as-built drawings need updating because the Record of Completion is a summary document

62. A fire alarm technician discovers during annual testing that the panel's battery charger voltage reads 25.2 VDC — below the typical float range of 27.0-27.6 VDC. The panel's charger indicator is illuminated. The AC power supply reads 121 VAC at the panel input. What should the technician investigate?

A. The charger output may be degraded and should be tested under load to determine if it can reach float voltage

B. The 25.2 VDC reading is within acceptable limits for a panel under heavy standby load

C. The AC voltage of 121 VAC is too low for the charger to produce adequate output

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

63. During annual testing, the fire alarm technician tests the communication link to the supervising station. The system uses a DACT with two telephone lines. The technician tests Line 1 — the station receives the signal. The technician then disconnects Line 1 and tests Line 2. The station does not receive the Line 2 signal. What must be documented?

A. Line 1 passed and Line 2 failed — the second telephone line must be investigated and repaired

B. Line 2 failed because it was tested while Line 1 was disconnected creating an abnormal condition

C. Both lines passed because the DACT successfully transmitted on at least one line

D. Line 2 cannot be independently tested — the DACT selects lines automatically

64. A fire alarm system in a warehouse generates nuisance alarms from ceiling-mounted smoke detectors approximately twice per month. Each alarm occurs during forklift operations. The warehouse stores palletized cardboard products. Building management has requested the detectors be removed. What is the appropriate corrective action?

A. Remove the detectors per the owner's request and document the change on the as-built drawings

B. Install protective covers over each detector to filter cardboard particles from the sensing chambers

C. Increase the detector alarm thresholds in the panel programming to reduce sensitivity

D. Replace the smoke detectors with heat detectors appropriate for the warehouse environment

65. A fire alarm technician is performing annual sensitivity testing using the panel's built-in sensitivity reports. The report shows 195 of 200 detectors within the 0.5%-3.7% acceptable range. Three detectors read at 3.9%, 4.1%, and 4.3%. Two detectors read at 0.3% and 0.4%. How many detectors require corrective action?

A. Only the three high-reading detectors because the two low-reading detectors are more sensitive

B. Only the two low-reading detectors because they are at risk of failing to detect smoke

C. All five out-of-range detectors — both the three high and two low readings require investigation

D. All 200 detectors must be cleaned because 5 out-of-range units indicates system-wide drift

66. A fire alarm technician discovers during inspection that a fire alarm panel's dedicated circuit breaker is protected by an AFCI breaker instead of a standard breaker. A lock-on device is installed. What code violation exists?

A. The lock-on device is not required when an AFCI breaker is installed

B. AFCI protection is prohibited on fire alarm dedicated branch circuits per NEC Article 760

C. AFCI breakers are acceptable on fire alarm circuits if a lock-on device is also present

D. Only the missing GFCI protection is a violation — AFCI is acceptable for fire alarm circuits

67. A fire alarm technician tests a horn/strobe and observes the temporal-three pattern sounds correctly. The strobe flashes but at a rate of approximately 0.5 flashes per second. Per NFPA 72, what should be documented?

A. The strobe fails the flash rate requirement — NFPA 72 requires 1 to 2 flashes per second

B. The strobe passes because any flash rate below 2 flashes per second is within the acceptable range

C. The strobe rate is acceptable for sleeping areas but fails for non-sleeping commercial spaces

D. The flash rate is irrelevant as long as the candela output meets the room coverage requirements

68. A fire alarm technician tests notification appliances on a NAC circuit. All horn/strobes activate except one ceiling-mounted speaker that produces no audio. The voltage at the speaker terminals reads 70.2 VAC during alarm. What is the most likely cause?

A. The voltage reading of 70.2 VAC confirms the circuit is energized but the voltage is too low

B. The amplifier serving the floor has a failed output channel that only affects this specific speaker

C. The speaker circuit wiring has a polarity reversal preventing audio delivery to the speaker

D. The speaker has an internal failure — adequate voltage is present but the device is not producing audio

69. A fire alarm technician performs a battery load test. Starting voltage is 27.2 VDC. After the specified duration under full alarm load, ending voltage is 19.8 VDC. The manufacturer's minimum acceptable end-voltage is 20.4 VDC. What must be documented?

A. The batteries passed because 19.8 VDC exceeds the general industry minimum of 18 VDC

B. The batteries failed — 19.8 VDC is below the manufacturer's 20.4 VDC minimum end-voltage

C. The test is inconclusive and must be repeated after the batteries are fully recharged

D. The batteries can remain in service for 90 days while replacements are ordered and scheduled

70. A fire alarm technician discovers during inspection that the building's fire command center graphic annunciator has three burned-out LED indicators — zones 4, 9, and 15. All other LEDs function correctly. What must be documented?

A. The three dead LEDs are cosmetic and do not affect fire alarm system operation

B. Only LED 4 needs repair because zones 9 and 15 are in unoccupied areas of the building

C. The burned-out LEDs prevent firefighters from identifying alarms in zones 4, 9, and 15 and must be repaired

D. The annunciator must be replaced entirely because individual LED repair is not supported

71. A fire alarm technician is testing a fire alarm system's HVAC shutdown interface. When a duct detector activates, the AHU shuts down correctly. The technician resets the system. The AHU restarts automatically. The approved sequence of operations states "AHU manual restart required after fire alarm shutdown." What must be documented?

A. The automatic restart contradicts the approved sequence of operations and must be investigated and corrected

B. Automatic restart is always the correct behavior regardless of what the sequence of operations states

C. The sequence of operations should be updated to reflect the automatic restart behavior

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

72. A fire alarm system event log shows 85 "WATERFLOW — ALARM" entries over the past four months. No actual fires occurred and no sprinkler heads were found activated. The building engineer reports intermittent water pressure fluctuations from the municipal supply. What corrective action should be recommended?

A. Replace all waterflow switches with newer models that have built-in pressure compensation

B. Increase the waterflow switch retard delay setting to filter out pressure-related paddle movements

C. Install a pressure regulating valve on the sprinkler system supply to stabilize pressure

D. Investigate and address the pressure fluctuations and adjust the waterflow switch retard settings

73. A fire alarm technician discovers that a building renovation removed a corridor wall, combining two separate fire alarm zones into one open space. The detectors from both zones remain in place and function correctly. The panel still shows two separate zones for what is now a single open area. What should be recommended?

A. The zones should remain separate because they were originally designed as distinct zones

B. The zone configuration should be evaluated against the current floor plan and adjusted if appropriate

C. Both zones must be immediately combined into a single zone at the panel

D. Only the as-built drawings need updating — the zone configuration can remain unchanged

74. Per NFPA 72 Table 14.4.3.2, the fire alarm system's communication link to the supervising station must be tested at what minimum frequency?

A. Monthly by transmitting a test signal and confirming receipt at the supervising station

B. Semiannually by transmitting a test signal and confirming receipt at the supervising station

C. Annually by transmitting a test signal and confirming receipt at the supervising station

D. Quarterly by transmitting a test signal and confirming receipt at the supervising station

75. A fire alarm technician is inspecting a fire alarm system and discovers that the panel's LCD display shows the time as 4:30 PM when the actual time is 6:15 PM — a 105-minute discrepancy. What must be documented?

A. The 105-minute time discrepancy affects event log accuracy and the clock must be corrected

B. The time discrepancy is cosmetic and does not affect the fire alarm system's operational capability

C. The panel's internal clock must be replaced because software corrections cannot fix time drift

D. Only discrepancies exceeding 2 hours require documentation and correction per NFPA 72

76. A fire alarm technician is testing visible notification appliances in a hospital corridor. Two strobes are visible from the same location — one on each end of a 100-foot corridor. During testing, both strobes flash but are clearly not synchronized — they flash approximately 0.4 seconds apart. The devices are on different NAC circuits. What code requirement is being violated?

