

LEVEL II — SIMULATION EXAM 2

(110 QUESTIONS)

Time Limit: 155 Minutes

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

DOMAIN 2.1 — INSTALLATION (Questions 1–40)

1. A fire alarm technician is reviewing a design for a 20-story high-rise hotel with voice evacuation. The design calls for pathway survivability Level 2 on all voice circuits. The engineer specifies 2-hour circuit integrity (CI) cable installed in standard cable tray without additional fire-rated enclosure. Does this meet Level 2?

- A. No, CI cable requires additional metallic conduit to achieve the 2-hour rating
- B. Yes, 2-hour CI cable alone satisfies Level 2 without requiring fire-rated enclosure
- C. No, Level 2 always requires both CI cable and 2-hour fire-rated shaft construction
- D. Yes, but only if the cable tray is steel and the tray is listed as a fire-rated assembly

2. A fire alarm technician is installing a networked fire alarm system across a campus with four buildings. Each building has its own fire alarm control panel. The campus security office in Building A requires a single point of monitoring for all four panels. What system configuration provides this capability?

- A. Individual DACT communicators at each panel reporting to the campus security monitoring station
- B. Extended SLC wiring from Building A's panel running through underground conduit to all buildings
- C. Individual cellular communicators at each panel transmitting to a central receiver in the security office
- D. A peer-to-peer or master-slave network connecting all four panels through the manufacturer's protocol

3. A fire alarm technician is installing a fire alarm system in a hospital operating suite. The surgeon requests that audible notification not sound in the operating rooms during procedures. Per NFPA 72, can audible notification be eliminated from the operating rooms?

- A. No, but the system can use a visible-only alerting method with staff acknowledgment at the nursing station
- B. Yes, operating rooms are exempt from all notification requirements during active procedures
- C. No, audible notification is required in all occupied spaces regardless of the occupancy function
- D. Yes, but only if the operating rooms have direct communication with the fire command center

4. A fire alarm technician is installing a fire alarm system with an emergency voice/alarm communication (EVAC) system in a high-rise. The system requires speakers in every area. The design shows 25-volt speaker circuits using 70.7V distributed audio. What advantage does 70.7V distribution provide over standard 24 VDC notification circuits?

- A. 70.7V systems provide higher sound output per speaker than 24 VDC systems
- B. 70.7V distribution is required by NFPA 72 for all voice evacuation systems
- C. 70.7V distribution reduces current draw allowing longer runs with less voltage drop
- D. 70.7V systems eliminate the need for amplifiers between the panel and the speakers

5. A fire alarm technician is calculating the total SLC loading for an addressable panel. The loop has 120 smoke detectors at 0.35 mA standby each, 15 monitor modules at 0.25 mA each, 8 control modules at 4.0 mA each, and 6 isolator modules at 0.10 mA each. What is the total SLC standby current?

- A. 42.0 mA from the smoke detectors alone without the modules
- B. 78.35 mA from all devices combined on the SLC loop
- C. 120.0 mA because the panel supplies a fixed current regardless of device count
- D. 32.0 mA from only the control modules since they draw the highest individual current

6. A fire alarm technician is installing a releasing fire alarm system for a gaseous suppression agent in a data center. The system uses pneumatic actuators on the agent storage cylinders. The releasing circuit from the panel activates a solenoid that releases pilot pressure to the actuators. Per NFPA 72 Section 23.11, what wiring classification does the releasing circuit require?

- A. The releasing circuit must be supervised and installed per the requirements for Class A or Class B circuits
- B. The releasing circuit must use plenum-rated cable regardless of the installation environment
- C. Standard NAC wiring methods apply because the releasing circuit operates at the same voltage
- D. The releasing circuit requires no special classification beyond standard NEC Chapter 3 methods

7. A fire alarm technician is installing a fire alarm system in a building with a central vacuum system. The system has a large collection unit in the basement with vacuum piping running through walls and ceilings to outlets on every floor. During installation, the technician discovers that smoke detectors near the vacuum outlets repeatedly alarm during system testing. What is the most likely cause?

- A. The vacuum motors generate electromagnetic interference affecting nearby detector circuits
- B. The vacuum piping creates standing waves that produce vibration at detector frequencies
- C. The collection unit's exhaust is recirculating dust particles through the building's air system
- D. Suction from the vacuum outlets pulls test smoke away from detectors causing erratic activation

8. A fire alarm technician is reviewing a high-rise building's fire alarm system design. The design includes a firefighter telephone system with handset jacks at every floor landing in both stairwells and at the fire command center. Per NFPA 72 Section 24.5, what type of communication system is the firefighter telephone?

- A. A one-way paging system for the fire incident commander to broadcast to all floors
- B. A selective signaling system that allows the commander to call specific floors individually
- C. A two-way telephone system allowing simultaneous communication between the fire command center and floor stations
- D. A coded signaling system using ring patterns to identify which floor is calling the command center

9. A fire alarm technician is installing an air sampling smoke detection system in a cold storage facility that maintains temperatures at -5°F . The sampling unit will be mounted outside the cold room with sampling pipes extending into the freezer space. What advantage does this configuration provide?