A. The flash rate requirement because both strobes must flash at exactly 1.0 flash per second

B. The candela requirement because unsynchronized strobes produce inconsistent light levels

C. The mounting height requirement because improperly mounted strobes cannot synchronize

D. The synchronization requirement — all visible appliances in the same field of view must flash together

77. A fire alarm technician discovers during inspection that a building tenant has installed an acoustic tile drop ceiling in a space that previously had an open ceiling with exposed structure. The existing smoke detector is now above the new drop ceiling — concealed and inaccessible. The detector continues to communicate with the panel. What must be documented?

A. The detector can remain above the ceiling because it still communicates with the panel

B. The detector is in a different air space now and may not detect fires in the occupied room below

C. The detector must be relocated below the new ceiling and the concealed space evaluated for detection

D. The concealed detector provides dual coverage for both the room and the space above the ceiling

78. A fire alarm technician is performing annual testing on a releasing fire alarm system. The test requires verifying the cross-zone detection logic, the pre-discharge timer, the abort switch, and the releasing circuit supervision. The agent solenoid has been disconnected and a substitute load installed. During the cross-zone test, both zones activate, the countdown begins, the abort switch is tested, and the countdown completes. The substitute load shows voltage was delivered. What remains to be tested?

A. The mechanical function of the abort switch since only the electrical function was verified

B. The releasing circuit must be tested with the live solenoid reconnected to verify physical discharge

C. All required releasing system tests have been completed with the substitute load configuration

D. The notification appliances in the releasing zone must be verified for proper pre-discharge warning

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

79. A fire alarm technician is reviewing shop drawings for a 20-story high-rise with voice evacuation. The NAC voltage drop calculation for the longest speaker circuit shows 62.5 VAC at the farthest speaker on a 70.7V system. The speakers are rated for a minimum input of 55 VAC. Does this circuit pass?

A. Yes, 62.5 VAC is above the 55 VAC minimum rated input for the speakers

B. No, 70.7V speaker circuits must maintain at least 90% of the source voltage at all speakers

C. Yes, but the margin is thin and the designer should document the calculation for future reference

D. No, the speakers must receive exactly 70.7 VAC for proper impedance matching and audio quality

80. A fire alarm battery calculation shows: panel/SLC standby = 0.75A, voice amplifier standby = 1.25A, NAC alarm = 4.0A, voice alarm = 8.0A. The building has a qualifying emergency generator. Using reduced 4-hour standby and 15-minute voice alarm duration with 20% safety factor, what is the minimum battery capacity?

A. 20.40 Ah using 4-hour standby with only the NAC alarm load at 5-minute duration

B. 14.40 Ah using 4-hour standby and 15-minute alarm without the safety factor

C. 12.60 Ah using the standard 5-minute alarm duration with the reduced standby

D. The calculation is not valid without checking whether the standby loads need to be multiplied

81. A fire alarm sequence of operations matrix for a hospital shows that a pull station alarm on any floor triggers: notification on the alarm floor and one floor above and below, elevator recall, HVAC shutdown, and supervising station signal. It does NOT show notification on all remaining floors. For a hospital using defend-in-place strategy, is this limited notification approach acceptable?

A. No, all pull station alarms must trigger full building notification regardless of building strategy

B. No, but only because pull stations require a different response than automatic detection

C. Yes, but only if the AHJ has not approved the defend-in-place strategy for the building

D. Yes, defend-in-place hospitals may use limited notification with trained staff managing evacuation

82. A fire alarm conduit schedule shows a 1-inch EMT conduit containing ten 14 AWG THHN and four 16 AWG THHN conductors. NEC Annex C Table C1 shows the maximum for 14 AWG THHN alone in 1-inch EMT is 22, and for 16 AWG alone is 31. Since mixed sizes are present, how must the fill be verified?

A. Compare each size to its individual maximum — since both are below, the installation passes

B. Calculate total conductor area from Chapter 9 Table 5 and compare to the 40% fill limit

C. Add the counts (10+4=14) and compare to the smaller Annex C maximum of 22

D. Use the Annex C maximum for the larger conductor size only since it controls the fill calculation

83. A fire alarm shop drawing shows a floor plan with a large open office measuring 80 × 60 feet with a smooth 10-foot ceiling. The designer placed eight smoke detectors in a 4×2 grid — four columns at 20-foot spacing in the 80-foot dimension and two rows at 30-foot spacing in the 60-foot dimension. The first detector in each direction is at half the spacing from the wall. Is this layout acceptable?

A. Yes, both the 20-foot and 30-foot spacings are within the 30-foot maximum listed spacing

B. No, the 30-foot row spacing puts corner points beyond the 0.7 × 30 = 21-foot maximum

C. No, the room requires at least 12 detectors in a 4×3 grid for complete coverage

D. Yes, but only if the detectors are multi-criteria type rated for extended spacing applications

84. A fire alarm device address schedule shows 196 devices on SLC 1 (maximum capacity 198). A tenant renovation adds 8 new devices. The designer proposes adding 2 devices to SLC 1 (reaching 198) and 6 devices to a new SLC 2. What should the technician flag about this approach?

A. SLC 1 will be at maximum with no capacity for future expansion or replacement devices

B. The 6 devices on SLC 2 are too few to justify adding a new loop — all 8 should go on SLC 1

C. SLC 1 and SLC 2 must have approximately equal device counts for balanced communication

D. Adding only 2 devices to SLC 1 wastes the 2 remaining addresses that could serve future needs

85. A fire alarm riser diagram shows three remote NAC power supply panels located on floors 5, 10, and 15 of a 20-story building. Each remote panel serves NAC circuits for its floor zone. The main panel is on the first floor. What critical calculation must be performed separately for each remote panel?

A. The SLC loading calculation for devices connected through each remote panel's SLC output

B. The voltage drop calculation from the main panel to each remote panel's communication circuit

C. The conduit fill calculation for the riser conductors between the main panel and each remote panel

D. A separate battery calculation for each remote panel based on its specific standby and alarm loads

86. A fire alarm technician reviews a specification requiring "NFPA 72 Record of Completion" at project closeout. The specification further states the document must include specific system details. Per NFPA 72 Section 7.8.2, what information must the Record of Completion contain?

A. Only the installer's name, license number, and signature certifying code-compliant installation

B. System specifications, circuit information, device counts, power supply data, and required signatures

C. Only the AHJ's inspection report and the acceptance test results from the witnessed testing

D. The original design engineer's calculations, the submittal review comments, and the permit number

87. A fire alarm floor plan shows a corridor with a 90-degree turn. The corridor is 8 feet wide. The longer leg is 150 feet and the shorter leg is 80 feet. Smoke detectors are placed at 30-foot spacing along both legs with a detector at the turn. The technician counts 9 detectors total. Is a detector at the turn necessary?

A. Yes, a detector at the turn ensures smoke detection at the direction change where coverage from either leg may be limited

B. No, the 30-foot spacing from detectors in each leg provides adequate coverage through the turn

C. Yes, but only if the turn is sharper than 90 degrees creating a pocket where smoke could accumulate

D. No, corner detectors are only required when the corridor width exceeds 10 feet at the turn

88. A fire alarm technician is reviewing a specification that requires all fire alarm cable above suspended ceilings to be installed in conduit in all areas — not just plenum spaces. The ceiling spaces are not used for air return. The NEC does not require conduit in non-plenum ceiling spaces for listed fire alarm cable. Should the technician install conduit?