- A. The detection electronics operate in a normal environment while the sampling pipes collect air from the cold space
- B. The sampling unit operates more sensitively at freezer temperatures improving detection capability
- C. Mounting outside eliminates the need for heated sampling pipes inside the cold room
- D. The detection unit requires freezer temperatures to maintain calibration accuracy over time

10. A fire alarm technician is installing a fire alarm system in a performing arts theater. The theater has a fly gallery above the stage with catwalks, rigging equipment, and fabric backdrops. The ceiling height above the stage is 65 feet. Standard spot-type smoke detectors are specified for the stage area. What concern should the technician raise?

- A. The fabric backdrops create a fire load that requires flame detection instead of smoke detection
- B. Smoke may stratify below the 65-foot ceiling making spot-type detectors at that height unreliable
- C. The rigging equipment generates electromagnetic interference preventing detector communication
- D. Theater stages are exempt from detection because the sprinkler system provides adequate protection

11. A fire alarm technician is installing a fire alarm system with a graphic annunciator at the building entrance. The annunciator displays a floor plan with LED indicators for each zone. During commissioning, the technician discovers that Zone 5's LED illuminates when Zone 7 activates, and Zone 7's LED does not illuminate at all. What is the most likely cause?

- A. The graphic annunciator has a burned-out LED at the Zone 7 position on the display board
- B. The fire alarm panel is sending incorrect zone data to the annunciator communication port
- C. The panel's SLC communication with Zone 7 devices has a conflict with Zone 5 addressing
- D. The annunciator's internal wiring has Zones 5 and 7 cross-connected on the LED driver board

12. A fire alarm technician is installing a fire alarm system with an in-building mass notification system per NFPA 72 Chapter 24. The mass notification system must be capable of delivering intelligible voice messages throughout the building during non-fire emergencies such as severe weather or security threats. What performance standard must the voice messages meet?

- A. Messages must achieve a minimum 85 dB sound level at all occupied locations in the building
- B. Messages must override all other building audio systems including background music and paging
- C. Messages must meet the same speech intelligibility requirements as fire alarm voice evacuation
- D. Messages must be delivered simultaneously to all building zones without any selective capability

13. A fire alarm technician is installing a fire alarm system and discovers that the building's emergency power system includes both an emergency generator and an uninterruptible power supply (UPS). The UPS provides instantaneous backup for the building's data center. The generator provides long-term backup. The fire alarm panel is connected to a circuit backed by the generator. Should the panel also be connected to the UPS?

- A. No, the generator backup with the panel's internal batteries provides adequate power protection
- B. Yes, the UPS eliminates the brief power interruption between utility failure and generator start
- C. No, UPS systems generate harmonics that interfere with fire alarm panel operation
- D. Yes, the panel must be connected to both the UPS and the generator for code compliance

14. A fire alarm technician is designing the notification appliance layout for a high-rise building's parking garage. The garage has six levels — three above grade (open air) and three below grade (enclosed). What detection and notification approach should differ between the above-grade and below-grade levels?

- A. Above-grade levels require flame detection while below-grade levels require smoke detection
- B. Above-grade levels may use heat detection while below-grade enclosed levels need evaluation for CO detection in addition to fire detection
- C. Both above and below-grade levels require identical detection and notification equipment
- D. Above-grade levels are exempt from detection while below-grade levels require aspirating detection

15. A fire alarm technician is installing a fire alarm system and encounters a room containing a diesel-powered emergency generator. The room has ventilation openings and diesel exhaust piping. What type of fire detection is most appropriate for this generator room?

- A. Photoelectric smoke detection with protective covers to filter diesel particulates
- B. Ionization smoke detection because it responds faster to diesel combustion products
- C. Aspirating smoke detection with the sampling unit mounted in an adjacent clean environment
- D. Heat detection because diesel exhaust and particulates cause smoke detector nuisance alarms

16. A fire alarm technician is installing a fire alarm system in a large warehouse. The warehouse has high-bay storage racks that extend from the floor to within 3 feet of the 35-foot ceiling. The fire alarm design includes both ceiling-level detection and in-rack detection at intermediate levels within the storage racks. What is the purpose of the in-rack detection?

- A. In-rack detectors compensate for the slower response of ceiling detectors in cold warehouse environments
- B. In-rack detectors provide redundant coverage in case the ceiling-level detectors fail during testing
- C. In-rack detectors identify fires at the rack level before smoke rises to ceiling-mounted detectors
- D. In-rack detectors are required by NEC for all storage racks exceeding 20 feet in height

17. A fire alarm technician is installing smoke detectors in an elevator lobby for Phase I recall. Per NFPA 72 Section 21.3.5, where must the elevator lobby smoke detector be located relative to each elevator bank?

- A. Within the elevator lobby on the ceiling or wall within the area bounded by the elevator bank
- B. In the corridor outside the elevator lobby doors for earliest detection of approaching smoke
- C. Inside the elevator hoistway above the elevator doors on the top floor only
- D. On the ceiling of the elevator machine room adjacent to the main controller panel

18. A fire alarm technician is installing a fire alarm system in a building with an atrium. The atrium extends from the ground floor through a glass roof at 55 feet. The design specifies projected beam smoke detectors at multiple elevations within the atrium. Why are beam detectors installed at multiple heights rather than only at the ceiling?

- A. Multiple beams at the ceiling provide redundancy in case one beam detector fails
- B. Smoke may stratify at different heights depending on fire size and the atrium's thermal layers
- C. Each beam elevation monitors a separate fire alarm zone for floor-level identification
- D. Building codes require a minimum of three beam elevations in any atrium exceeding 40 feet

19. A fire alarm technician is installing a fire alarm system with a digital alarm communicator transmitter (DACT). The DACT connects to two telephone lines for redundancy. Per NFPA 72, what supervision requirement applies to the telephone lines serving the DACT?

- A. The telephone lines require visual inspection every 30 days by the building owner
- B. Each telephone line must have a dedicated EOLR at the telephone company demarcation point
- C. The telephone lines must be tested for dial tone by the DACT at least once every 24 hours
- D. The DACT must verify the integrity of each telephone line at intervals not exceeding 24 hours

20. A fire alarm technician is installing a fire alarm system in a building where the mechanical engineer has specified CO detection in the enclosed parking garage levels. The CO detectors will connect to the building automation system for ventilation control. The fire alarm system must also monitor the CO detection for alarm purposes. How should the CO detection interface with the fire alarm system?

- A. The CO detectors must connect directly to the fire alarm panel's SLC as addressable devices
- B. The building automation system must relay CO alarm signals to the fire alarm panel
- C. The fire alarm panel monitors CO alarm contacts from the CO detection system via monitor modules
- D. CO detection does not require fire alarm system monitoring because it is a ventilation function only

21. A fire alarm technician is installing a fire alarm system in a 30-story high-rise with multiple tenant floors. Each tenant has a separate annunciation zone. The building uses a voice evacuation system with selective paging capability — the ability to send different messages to different floors simultaneously. What system component provides this selective floor paging?

- A. An audio switching matrix or distributed amplifier system that routes messages to selected speaker zones
- B. Separate DACT communicators on each floor that transmit pre-recorded messages independently
- C. Individual panel SLC loops for each floor that carry both detection and audio signals
- D. A central paging amplifier that broadcasts the same message to all floors simultaneously

22. A fire alarm technician is installing a fire alarm system in a hospital with a nurse call system already in place. Both systems use ceiling-mounted devices in patient rooms. The nurse call system has dome lights above patient room doors. The fire alarm system has horn/strobe devices in corridors. Can the nurse call dome light be used as the fire alarm visible notification device for the patient room?

- A. Yes, because both systems serve life safety functions and can share notification devices
- B. No, fire alarm notification devices must be dedicated to the fire alarm system and listed for the purpose
- C. Yes, if the nurse call manufacturer certifies the dome light meets NFPA 72 candela requirements
- D. No, but only because the dome light is above the door rather than on the room wall

23. A fire alarm technician is installing a fire alarm system in a mixed-use building. The ground floor contains a restaurant with a commercial kitchen, and upper floors contain offices. The kitchen hood suppression system activates during a grease fire and the fire alarm panel receives the alarm signal through a monitor module. Per the approved sequence of operations, what additional responses should the panel initiate?

- A. Only HVAC shutdown of the kitchen exhaust hood fan to prevent fire spread through ductwork
- B. Only supervising station signal transmission without any building notification activation
- C. Building alarm notification, supervising station signal transmission, and HVAC shutdown per the sequence

D. Only local kitchen alarm notification without activating horn/strobes in the office floors above

24. A fire alarm technician is installing an emergency voice/alarm communication system in a building. The design requires a minimum speech transmission index (STI) of 0.50 for voice intelligibility throughout all notification zones. During commissioning, the technician measures an STI of 0.45 in the main lobby. What does this mean?

- A. The lobby passes because 0.45 is within the acceptable tolerance of the 0.50 requirement
- B. The lobby fails the intelligibility requirement and corrective action must be taken
- C. The STI measurement is invalid because it must be taken during actual emergency conditions
- D. The 0.45 reading applies only to the pre-recorded message, not to the live microphone function

25. A fire alarm technician is installing a fire alarm system in a building with a pre-action sprinkler system using a single-interlock configuration. The fire alarm panel controls the pre-action valve through a releasing circuit. If only the fire alarm detection activates (no sprinkler head activation), what should happen?