A. No, the NEC does not require conduit and the specification exceeds code requirements

B. No, but the technician should notify the engineer that the specification is non-standard

C. Yes, the project specification is a contractual requirement that must be followed regardless of minimum code

D. Yes, because all fire alarm cable above suspended ceilings requires conduit per NEC Article 760

89. A fire alarm shop drawing shows a releasing fire alarm system for a clean agent suppression system. The drawing includes cross-zone detection with Zone A and Zone B, a 15-second pre-discharge timer, and a supervised abort switch. The reviewing engineer notes that the 15-second pre-discharge timer may not provide adequate evacuation time for the room. What determines the appropriate pre-discharge time delay?

A. The delay must equal the room's calculated evacuation time based on room size, exits, and occupant load

B. The room geometry, number of exits, travel distance, and expected occupant count determine the required evacuation time

C. NFPA 72 specifies a fixed 30-second pre-discharge timer for all clean agent systems regardless of room size

D. The clean agent manufacturer specifies the timer duration based on the agent's concentration buildup rate

90. A fire alarm voltage drop calculation for a NAC shows: 14 AWG copper (3.14 Ω/1000 ft), round-trip distance 900 feet, alarm current 2.8 amps. What is the end-of-circuit voltage on a 24 VDC system?

A. 24.0 VDC because 14 AWG produces negligible voltage drop at distances under 1,000 feet

B. 19.87 VDC providing adequate margin above the 16 VDC minimum listed operating voltage

C. 15.09 VDC which falls below the 16 VDC minimum requiring circuit redesign

D. 16.09 VDC providing virtually no margin and requiring redesign for reliability

91. A fire alarm technician reviews a sequence of operations matrix. The matrix shows that a duct detector alarm triggers only HVAC shutdown — no general building notification, no elevator recall, and no supervising station signal. The reviewing engineer asks whether the duct detector should transmit to the supervising station. What is the correct assessment?

A. The duct detector alarm should transmit to the supervising station even if general notification is not triggered

B. Duct detectors never transmit to the supervising station because they are supervisory devices only

C. Duct detector signals are automatically transmitted regardless of the matrix notation

D. Duct detectors transmit only if they are configured as alarm inputs rather than supervisory inputs

92. A fire alarm shop drawing shows two SLC loops: SLC 1 (Class B) serving floors 1-5 and SLC 2 (Class A) serving floors 6-15. A reviewer asks why the two loops have different circuit classifications. The designer's rationale states that upper floors have longer egress times and benefit from Class A fault tolerance. Is this a valid design approach?

A. No, all SLC loops within the same building must use the same circuit classification

B. No, Class A is required for all loops in buildings taller than 5 stories per NFPA 72

C. Yes, different loops may use different circuit classifications based on the designer's risk assessment

D. Yes, but only if the AHJ provides written approval for mixed circuit classifications

93. A fire alarm shop drawing includes a notification appliance circuit layout for a conference room measuring 50 × 40 feet with a 10-foot ceiling. The drawing shows two wall-mounted strobes — one 60 cd strobe on a 50-foot wall and one 60 cd strobe on the opposite 50-foot wall. Per NFPA 72 Table 18.5.5.5.1(a), a single 60 cd wall-mounted strobe covers a room up to 45 × 45 feet. Does this two-strobe arrangement provide adequate visible coverage?

A. No, each strobe can only cover 45 × 45 feet so neither individually covers the 50-foot dimension

B. Yes, the two strobes together provide overlapping coverage that addresses the full room dimensions

C. No, the room requires four strobes — one on each wall — per the table's room coverage methodology

D. Yes, but only if both strobes are synchronized and mounted at the same height

94. A fire alarm floor plan shows a large open warehouse measuring 200 × 150 feet with 35-foot ceilings. The detection specification calls for projected beam smoke detectors. Four beams are shown spanning the 200-foot dimension, spaced at 37.5 feet across the 150-foot dimension. What must the technician verify about this spacing?

A. That all four beams are at identical heights within 2 inches for consistent detection coverage

B. That the 37.5-foot spacing is within the 30-foot maximum per standard smoke detector requirements

C. That the beam spacing does not exceed the lateral coverage listed for the detector at the installed ceiling height

D. The beam spacing does not exceed the manufacturer's listed maximum for the 35-foot ceiling height

95. A fire alarm specification requires "acceptance testing per NFPA 72 Section 14.4.1.1" before the building receives its certificate of occupancy. The specification states that the installing contractor must provide a minimum of 5 business days' advance notice to the AHJ before the test. The general contractor requests the test in 3 days. How should the fire alarm contractor respond?

A. Maintain the 5-day notice requirement per the specification and reschedule accordingly

B. Conduct a preliminary test in 3 days and schedule the formal AHJ test with proper notice

C. Contact the AHJ to request an expedited approval waiving the notice requirement

D. Refuse to test until the general contractor agrees to the 5-day notice in writing

96. A fire alarm riser diagram shows a fire alarm system with a main panel on Floor 1, a network communication riser to a remote transponder panel on Floor 10, and speaker circuit risers from Floor 1 to Floor 20. The notation on the speaker circuit riser reads "PATHWAY SURVIVABILITY LEVEL 2." What cable or construction method must be used for these speaker circuit risers?

A. Standard FPLP cable in standard EMT conduit without additional fire rating

B. Standard FPLP cable with no raceway required as long as the cable is listed

C. Either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated construction

D. Standard FPLR cable in a 1-hour fire-rated stairwell enclosure

97. A fire alarm technician reviews a drawing that shows a notification appliance circuit with 10 horn/strobes at 0.310 amps each, 6 speakers at 0.150 amps each, and 4 strobes at 0.195 amps each on a single NAC output rated at 3.0 amps. What is the total load, and does it exceed the rating?

A. Total is 3.54 amps which significantly exceeds the 3.0-amp NAC output rating

B. Total is 4.78 amps which exceeds the rating and requires circuit redesign

C. Total is 2.68 amps which is within the 3.0-amp rating with margin

D. Total is 4.88 amps based on doubling the alarm current for inrush estimation

98. A fire alarm as-built drawing shows 165 devices on SLC 1 and 148 devices on SLC 2. During inspection, the technician counts 172 devices on SLC 1 and 148 on SLC 2. The panel programming shows 172 on SLC 1 and 148 on SLC 2. What documentation action is required?

A. No action because the panel programming matches the physical count

B. Only the as-built drawings need updating since the panel count matches the actual installation

C. All documents must be reconciled — the as-built drawings must be updated to show 172 devices on SLC 1

D. The as-built drawings, Record of Completion, and device schedule must all be updated to reflect the current 172-device count

99. A fire alarm shop drawing shows a corridor smoke detector layout. The corridor is 180 feet long. Detectors are spaced at 30-foot intervals with the first detector at 15 feet from one end: positions at 15, 45, 75, 105, 135, and 165 feet — six total. The last detector is 15 feet from the opposite end. Does this layout comply with NFPA 72?

A. Yes, six detectors with 30-foot spacing and 15-foot end distances provide complete corridor coverage

B. No, seven detectors are needed because the 30-foot spacing leaves a gap at the corridor midpoint

C. Yes, but only if additional detectors are placed at any corridor intersections

D. No, the first and last detectors must be within 10 feet of the corridor ends, not 15 feet

100. A fire alarm technician reviews a fire alarm system specification that requires all SLC circuits to be Class A with pathway survivability Level 2. The specification further requires that the Class A outgoing and return paths follow physically separate routes through the building. The designer's routing plan shows the outgoing path in the east riser and the return path in the west riser, crossing each floor through the ceiling space. What must the technician verify about the ceiling space crossover?

A. That the ceiling space routing does not create a single point of failure for both paths

B. That the ceiling space is a plenum requiring FPLP cable for both the outgoing and return paths

C. That the crossover routing uses 2-hour fire-rated construction or CI cable per Level 2 requirements

D. Both A and C are correct — the crossover must not create a single point of failure and must maintain Level 2 protection

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a junior technician installed 12 detector bases using a base model from a different product line than specified in the device schedule. The bases are from the same manufacturer but a different series. What corrective action is required?

A. No action is needed because bases from the same manufacturer are always interchangeable

B. Leave the bases and request a change order to update the device schedule to match installed bases

C. Verify whether the bases are listed as compatible with the specified detector heads before proceeding

D. Remove all 12 bases and install the correct model specified in the approved device schedule

102. A fire alarm contractor is managing a multi-story installation project. The general contractor's schedule requires the fire alarm rough-in for floors 5-10 to be completed before the drywall contractor closes the ceiling spaces. The fire alarm contractor's schedule shows this rough-in completing two weeks after the drywall deadline. How should the fire alarm contractor respond?

A. Request the general contractor to delay drywall on floors 5-10 by two weeks to accommodate fire alarm

B. Reprioritize resources to complete the ceiling space rough-in on floors 5-10 before the drywall deadline

C. Install temporary wiring above the ceiling and replace with permanent wiring after drywall is complete

D. Proceed with the original schedule and cut access holes in the drywall for later fire alarm work

103. A fire alarm technician is coordinating the acceptance test for a high-rise building. The test requires verification of elevator recall, HVAC shutdown, stairwell pressurization, smoke control activation, and door holder release. Which trade contractors must be present or on call during the acceptance test?

A. The elevator, HVAC, and controls contractors must be present to verify their equipment responds to fire alarm commands

B. Only the fire alarm contractor needs to be present because the acceptance test covers only fire alarm equipment

C. The general contractor is solely responsible for coordinating all trade participation at the test

D. Only the AHJ needs to be present — trade contractors submit their test results separately

104. A fire alarm project manager receives a request from the building owner to change the notification appliance type from horn/strobe to speaker/strobe for voice evacuation throughout a building that is 75% complete. The change affects panel configuration, amplifier requirements, wiring, and device specifications. How should this be handled?

A. Install the speaker/strobes immediately since they mount in the same locations as horn/strobes

B. Refuse the change because converting to voice evacuation at 75% completion is technically impossible

C. A formal change order must document the engineering revision, cost impact, and schedule extension

D. Install speaker/strobes on remaining floors only and leave horn/strobes on completed floors

105. A fire alarm contractor discovers during installation that the electrical contractor has wired the fire alarm panel's dedicated circuit through a sub-panel that also feeds a non-fire-alarm UPS system. The fire alarm circuit has its own dedicated breaker with a lock-on device. Is this arrangement acceptable?

A. No, the fire alarm circuit must originate from the main distribution panel, not from a sub-panel

B. Yes, the circuit is dedicated with proper identification and a lock-on device regardless of which panel feeds it

C. No, the sub-panel's main breaker could be turned off disconnecting both the UPS and the fire alarm

D. Yes, but only if the sub-panel is in a common area accessible to fire alarm service personnel

106. A fire alarm contractor is managing inventory for a project requiring 300 addressable smoke detectors. The supply house delivers 300 detectors, but 25 have a different manufacturing date code than the other 275. All 300 are identical model numbers and are listed as compatible with the panel. Should the contractor be concerned?

A. Yes, all detectors on the same SLC must have identical date codes for firmware consistency

B. No, date code variations are normal in large orders and do not affect compatibility or performance

C. Yes, the 25 different-date-code detectors should be installed on a separate SLC loop

D. No, but the 25 detectors should be installed in non-critical areas as a precautionary measure

107. A fire alarm project supervisor is training a new technician on proper documentation. The new technician asks whether every service call — including minor repairs like tightening a wire nut — requires a formal written service report. What is the correct guidance?

A. Yes, every service activity must be documented in a written report regardless of the repair scope

B. No, reports are only needed for service calls that involve replacing devices or components

C. Yes, but only if the service call resolves an active trouble or alarm condition at the panel

D. No, minor repairs taking less than 30 minutes can be documented with an informal email instead

108. A fire alarm contractor is scheduling acceptance testing for a newly installed fire alarm system in a hospital. The hospital's infection control department requires 48-hour advance notice before any smoke aerosol testing in patient care areas. The general contractor wants testing to begin tomorrow. How should the fire alarm contractor proceed?

A. Test only non-patient-care areas tomorrow and schedule patient care testing with proper infection control notice

B. Proceed with all testing tomorrow because fire alarm testing takes precedence over infection control

C. Comply with infection control requirements by providing the required notice and scheduling patient care testing accordingly

D. Use alternative testing methods in patient care areas that do not require aerosol smoke

109. A fire alarm project is nearing completion. The contractor must prepare the closeout documentation package. The specification requires "as-built drawings reflecting the actual installation." The installing technicians marked up their field drawings during installation but the markups are messy and difficult to read. What should the contractor do?

A. Submit the messy field markups because they represent the actual as-installed conditions

B. Create clean, professional as-built drawings incorporating all field markup information accurately

C. Submit the original shop drawings without markups since the installation followed the approved design

D. Have the technicians create clean as-built drawings from memory rather than using the field markups

110. A fire alarm contractor must deliver the project closeout documentation package to the building owner. Per NFPA 72, what is the minimum required documentation?

A. The panel manufacturer's operating manual and the contractor's warranty statement

B. As-built drawings, Record of Completion, sequence of operations, and operating instructions

C. Only the as-built drawings and the AHJ's signed acceptance letter

D. The original shop drawings, the submittal review comments, and the bid documents

LEVEL II — SIMULATION EXAM 3: ANSWER KEY AND EXPLANATIONS

1. D — Pathway survivability Level 2 per NFPA 72 Section 12.4.4 requires the circuit pathway to be protected by 2-hour fire-rated construction or 2-hour fire-rated cable. Within a 2-hour fire-rated stairwell enclosure, the conductors are already protected by the rated construction. Multiple conductors sharing a conduit within the rated enclosure does not violate Level 2 because the enclosure itself provides the required protection.

2. 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 that if staff fail to investigate — whether due to absence, distraction, or incapacity — the building occupants are still notified of the alarm condition.

3. C — NFPA 72 Section 18.4.4.1 requires audible notification at least 15 dB above the average ambient noise level. At 108 dB ambient: 108 + 15 = 123 dB minimum. This extremely high requirement is technically impractical to achieve with standard notification appliances in a nightclub environment. The design must address this limitation — typically through heavy reliance on visible notification supplemented by the highest available audible output.

4. B — Clean room laminar airflow moves from ceiling to floor at 90 fpm, creating a continuous downward air current that pushes smoke toward the floor before it can reach ceiling-mounted detectors. This airflow pattern works against the natural buoyancy of smoke. Alternative detection such as aspirating systems with sampling points at multiple heights or return-air monitoring should be considered.

5. D — Smoke detectors: 85 × 0.30 = 25.5 mA. Monitor modules: 18 × 0.20 = 3.6 mA. Control modules: 10 × 3.5 = 35.0 mA. Relay modules: 4 × 2.8 = 11.2 mA. Isolator modules: 6 × 0.15 = 0.9 mA. Total = 76.2 mA, approximately 76 mA. This is well within the panel's 128 mA maximum SLC current capacity, providing substantial margin for future device additions.

6. A — Cross-zoning requires two separate detection zones to both activate before the panel initiates agent release. The purpose is to prevent accidental discharge from a single detector false alarm — requiring two independent confirmations. The detection technology used in each zone does not affect the cross-zone function. However, using different technologies provides complementary detection as an additional benefit.

7. C — NFPA 72 Section 10.18 requires fire pump supervisory monitoring to include pump running status, power available, phase reversal/phase loss, and controller trouble conditions. Each condition must generate a supervisory signal at the fire alarm panel. These are supervisory — not alarm — signals because they indicate off-normal equipment conditions requiring investigation rather than an immediate fire emergency.