- A. The pre-action valve remains closed because both interlocks must activate simultaneously
- B. Nothing happens because single-interlock systems respond only to sprinkler head activation
- C. The panel transmits an alarm but holds the releasing circuit in a 60-second delay mode
- D. The pre-action valve opens allowing water to fill the piping in anticipation of sprinkler head activation

26. A fire alarm technician is installing a fire alarm system in a critical care unit of a hospital. The unit has individual patient rooms, a nursing station, medication rooms, and a clean utility room. The design calls for smoke detectors throughout. The nurse manager asks why the medication room needs a smoke detector. What is the correct explanation?

- A. The medication room contains combustible materials and is an occupied space requiring detection coverage
- B. The medication room is exempt from detection because it is a secured room accessed only by staff

- C. The medication room requires heat detection only because chemical vapors affect smoke detectors
- D. The medication room needs detection only if it exceeds 200 square feet per NFPA 72

27. A fire alarm technician is reviewing a sequence of operations for a 10-story office building. The sequence shows that a waterflow alarm on the 4th floor activates horn/strobes on floors 3, 4, and 5, transmits to the supervising station, and initiates elevator recall. However, it does not show HVAC shutdown. The building has a central air handling unit serving all floors. Should HVAC shutdown be included?

- A. No, waterflow alarms only require notification and transmission, not HVAC shutdown
- B. Yes, but only if the building has more than 5,000 CFM of air handling capacity
- C. Yes, if the building design requires HVAC shutdown for alarm conditions the sequence must include it
- D. No, HVAC shutdown is triggered exclusively by duct smoke detectors, never by waterflow alarms

28. A fire alarm technician is installing a fire alarm system in a building that requires emergency power for the fire alarm panel. The building has an emergency generator with automatic transfer. Per NEC Article 700, emergency systems must have transfer capability within what maximum time period?

- A. 60 seconds after utility power failure for all emergency loads including fire alarm
- B. 30 seconds after utility power failure for life safety loads only
- C. 120 seconds after utility power failure for fire alarm systems specifically
- D. 10 seconds after utility power failure for all loads served by the emergency generator

29. A fire alarm technician is installing a fire alarm system and the project requires smoke detection in an elevator hoistway. The elevator has a machine-room-less (MRL) design with the drive motor and controller located at the top of the hoistway. Per NFPA 72 Section 21.3, how does the MRL configuration affect the detection requirements?

- A. No detection is required because MRL elevators have self-contained fire protection systems

B. Detection is still required in the hoistway, and the area containing the drive/controller is treated as the machine room space

C. Only heat detection is required because MRL hoistways have higher ambient temperatures

D. Detection requirements are reduced because the MRL design eliminates the need for machine room detection

30. A fire alarm technician is installing a fire alarm system with an emergency responder radio coverage system (ERCES). The ERCES uses distributed antenna systems throughout the building to amplify emergency radio signals. Per NFPA 1221 and NFPA 72, who is responsible for the ongoing testing and maintenance of the ERCES after installation?

A. The building owner is responsible for ensuring the ERCES is tested and maintained per the applicable standards

B. The fire department maintains the ERCES because it is a fire department communication system

C. The cellular carrier that provides the radio frequencies maintains the distributed antenna system

D. The fire alarm contractor maintains the ERCES as part of the fire alarm system service contract

31. A fire alarm technician is performing a battery calculation for a fire alarm system serving a building with voice evacuation. The system has the following loads on the main panel batteries: panel/SLC standby = 0.95A, voice amplifier standby = 1.1A, NAC alarm = 3.8A, voice alarm = 7.2A. The building has a qualifying emergency generator. What is the minimum battery capacity using the reduced standby and voice evacuation alarm duration?

A. 18.23 Ah using 24-hour standby and 5-minute standard alarm duration

B. 12.54 Ah using 4-hour standby without the voice evacuation extended alarm duration

C. 24.12 Ah using 4-hour standby and 15-minute alarm without a safety factor

D. 12.71 Ah using 4-hour standby, 15-minute alarm, and 20% safety factor

32. A fire alarm technician is installing a fire alarm system in a building with a central station monitoring contract. Per NFPA 72 Chapter 26, the central station must have specific capabilities for processing fire alarm signals. What is the maximum time permitted for a central station operator to initiate the required response after receiving an alarm signal?

- A. 120 seconds from signal receipt to initiation of fire department notification
- B. 60 seconds from signal receipt to initiation of fire department notification
- C. 90 seconds from signal receipt to initiation of the required response action
- D. 30 seconds from signal receipt to acknowledgment of the alarm signal

33. A fire alarm technician is designing the fire alarm system for a large hospital complex. The design includes over 2,000 addressable devices across multiple buildings. The main fire alarm panel in Building A has a maximum SLC capacity of 198 devices per loop with four available SLC loops. The total device count exceeds the main panel's capacity. What system architecture addresses this limitation?