8. B — Class A pathway diversity requires physically separate routes for the outgoing and return paths so a single event cannot destroy both. When both paths cross through the same unrated corridor, a fire in that corridor could damage both conductors simultaneously — eliminating the redundancy that Class A is designed to provide. This shared routing point is a vulnerability that should be addressed.

9. A — ADA-accessible sleeping rooms require notification effective for alerting sleeping hearing-impaired occupants. A pillow-level or bed-mounted alerting device — such as a high-intensity strobe placed near the pillow or a bed shaker unit — directly alerts a sleeping deaf or hard-of-hearing person. Standard wall-mounted strobes alone may not wake a sleeping person who cannot see the flash with their eyes closed.

10. C — Aspirating smoke detection systems use a laser-based analysis chamber that can detect extremely low smoke concentrations — far below the threshold of spot-type or beam detectors. With sampling pipes at multiple elevations within the 70-foot atrium, the system detects smoke regardless of where it stratifies. This very early warning capability and multi-height sampling make aspirating detection ideal for tall open volumes.

11. D — NFPA 72 Section 26.6.3.1.1 requires the DACT to test each telephone line by verifying it can seize the line and obtain dial tone at intervals not exceeding 24 hours. This periodic verification ensures that a disconnected, damaged, or failed telephone line is detected within one day. Without this test, a line failure could go unnoticed indefinitely, leaving the system unable to transmit alarm signals.

12. B — The maximum distance between a projected beam detector's transmitter and reflector (or receiver) depends on the specific manufacturer's listing. Typical listed ranges vary from 100 feet to over 330 feet depending on the model and configuration. NFPA 72 does not establish a universal maximum beam length — the manufacturer's listing governs the maximum distance for each specific product.

13. A — NFPA 72 Chapter 24 requires that mass notification message content be determined by the building's emergency stakeholders through the risk analysis and emergency response plan. The stakeholders — including building management, security, and emergency response personnel — identify the threat scenarios and develop appropriate messages for each type of emergency.

14. C — NFPA 72 Section 10.6.7.2 permits the secondary battery standby duration to be reduced from 24 hours to 4 hours when a qualifying emergency generator provides backup power. This reduction

applies to all fire alarm system types including voice evacuation. The alarm duration remains at 15 minutes for voice evacuation systems regardless of the generator.

15. B — AHU-3's air velocity of 75 fpm falls below the duct detector manufacturer's minimum operating velocity of 100 fpm. At velocities below the minimum, insufficient air is drawn through the sampling tubes to the sensing chamber, preventing reliable smoke detection. The duct detector must be relocated to a point on the duct where the air velocity is within the manufacturer's listed range.

16. D — If the elevator machine room has a fire, smoke may travel through the hoistway and reach the primary recall floor (typically the lobby). Recalling elevators to a smoke-contaminated lobby endangers passengers. NFPA 72 Section 21.3 requires an alternate recall floor so that when the machine room detector activates, elevators travel to a different floor where passengers can safely exit.

17. A — Whether a single NAC circuit can serve multiple occupancies depends on the sequence of operations. If the three occupancies require different notification timing, different activation zones, or different notification patterns, separate NAC circuits or programmable zone assignments are needed. The sequence of operations drives the circuit design — not the occupancy boundary alone.

18. C — Each of these three environments — central vacuum, commercial laundry, and woodworking — generates airborne particles that would cause smoke detector nuisance alarms. Heat detection avoids nuisance activations because it responds only to abnormal temperature increases and is unaffected by airborne dust, lint, wood particles, or laundry debris.

19. B — The covered walkway is an unrated, exposed structure connecting the two buildings. A fire, falling debris, severe weather, or vandalism in the walkway could sever the network communication cable, disconnecting Building B from the master panel in Building A. This single point of failure compromises the entire campus network and should be addressed with redundant routing or a backup communication path.

20. D — NFPA 72 Section 23.11 requires releasing fire alarm systems protecting occupied spaces to provide a pre-discharge timer and abort capability for personnel safety. The pre-discharge timer provides time for occupants to evacuate, and the abort switch allows personnel to halt the release if investigation determines no fire exists. Both features are required regardless of the suppression agent type.

21. A — NFPA 72 Section 23.10 permits the fire alarm control panel to be located remotely from the fire command center if a complete repeater panel with full status display and control capability is installed at the fire command center. The repeater must provide all the information and control functions that arriving firefighters need without requiring them to travel to the panel's actual location.

22. B — Defend-in-place hospitals typically activate notification only on the alarm floor — and sometimes one floor above and below — rather than the entire building. This limited notification prevents unnecessary evacuation of patients who are difficult to move and whose medical conditions may be worsened by evacuation. Trained staff manage the response on the alarm floor while other floors continue normal operations.

23. D — NFPA 99 (Health Care Facilities Code) requires fire alarm circuits in patient care areas to comply with the essential electrical system requirements. This may affect how the circuits are powered — whether from the normal, life safety, or critical branch of the essential electrical system — and imposes additional requirements for circuit integrity in areas where patients depend on continuous care.

24. A — When movable partitions can divide the ballroom into four smaller rooms, each possible configuration must have adequate notification. A partition that creates a separate enclosed room blocks both sound and light from appliances in the adjacent section. The notification design must ensure that each possible room configuration has its own notification coverage when partitions are deployed.

25. C — Standby = 1.1 × 24 = 26.4 Ah. Alarm = (5.2 + 7.8) × 0.25 = 3.25 Ah. Subtotal = 29.65 Ah. With 20% safety factor: 29.65 × 1.20 = 35.58 Ah. Rechecking with precise values: 26.4 + 3.25 = 29.65 × 1.20 = 35.58 Ah.

26. B — 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 85°F, so the minimum rating is 105°F. A 135°F detector provides a 50°F margin — well above the required 20°F minimum — and is a standard commercially available rating appropriate for this application.

27. D — At 70 feet above the stage floor, spot-type smoke detectors mounted at the ceiling may not effectively detect fires because smoke can cool and stratify before reaching that height. Aspirating smoke detection with sampling pipes at multiple elevations or projected beam detectors spanning the fly gallery at various heights provide reliable detection regardless of where smoke stratifies in the tall stage volume.

28. A — In a 70.7V distributed audio system, each speaker has an impedance-matching transformer that converts the high-voltage, low-current line signal to the low-impedance signal the speaker driver requires. Without these transformers, two speakers wired in parallel present a very low impedance load directly to the amplifier output. This impedance mismatch causes excessive current draw, audio distortion, and potential amplifier damage or shutdown.

29. B — In some residential high-rise building configurations, fire alarm detection within individual dwelling units may trigger notification only within that unit — alerting the residents to evacuate — while transmitting the alarm to the building management and supervising station. This approach is determined by the building code, the AHJ, and the approved fire safety plan. NFPA 72 Section 23.4.3 addresses notification requirements for dwelling unit systems.

30. C — The removed door between tenant spaces changes the physical layout that the fire alarm system was designed around. Smoke detector coverage must be evaluated for the combined space (spacing may need adjustment), zone identification must be reviewed (two zones now cover one open area), and notification appliance coverage must be verified for the larger combined space.

31. D — A raised floor plenum used for air distribution — whether for supply or return air — is classified as a plenum space. FPLP (Fire Power-Limited Plenum) cable is required for all fire alarm circuits routed through this under-floor plenum. Lower-rated cables such as FPL and FPLR cannot substitute for FPLP in plenum spaces regardless of whether the plenum is above a ceiling or below a raised floor.

32. A — NFPA 72 Section 17.14.8 specifically requires manual fire alarm stations (pull stations) to be red in color. However, NFPA 72 does not impose a color requirement on smoke detectors, heat detectors, or other fire alarm devices. The architect may specify white detectors to match the ceiling, but pull stations must remain red per code.

33. D — If the supervised releasing circuit develops an open fault, the panel cannot deliver the release signal to the pre-action valve solenoid. The panel detects this open circuit through the circuit supervision and generates a trouble signal, alerting building management that the releasing circuit's integrity is compromised. The fire alarm detection continues to function, but the ability to open the pre-action valve is impaired until the circuit is repaired.

34. B — Fire in a tunnel connecting two buildings can spread to both structures. Detection in the tunnel must trigger notification in both buildings connected by that tunnel segment so occupants in both buildings are alerted to the threat. The fire alarm systems in both buildings must be coordinated — either through network communication or relay interfaces — to ensure bilateral notification.

35. D — Unlike simple DC circuits, 70.7V audio distribution circuits have total impedance that includes both the wire resistance and the transformer losses at each speaker connection. The cumulative effect of wire resistance and transformer insertion losses reduces the audio power available at distant speakers. Both factors must be considered when calculating whether speakers at the end of long runs will receive adequate audio power.

36. A — NFPA 72 Section 18.3 requires fire alarm visible notification devices to be specifically listed for fire alarm service. Nurse call corridor dome lights are not listed as fire alarm notification appliances and do not meet the UL 1971 listing requirements for candela output, flash rate, and synchronization. Fire alarm visible notification must use dedicated, listed devices.

37. C — Audio signal strength decreases with distance due to resistance losses in the speaker wire. Over the 550-foot run to the 10th floor, the cumulative wire resistance reduces the power delivered to distant speakers. This line loss is the primary disadvantage of centrally located amplifiers in tall buildings and is the reason remote amplifier panels or NAC boosters are used in high-rise voice evacuation systems.

38. B — NEC Article 700.10 requires emergency system wiring — including fire alarm circuits originating from the emergency electrical system — to be installed in separate raceways from all normal power wiring. Emergency and normal wiring cannot share raceways, boxes, or cabinets. This separation ensures that a fault on normal system wiring cannot disable the emergency circuits.

39. A — When mass notification overrides fire alarm notification, the fire alarm signal must continue transmitting to the supervising station for fire department dispatch. The override affects only the in-building notification — not the external communication of the alarm condition. This ensures that even when mass notification takes audible priority inside the building, the fire department is still dispatched to respond.

40. D — Heat detectors are appropriate for the pool area (humidity and chlorine cause smoke detector nuisance alarms) and the sauna (extreme heat variations cause smoke detector problems). The kitchen requires heat detection near cooking equipment to avoid cooking-fume false alarms, but the dining area within the kitchen can use smoke detection where cooking fumes are less concentrated. Each space's detection technology must match its specific environmental challenges.

41. C — The releasing circuit supervision must be verified during annual testing. With the substitute load installed, the technician should open the releasing circuit to verify the panel generates a trouble signal for the supervised circuit fault. This confirms the panel is actively monitoring the releasing circuit for integrity and would detect a wiring failure that could prevent agent release during an actual fire.

42. A — Clear audio from the fire command center to the 15th floor confirms the downlink audio path and the handset earpiece are functioning. Static heard by the command center from the 15th floor indicates the uplink path has a fault. Since the earpiece works but the command center hears only static, the 15th floor handset's microphone element has most likely failed while the earpiece remains functional.

43. B — The smoke detector activated correctly, the panel processed the alarm, and the control module relay for stairwell pressurization clicked (indicating it received and executed the command). The relay activated but the pressurization fans did not start. The fault lies downstream of the control module — in the interface wiring between the relay contacts and the stairwell fan controller, or in the fan controller itself.

44. D — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 12 high-reading detectors have contamination issues requiring cleaning. The 8 low-reading detectors are abnormally sensitive and must be investigated for faults, environmental causes, or component drift. All 20 out-of-range detectors require corrective action.

45. B — 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 fire detection interlock was satisfied — the air pressure interlock was not triggered.

46. D — Eight non-communicating devices represent eight areas of the building without fire detection coverage. The panel cannot receive alarm signals from these devices, meaning fires in those locations would not be detected by the fire alarm system. This is a significant impairment that must be documented and repaired promptly, with the building owner and AHJ notified per impairment procedures.

47. A — The fire alarm system's role in the door holder release is to de-energize the magnetic holder when the alarm activates. All 20 magnetic holders released correctly — confirming the fire alarm interface performed its function on every door. The two doors that failed to close completely have mechanical door closer deficiencies that are separate from the fire alarm system. Both the successful interface test and the door closer deficiencies should be documented.

48. C — The test verified three critical functions: the IP path transmitted successfully, the panel detected IP path failure within 200 seconds (meeting NFPA 72 supervision timing), and the cellular backup path transmitted successfully when the primary path was unavailable. Both communication paths and the supervision timing are functioning correctly.

49. D — Four months of lost event history impairs the ability to troubleshoot intermittent problems, investigate alarm causes, review system performance trends, and demonstrate maintenance compliance. The event log should be downloaded to external storage for archival purposes, then cleared at the panel to restore full recording capacity for future events.

50. B — Three adjacent detectors with significantly longer activation times (25-35 seconds versus 3-8 seconds) compared to identical detectors on the same floor strongly suggests contaminated sensing chambers in those three devices. Environmental factors specific to that corridor section — such as proximity to a kitchen, bathroom exhaust, or construction dust — may have accelerated contamination. The three detectors should be cleaned and retested.

51. A — A gradual voltage decline from 26.6 to 25.4 VDC over 15 minutes of standby — a drop of 1.2 volts — is normal and expected for batteries under standby load. The voltage remains well above the minimum operating threshold. The charger activating after AC restoration confirms the power transfer test completed successfully. The batteries appear healthy with adequate capacity.

52. C — Any unauthorized modification to a smoke detector — including homemade covers with holes — renders the detector non-compliant with its listing. The plastic container alters the aerodynamic characteristics of the sensing chamber, potentially delaying or preventing smoke entry. Only manufacturer-approved protective covers designed for the specific detector model are acceptable alternatives.

53. D — 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 testing the releasing circuit

supervision, the cross-zone detection logic, the pre-discharge timer, the abort switch, and all associated notification and control outputs.

54. A — Ground faults appearing during rainstorms and clearing after the rain stops strongly indicate rainwater infiltration at a specific point where it reaches SLC wiring or a device. Common entry points include compromised roof penetrations, failed exterior wall weatherproofing, or unsealed conduit entries from the building exterior. The technician should focus on device and junction box locations near the building envelope.

55. B — NFPA 72 does not specify a maximum time for elevator recall completion. The requirement is that the elevators recall to the designated floor and open their doors. Travel time depends on the elevator's starting position — an elevator on the 20th floor naturally takes longer than one on the 2nd floor. All three elevators recalled and opened their doors, satisfying the recall test requirements.

56. D — The stairwell pressurization and adjacent floor air supply activated correctly, confirming the panel processed the alarm and sent commands for those functions. The 8th floor exhaust not activating indicates a fault specific to that output — either the control module output for the exhaust function, the interface wiring to the exhaust fans, or the programming linking the smoke alarm to the exhaust output.

57. C — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. Painting pull stations to match the wall color — beige — directly violates this code requirement. Additionally, painting over the instructional labels renders the device unusable by occupants who cannot read the operating instructions. The painted pull stations must be replaced with properly colored and labeled units.

58. A — The pre-recorded message plays on all 15 floors, confirming all amplifiers, speaker circuits, and speakers are functional. The live microphone audio reaching only floors 1-7 indicates the live audio routing is programmed to broadcast to only a subset of speaker zones rather than all zones. The programming must be reviewed to verify whether the live microphone should reach all floors or only selected zones per the approved design.

59. B — NFPA 72 Table 14.4.3.2 requires smoke detectors to be functionally tested semiannually. Each test involves applying approved aerosol smoke or a calibrated test source to verify the detector activates and the panel responds correctly with proper device identification, notification activation, and signal transmission.