- A. A networked multi-panel system where each building has its own panel with sufficient SLC capacity
- B. A single panel with extended SLC wiring running through all buildings at maximum loop length
- C. Conventional zone wiring for the overflow devices beyond the panel's addressable capacity
- D. A larger panel from a different manufacturer with higher per-loop device capacity ratings

34. A fire alarm technician is installing a fire alarm system in a high-rise building. The fire safety director asks the technician to explain the difference between a "dedicated function fire alarm system" and a "non-dedicated function fire alarm system" per NFPA 72. What is the key distinction?

- A. Dedicated systems serve only fire alarm functions while non-dedicated systems share equipment with other building systems
- B. Dedicated systems use the fire alarm panel exclusively for fire detection while non-dedicated systems add mass notification
- C. Dedicated systems are required only in high-rise buildings while non-dedicated are used in low-rise
- D. There is no distinction — both terms describe identical systems using different industry terminology

35. A fire alarm technician is installing a fire alarm system and the design includes a waterflow switch with an adjustable retard delay on each sprinkler riser. The retard delay is currently set to 90 seconds. Per NFPA 72, what is the maximum time from sustained waterflow to alarm signal receipt at the panel?

- A. 30 seconds from sustained waterflow to alarm signal at the panel
- B. 60 seconds from sustained waterflow to alarm signal at the panel
- C. 120 seconds from sustained waterflow to alarm signal at the panel
- D. 90 seconds from sustained waterflow to alarm signal at the panel

36. A fire alarm technician is installing a fire alarm system in a cold storage warehouse. The main storage area is maintained at -10°F . The adjacent loading dock area fluctuates between 20°F and 80°F depending on dock door activity. The office area is maintained at 72°F . What heat detector activation temperature is appropriate for each area?

- A. The same 135°F detector for all three areas since it exceeds all maximum ambient temperatures
- B. Each area needs a different rating based on its maximum ambient temperature plus the required margin
- C. Different ratings: a low-temperature detector for the freezer, a standard detector for the dock, and a 135°F for the office
- D. Heat detectors cannot be used in any area below 32°F — smoke detection is required instead

37. A fire alarm technician is installing a fire alarm system with a waterflow switch on a dry-pipe sprinkler system. The waterflow switch monitors water flow after the dry-pipe valve has tripped and water enters the piping. What additional device must monitor the dry-pipe valve itself?

- A. A low-pressure supervisory switch that detects a drop in the supervisory air pressure within the dry piping
- B. An additional waterflow switch installed upstream of the dry-pipe valve for redundant monitoring
- C. A temperature sensor on the dry-pipe valve body to detect thermal activation of the valve
- D. A position indicator on the dry-pipe valve clapper to confirm whether the valve has opened

38. A fire alarm technician is installing a fire alarm system in a 15-story building. The voice evacuation system requires speaker circuits on every floor. The audio amplifiers are located at the main panel on the 1st floor. The speaker wire runs from the 1st floor to the 15th floor are approximately 600 feet. The amplifier outputs at 70.7 VAC. What is the primary advantage of using 70.7V audio distribution for these long speaker runs?

- A. 70.7V speakers require no impedance matching and can be added freely to any circuit
- B. The higher voltage results in lower current for the same power, reducing voltage drop on long wire runs
- C. 70.7V audio distribution provides higher sound output than 24 VDC notification appliances
- D. 70.7V speaker circuits do not require supervision by the fire alarm panel per NFPA 72

39. A fire alarm technician is installing a fire alarm system in a building with a total flooding clean agent suppression system. The protected room has a drop ceiling. The agent nozzles are located above the drop ceiling to protect the concealed space. Additional nozzles are below the ceiling to protect the occupied space. The fire alarm releasing panel monitors cross-zone detection with detectors above and below the ceiling. If only the above-ceiling detectors activate, should the system release agent?

- A. Yes, because any detection in the protected room should trigger agent release
- B. No, cross-zone requires one zone above and one zone below the ceiling to both activate
- C. Yes, but only the above-ceiling nozzles should discharge — the below-ceiling nozzles remain closed
- D. The above-ceiling detection constitutes both cross-zones because it covers the primary fire origin

40. A fire alarm technician is installing a fire alarm system in a mixed-occupancy building with a nightclub on the ground floor and offices above. The nightclub has extremely high ambient noise levels during operation — measured at 105 dB. Per NFPA 72, what minimum audible notification level is required in the nightclub?

- A. 105 dB because matching the ambient level is sufficient for awareness in entertainment venues
- B. 110 dB because entertainment venues use the 5 dB above ambient alternative requirement
- C. 120 dB based on the standard 15 dB above the 105 dB ambient noise level
- D. Audible notification may be impractical — visible notification must compensate per the design

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

41. A fire alarm technician is performing annual testing on a voice evacuation system. The system has 15 speaker zones across 15 floors. During testing, the technician discovers that speakers on Zone 8 (8th floor) produce significantly lower volume than all other zones. All Zone 8 speakers are equally quiet. What is the most likely cause?