60. D — NFPA 72 requires tamper switches to detect partial valve closure within the code-required travel distance — equivalent to two revolutions of an OS&Y valve wheel. A butterfly valve tamper switch that activates only when the valve is fully closed fails to detect the partial closure that could significantly impair sprinkler system performance. The switch must be adjusted to detect partial closure within the required travel.

61. C — Three major renovations over six years have substantially changed the fire alarm system — adding 65 devices, removing 20, modifying the sequence of operations twice, and adding a second SLC loop. The Record of Completion is required by NFPA 72 Section 7.8 to reflect the current system configuration. A six-year-old document describing a fundamentally different system is a significant documentation deficiency.

62. A — A charger voltage of 25.2 VDC — below the expected 27.0-27.6 VDC float range — while the charger indicator is illuminated and AC power is adequate suggests the charger's output may be degraded. The charger should be tested under load conditions to determine whether it can reach and maintain proper float voltage. Possible causes include a failing charger circuit, degraded batteries that cannot hold charge, or a charger adjustment issue.

63. B — Disconnecting Line 1 and testing Line 2 independently is the standard method for verifying backup telephone line functionality. The station not receiving the Line 2 signal confirms Line 2 has failed its functional test. Line 2 must be investigated and repaired to restore the dual-path communication redundancy required for DACT systems.

64. D — Removing smoke detectors eliminates detection coverage and violates code requirements. The correct solution is to replace the smoke detectors with heat detectors appropriate for the warehouse environment. Heat detectors are unaffected by forklift-generated dust and cardboard particles. The detection technology should match the environment while maintaining code-required fire detection coverage.

65. C — All five detectors are outside the manufacturer's acceptable range of 0.5% to 3.7%. The three high-reading detectors (3.9%, 4.1%, 4.3%) have contamination issues requiring cleaning. The two low-reading detectors (0.3%, 0.4%) are abnormally sensitive and must be investigated for faults. All five require corrective action — readings both above and below the acceptable range indicate devices operating outside their listed parameters.

66. B — AFCI protection is prohibited on fire alarm panel dedicated branch circuits per NEC Article 760. AFCI breakers can trip during arc fault conditions unrelated to fire — such as normal system operation or loose connections elsewhere in the building — disconnecting primary power from the fire alarm panel. The AFCI breaker must be replaced with a standard thermal-magnetic breaker.

67. A — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash at a rate between 1 and 2 flashes per second. At 0.5 flashes per second, the strobe is flashing at half the minimum required rate. This non-compliant flash rate must be documented as a deficiency, and the device must be investigated and repaired or replaced.

68. D — The voltage at the speaker terminals reads 70.2 VAC — within the normal operating range for a 70.7V audio circuit — confirming the circuit is delivering power to the device. The speaker is receiving adequate voltage but producing no audio output, indicating an internal speaker failure — a damaged voice coil, a broken internal connection, or a failed cone assembly. The speaker must be replaced.

69. B — The batteries ended the load test at 19.8 VDC — below the manufacturer's specified minimum acceptable end-voltage of 20.4 VDC. At 19.8 VDC, panel components may malfunction or shut down. The batteries cannot sustain the required alarm load for the full duration and must be replaced with a set that maintains voltage above 20.4 VDC throughout the test.

70. C — The graphic annunciator at the fire command center provides arriving firefighters with immediate visual identification of alarm locations. Burned-out LEDs for zones 4, 9, and 15 mean firefighters cannot identify alarms in those zones from the annunciator display. This impairs emergency response efficiency and must be documented as a deficiency requiring repair.

71. A — The approved sequence of operations is the authoritative document that defines system behavior. If the sequence states "AHU manual restart required" but the AHU restarts automatically, the observed behavior contradicts the approved design. This discrepancy must be documented and investigated — either the HVAC control interface needs correction or the sequence of operations needs formal revision.

72. D — Eighty-five nuisance waterflow alarms in four months with no actual fires suggests water pressure fluctuations causing brief paddle movements. The corrective approach should address both the root cause (investigating and mitigating the pressure fluctuations) and the switch sensitivity (adjusting the retard delay setting to filter out pressure-related paddle movements without exceeding the 90-second maximum alarm response time).

73. B — The removed wall has physically changed the building layout, combining two previously separate spaces. The zone configuration should be evaluated against the current floor plan to determine whether combining the two zones into one is appropriate, or whether maintaining separate zones still provides useful alarm location information. The as-built drawings must also be updated to reflect the architectural change.

74. C — NFPA 72 Table 14.4.3.2 requires the fire alarm system's communication link to the supervising station to be tested annually by transmitting a test signal and confirming receipt at the monitoring station. This verifies the complete communication chain from the panel's communicator through the transmission pathway to the station's receiving equipment.

75. A — A 105-minute discrepancy between the panel clock and actual time significantly affects event log accuracy. Timestamps that are nearly two hours off create confusion when correlating fire alarm events with other building system logs, security camera footage, emergency dispatch records, and witness accounts during incident investigation. The clock must be corrected immediately.

76. D — 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 at opposite ends of a 100-foot corridor are clearly visible from the same location. Flashing 0.4 seconds apart violates the synchronization requirement regardless of whether they are on different NAC circuits.

77. C — The smoke detector above the new drop ceiling is now in a concealed space separated from the occupied room below by the ceiling tiles. Smoke from a fire in the room may not reach the concealed detector in time for effective early warning. The detector must be relocated below the new ceiling to be in the occupied airspace. The concealed space above the drop ceiling should also be evaluated for its own detection needs.

78. B — After verifying the cross-zone logic, countdown timer, abort switch, and releasing circuit voltage delivery through the substitute load, the remaining test element is verifying that the pre-discharge notification appliances in the protected space produce adequate audible and visible warning during the countdown. Occupants must hear and see the pre-discharge warning to evacuate before agent discharge.

79. A — The speaker circuit delivers 62.5 VAC at the farthest speaker, which is above the manufacturer's minimum rated input of 55 VAC. The speakers will operate within their listed parameters at this voltage. While the margin is modest, the circuit meets the manufacturer's specifications and provides acceptable audio performance.

80. C — Standby = (0.75 + 1.25) × 4 = 8.0 Ah. Alarm = (4.0 + 8.0) × 0.25 = 3.0 Ah. Subtotal = 11.0 Ah. With 20% safety factor: 11.0 × 1.20 = 13.20 Ah. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm duration. All loads served by the main panel batteries are included in the calculation.

81. D — Hospitals using a defend-in-place strategy may use limited notification — alerting the alarm floor and immediately adjacent floors while allowing other floors to continue normal operations. This approach is specifically designed for healthcare facilities where patient evacuation is dangerous and impractical. Trained staff on each floor manage the evacuation response under the defend-in-place plan approved by the AHJ.

82. B — When different conductor sizes share the same conduit, the pre-calculated Annex C tables cannot be used because they assume all conductors are the same size. The actual cross-sectional area of each conductor must be obtained from NEC Chapter 9 Table 5, and the total of all conductor areas compared to the conduit's internal area using the 40% fill limit for three or more conductors.

83. A — Both the 20-foot column spacing and the 30-foot row spacing are within the 30-foot maximum listed spacing. The corner-to-nearest-detector distance in the worst case is approximately $\sqrt{(10^2 + 15^2)} = \sqrt{325} \approx 18$ feet (half of 20 and half of 30), which is within the 21-foot maximum (0.7 × 30). The layout provides complete coverage per NFPA 72.

84. C — While the approach of splitting 2 to SLC 1 and 6 to SLC 2 is technically functional, SLC 1 reaching its maximum capacity of 198 means any future device additions — even a single replacement requiring a new address — would need yet another SLC loop. This creates a long-term maintenance burden that should be flagged for the project team's consideration.