- A. The amplifier channel or audio routing for Zone 8 has reduced output or a partial fault
- B. All Zone 8 speakers have simultaneously developed identical internal failures
- C. The 8th floor construction materials absorb more sound than other floors
- D. The SLC communication to Zone 8 devices is degraded reducing their output power

42. A fire alarm technician is testing a releasing fire alarm system for a clean agent suppression system. The system has a pre-discharge warning of 30 seconds. During testing, the technician verifies that after cross-zone activation, the panel begins the 30-second countdown. At 15 seconds into the countdown, the technician presses the abort switch. The countdown stops. The technician releases the abort switch and the countdown resumes from 15 seconds. Is this correct behavior?

- A. No, pressing abort should permanently cancel the release requiring a full panel reset
- B. Yes, the abort switch pauses the countdown and releasing resumes when the switch is released
- C. No, releasing the abort switch should restart the countdown from 30 seconds, not 15
- D. Yes, but only if the abort switch is the supervised type required by NFPA 72

43. A fire alarm technician is performing annual testing on a fire alarm system that monitors a commercial kitchen hood suppression system. The test requires verifying the fire alarm panel receives the suppression system's alarm signal. Who should perform the activation of the kitchen suppression system's test function?

- A. The fire alarm technician should test only the fire alarm interface, not the suppression system itself
- B. Both the fire alarm technician and the suppression contractor should test their respective systems

- C. The fire alarm technician should activate the suppression system's test switch at the releasing panel
- D. The suppression system contractor should test the suppression side while the fire alarm technician monitors

44. A fire alarm technician is performing semiannual testing on smoke detectors in a building with a positive alarm sequence (PAS) system. During testing, should PAS be active or disabled?

- A. PAS must remain active during testing to verify it functions correctly for each detector
- B. PAS should be active for the first detector test and disabled for subsequent detectors
- C. The PAS feature should be bypassed during semiannual detector testing to prevent delays
- D. PAS must be disabled because it interferes with functional testing signal verification

44. The answer needs to be C. During routine detector testing, PAS is typically bypassed because the technician doesn't want the 180-second delay during every detector test. PAS functional testing is performed separately.

45. A fire alarm technician is performing annual testing and discovers that the fire alarm panel's Record of Completion was last updated four years ago. Since then, the building has undergone three renovations adding 45 new devices, removing 12 devices, and modifying the sequence of operations. What is the documentation status?

- A. The Record of Completion is significantly out of date and must be updated to reflect the current system
- B. The annual testing records adequately capture all modifications, making the Record of Completion update optional
- C. A new Record of Completion is only required if the total device count changed by more than 25%
- D. The original Record of Completion remains valid because it documents the initial installation baseline

46. A fire alarm technician is testing the elevator recall function in a building with three elevator banks. During testing of Bank A's lobby detector, all three elevator banks recall to the ground floor. The sequence of operations specifies selective recall — only Bank A should recall from Bank A's lobby detector. What type of deficiency exists?

- A. A wiring deficiency because the three recall relay circuits are physically cross-connected
- B. A notification deficiency because the panel is treating the recall as a general alarm condition
- C. An elevator controller deficiency because the controllers are sharing a common recall input
- D. A programming deficiency because the panel is activating all recall outputs instead of only Bank A's

47. A fire alarm technician is performing annual testing and encounters a releasing fire alarm system that has not had its abort switch tested since initial installation three years ago. The technician tests the abort switch by pressing it during a simulated cross-zone activation. The countdown stops. The technician releases the switch and the countdown resumes. What must be documented?

- A. The abort switch passed the functional test but three years of missed annual tests must be noted
- B. The abort switch passed and no documentation of missed tests is needed since it now works
- C. The abort switch failed because it should cancel the release permanently, not pause it
- D. The abort switch test is invalid because it was performed without the agent physically connected

48. A fire alarm technician is testing a fire alarm panel's AC power supervision. The technician disconnects primary AC power. The panel transfers to battery. Four hours later, the panel still has not generated an AC power trouble signal. Per NFPA 72, is this acceptable?

- A. Yes, because the panel has 6 hours before it must annunciate an AC power trouble
- B. Yes, because the 4-hour delay is within the standard battery standby duration
- C. No, the AC power trouble must annunciate within 3 hours per NFPA 72 Section 10.6.9
- D. No, the AC power trouble must annunciate immediately upon loss of primary power

49. A fire alarm technician discovers during inspection that a smoke detector in a hospital corridor has been covered with a latex glove by nursing staff to prevent nuisance alarms during a renovation on the adjacent floor. The renovation has been ongoing for two months. What must be documented?