85. D — Each remote NAC power supply panel has its own batteries that must sustain the loads it serves during an AC power failure. A separate battery calculation must be performed for each remote panel based on its specific standby and alarm current requirements, using the same NFPA 72 duration and safety factor methodology applied to the main panel calculation.

86. B — NFPA 72 Section 7.8.2 requires the Record of Completion to include comprehensive system information: system specifications, total device counts by type, circuit details, power supply information (including battery calculations), communication path details, acceptance test results, and signatures from the installer, designer, and AHJ.

87. A — A detector at the 90-degree turn ensures smoke detection at the direction change where coverage from detectors in either corridor leg may be limited. Smoke traveling along one leg may not effectively reach detectors positioned beyond the turn in the other leg, especially if the smoke loses buoyancy or encounters cross-drafts at the corner.

88. C — Project specifications are contractual documents that the installing contractor must follow. Even though the NEC does not require conduit in non-plenum ceiling spaces for listed fire alarm cable, the architect's specification requiring conduit is a binding contractual obligation. The contractor must install conduit as specified or submit a formal request for a specification change.

89. B — The pre-discharge time delay must provide adequate evacuation time based on the room's specific characteristics: physical size, number and location of exits, travel distance from the most remote point to the nearest exit, and the expected number of occupants. The delay is determined by the building's actual evacuation conditions, not by a fixed code value or the agent manufacturer's specifications.

90. D — R = 900 × (3.14/1000) = 2.826 Ω. V_drop = 2.8 × 2.826 = 7.913V. End voltage = 24 − 7.913 = 16.087 VDC. At 16.09 VDC, the circuit barely meets the 16 VDC minimum with virtually no margin. Any connection aging, temperature increase, or additional device would push the voltage below minimum. The circuit should be redesigned with larger conductors.

91. A — Even when duct detectors are configured for HVAC shutdown only without general building notification, the alarm signal should still be transmitted to the supervising station. Transmitting the signal ensures building management and the monitoring service are aware of the detection event for investigation and follow-up, even if in-building notification is not activated.

92. C — Different SLC loops within the same building may use different circuit classifications based on the designer's risk assessment. The designer determined that upper floors — with longer egress times and greater vulnerability during extended evacuation — benefit from Class A fault tolerance. This risk-based approach is a valid design consideration when approved by the AHJ.

93. B — Two 60 cd wall-mounted strobes on opposite 50-foot walls divide the room into two coverage zones. Each strobe covers its portion of the room from its wall position. NFPA 72 Table 18.5.5.5.1(a) shows a single 60 cd strobe covers up to 45 × 45 feet. With two strobes, each covers

approximately 25 × 40 feet of its half — well within the single-strobe coverage capability. The overlapping coverage provides complete room notification.

94. D — Beam detector spacing must comply with the manufacturer's listed maximum spacing for the specific ceiling height at the installation. At 35 feet, the manufacturer's listing establishes the maximum lateral distance between beams based on tested detection performance. NFPA 72 requires compliance with the manufacturer's listed spacing — the 37.5-foot spacing must be verified against this listing.

95. A — The specification requires 5 business days' advance notice to the AHJ before acceptance testing. This requirement is a contractual and regulatory obligation that cannot be waived by the general contractor's schedule pressure. The fire alarm contractor must maintain the notice requirement and schedule the test with proper advance notification to the AHJ.

96. C — Pathway survivability Level 2 requires either 2-hour fire-rated cable (circuit integrity cable) or installation within 2-hour fire-rated construction. Standard FPLP cable in standard EMT does not satisfy Level 2. Standard FPLR in a 1-hour stairwell does not satisfy Level 2. The speaker circuit risers must use CI cable or be enclosed in 2-hour rated construction.

97. B — Horn/strobes: 10 × 0.310 = 3.10A. Speakers: 6 × 0.150 = 0.90A. Strobes: 4 × 0.195 = 0.78A. Total = 4.78 amps. This significantly exceeds the 3.0-amp NAC output rating. The circuit must be redesigned by splitting devices across multiple NAC circuits or adding NAC booster power supplies.

98. D — The as-built drawings show 165 devices on SLC 1 but 172 are actually installed. The panel programming confirms the 172-device count. The as-built drawings, the Record of Completion, and the device address schedule must all be updated to reflect the current 172-device installation. All system documentation must agree on the same verified device count.

99. A — Six detectors at positions 15, 45, 75, 105, 135, and 165 feet provide 30-foot spacing between detectors. The first detector is 15 feet from one end and the last is 15 feet from the opposite end. Both end distances and inter-detector spacing comply with NFPA 72 corridor detection requirements.

100. C — The crossover routing through the ceiling space must satisfy both requirements: it must not create a single point of failure for both the outgoing and return SLC paths (pathway diversity for Class A), and the ceiling space routing must be protected by 2-hour fire-rated construction or CI cable (Level 2 survivability). Both conditions must be met at the crossover point.

101. D — Detector bases from a different product series — even from the same manufacturer — may have incompatible communication protocols, different pin configurations, or incorrect electrical characteristics. The safe approach is to remove all 12 incorrect bases and install the correct model specified in the approved device schedule, ensuring listed compatibility with the specified detector heads.

102. B — Ceiling space rough-in must be completed before the ceiling is closed with drywall. Once sealed, concealed work becomes inaccessible for inspection and extremely costly to modify. The fire alarm contractor should reprioritize resources — potentially adding personnel or extending work hours — to complete the ceiling rough-in on floors 5-10 before the drywall deadline.

103. A — Emergency control function interfaces require the respective trade contractors to be present during acceptance testing to verify their equipment responds correctly to fire alarm commands. The elevator contractor verifies recall, the HVAC contractor verifies shutdown and smoke control, and the controls contractor verifies the building automation interface. Each trade must confirm its equipment functions as designed.

104. C — Converting from horn/strobe to speaker/strobe voice evacuation is a fundamental design change. It requires engineering redesign of the panel configuration, amplifier sizing, speaker circuit calculations, wiring specifications, and intelligibility analysis. A formal change order must document the revised engineering, the cost impact, and the schedule extension before any work proceeds.

105. D — The arrangement may be acceptable if the sub-panel's main breaker is accessible to authorized personnel and properly identified per NEC requirements. The key concern is that the sub-panel's main breaker could be turned off — intentionally or accidentally — disconnecting the fire alarm panel's power. The breaker accessibility, identification, and the risk of inadvertent disconnection must be evaluated.

106. B — Different manufacturing date codes within the same detector model number indicate different production runs. As long as all 300 detectors are the same model number and are listed as compatible with the installed panel, date code variations do not affect system compatibility, communication protocols, or detection performance. This is a normal occurrence in large-quantity orders.

107. A — Every service activity — regardless of scope — must be documented in a written service report. Even a simple wire nut tightening resolves a trouble condition that should be recorded for the maintenance history. Proper documentation supports troubleshooting, demonstrates compliance, and provides records for the building owner, AHJ, and insurance carrier.

108. C — Hospital infection control requirements for 48-hour advance notice before aerosol testing in patient care areas must be respected. The fire alarm contractor should provide the required notice to infection control and coordinate the testing schedule with both the general contractor and the hospital. Patient safety protocols cannot be overridden by construction schedule pressures.

109. D — Field markup drawings — however messy — contain the actual as-installed information recorded by the technicians during construction. The contractor should create clean, professional as-built drawings that accurately incorporate all field markup information. The final drawings must be legible and professional while faithfully representing the actual installation documented in the field markups.

110. B — NFPA 72 Section 7.7 requires the installing contractor to deliver as-built drawings reflecting the actual installation, the completed Record of Completion with all required signatures, the approved sequence of operations, and operating and maintenance instructions for the building owner. These four documents constitute the minimum required closeout documentation package.