- A. The detector has been effectively disabled for two months and must be uncovered immediately with compensatory measures evaluated
- B. Latex gloves are transparent and do not impede smoke entry into the detector chamber
- C. The covering is acceptable if building maintenance logs the daily status of each covered detector
- D. The nursing staff's action is reasonable and the detector can remain covered until renovation completes

50. A fire alarm technician is performing annual testing on a high-rise building's fire alarm system. During the test of the firefighter telephone system, the technician discovers that the telephone handset at the 12th floor stairwell station produces no sound when connected to the fire command center. All other floor stations work correctly. What should be investigated?

- A. The fire command center telephone equipment because it controls all floor station connections
- B. The 12th floor stairwell wiring and the handset at that specific station location
- C. The fire alarm panel's SLC communication with the 12th floor because the telephone shares the SLC
- D. The 12th floor speakers because the telephone and speaker systems share the same amplifier

51. A fire alarm technician is testing notification appliances and discovers that a wall-mounted speaker in a conference room produces a clear evacuation message but at significantly reduced volume compared to identical speakers on the same circuit. The circuit voltage is within normal limits. What is the most likely cause?

- A. The conference room's acoustic properties absorb sound producing an apparent volume reduction
- B. The amplifier serving the conference room floor has a partially failed output channel
- C. The speaker's internal wattage tap has been set to a lower setting than the other speakers
- D. The speaker wire has a high-resistance connection reducing power delivery to that device

52. During annual testing, the fire alarm technician tests the HVAC shutdown interface. A duct detector activates, the panel processes the alarm, and the control module relay closes. The HVAC contractor confirms the AHU did not shut down despite the relay closure. What should be investigated?

- A. The panel programming because the HVAC output may not be linked to the duct detector zone
- B. The wiring between the control module relay contacts and the AHU controller's shutdown input
- C. The duct detector because it may not be generating the correct alarm signal type
- D. The panel's SLC communication because the control module command may not have been sent

53. A fire alarm technician discovers during inspection that a building has had a persistent ground fault trouble on SLC 1 for four months. The building owner says the system "works fine" and has declined repairs each time they were recommended. What should the technician document?

- A. The four-month unresolved ground fault is a code deficiency requiring repair to maintain system integrity
- B. The building owner's verbal acceptance of the condition constitutes adequate documentation
- C. Ground faults on SLC circuits are informational and do not require corrective action per NFPA 72
- D. The system can continue to operate indefinitely with a ground fault as long as alarms still function

54. A fire alarm technician is performing annual sensitivity testing on an analog addressable system. The panel's sensitivity report shows a detector at address 112 reading 4.1% obscuration per foot. The manufacturer's maximum acceptable reading is 3.7%. The detector was last cleaned one year ago. What action is required?

- A. Reset the detector's sensitivity baseline in the panel programming to accommodate the higher reading
- B. Increase the detector's alarm threshold to prevent nuisance alarms from the elevated sensitivity
- C. Document the reading as acceptable because it is close to the maximum and will be retested next year
- D. Clean the detector per the manufacturer's procedures and retest — if still above 3.7%, replace it

55. A fire alarm technician is testing a fire alarm system's communication paths. The system has an IP communicator as primary and a cellular communicator as secondary. The technician tests the IP path — the station receives the signal correctly. The technician then disconnects the IP path and tests the cellular path. The station does not receive the cellular signal. What corrective action is needed?

- A. The IP communicator must be reprogrammed because its disconnection may have disrupted the cellular module
- B. The cellular communicator must be investigated and repaired or replaced to restore communication redundancy
- C. The supervising station must reconfigure their cellular receiver to accept signals from the building's account
- D. No action is needed because the primary IP path is functional and the cellular is only a backup

56. A fire alarm technician is testing a tamper switch on a butterfly valve in a sprinkler system. The technician partially closes the valve — the equivalent of two turns on an OS&Y valve. No supervisory signal appears. The technician continues closing until the valve is nearly shut, and only then does the signal appear. What deficiency exists?

- A. Butterfly valve tamper switches are not required to meet the two-revolution standard
- B. The valve position indicator on the panel is displaying the wrong valve identification
- C. The tamper switch adjustment is incorrect — it must detect partial closure within the code-required travel
- D. The switch is functioning correctly because butterfly valves require full closure for supervisory activation

57. A fire alarm technician is performing annual testing on a fire alarm system with a smoke control interface. When a smoke detector activates on the 5th floor, the system should activate the building's smoke control system to pressurize stairwells and exhaust smoke from the 5th floor. During testing, the stairwells pressurize but the 5th floor smoke exhaust does not activate. What should be investigated?

- A. The smoke detector because it may be generating a signal type that does not trigger smoke exhaust

- B. The stairwell pressurization fans because they may be drawing too much power for the exhaust to activate
- C. The 5th floor's mechanical systems because the exhaust fans may have a fault independent of the fire alarm
- D. The control module output, interface wiring, and programming for the 5th floor exhaust function

58. A fire alarm technician discovers that a high-rise building's fire command center has the following equipment: fire alarm panel repeater, voice evacuation controls, firefighter telephone, elevator status panel, and HVAC controls. During inspection, the technician notices that the graphic annunciator's display is dark — no LEDs or display elements are illuminated. What must be documented?

- A. The graphic annunciator failure must be documented as a deficiency affecting emergency response capability
- B. The annunciator is supplementary and its failure has no operational impact on the fire alarm system
- C. The annunciator must be replaced only if the fire department files a formal complaint about its condition
- D. The annunciator failure is a cosmetic issue because the panel repeater provides the same information

59. During annual testing, a fire alarm technician tests notification appliances on a NAC circuit serving the 3rd floor. All horn/strobes activate except one strobe near the elevator lobby. The horn component of the same device sounds the temporal pattern correctly. Voltage at the device measures 22.8 VDC during alarm. What is the most likely cause?

- A. The circuit voltage is too low for the strobe component to operate at its rated candela output
- B. The strobe component within the combination device has failed and the device needs replacement
- C. The NAC circuit polarity is reversed at this device preventing the strobe from receiving power
- D. The panel programming has disabled the visible output for this specific notification appliance zone

60. A fire alarm system in an office building has been generating "DEVICE DIRTY" trouble signals for 22 smoke detectors. The building is 7 years old and the detectors have never been cleaned. Building management has asked the fire alarm contractor for a proposal. What should the proposal include?

- A. Replacement of all 22 detectors with new units since cleaning cannot restore 7-year-old detectors
- B. A scheduled power wash of the ceiling-mounted detectors using approved cleaning solution
- C. Cleaning all 22 detectors per the manufacturer's procedures with sensitivity retesting after cleaning
- D. Increasing the alarm thresholds in the panel programming for the 22 affected detectors

61. A fire alarm technician discovers during inspection that a fire alarm panel's event log contains 50+ entries for "SUPERVISORY — VALVE TAMPER — ZONE 4" over the past three months. Each event lasts only seconds before restoring. No maintenance work was performed on the sprinkler valves during this period. What is the most probable cause?

- A. The panel's Zone 4 input board has a component failure generating false supervisory signals
- B. Building vibration from equipment or traffic is causing momentary tamper switch activation
- C. The sprinkler system has a pressure leak that causes the valve to move from pressure fluctuations
- D. Vibration or minor valve movement from water pressure fluctuations is intermittently triggering the switch

62. A fire alarm technician is performing annual testing of a fire alarm system and tests the AC power transfer to secondary battery. After disconnecting AC power, the technician monitors the battery voltage. The voltage drops rapidly — from 26.4 VDC to 19.2 VDC in 3 minutes. The system is in standby mode with no alarm condition. What must be documented?

- A. The batteries have failed and must be replaced — a 7.2-volt drop in 3 minutes during standby is catastrophic
- B. The voltage drop is within normal limits for batteries under initial discharge conditions
- C. The panel's standby current is excessive and should be investigated before replacing batteries
- D. The test is invalid because battery voltage must be measured under alarm load, not standby

63. During testing of a fire alarm system's elevator recall interface, the technician activates a lobby smoke detector. All elevators begin recalling. One elevator stops between floors and does not complete the recall. What should be documented?

- A. The fire alarm interface passed because the recall signal was successfully transmitted to all elevators
- B. The elevator failure is a mechanical issue outside the fire alarm technician's scope of testing
- C. The elevator that stopped between floors failed to complete recall — this deficiency must be documented and investigated
- D. The test must be repeated after the stuck elevator is freed to verify proper completion

64. A fire alarm technician is performing annual testing and discovers that visible notification appliances in a corridor are synchronized except for one strobe visible through a glass partition from an adjacent office. The corridor and office are on different NAC circuits. Per NFPA 72, is this a deficiency?

- A. No, synchronization is only required for devices on the same NAC circuit
- B. Yes, all visible appliances within the same field of view must flash in synchronization
- C. No, the glass partition provides adequate visual separation between notification zones
- D. Yes, but only if the glass partition is less than 50% of the wall area

65. During annual testing, the fire alarm technician tests the communication link using dual paths. The primary IP path transmits successfully. The technician disconnects the IP path to test the cellular backup. After 200 seconds, the panel generates a communication trouble for the IP path. The cellular test signal then transmits successfully. What has been verified?

- A. Only the IP path works correctly — the cellular path was untested because the trouble interrupted it
- B. The panel's 200-second supervision timing and the cellular backup path are both functioning correctly
- C. The cellular path failed because it should have transmitted the test signal before the trouble appeared
- D. Both paths are functioning but the cellular path has an unacceptable 200-second activation delay

66. A fire alarm technician discovers during inspection that a building's fire alarm system has four NAC circuits. NAC 1 and NAC 2 serve horn/strobes on floors 1–5 and 6–10 respectively. NAC 3 serves elevator lobby strobes. NAC 4 is labeled "spare" and has no devices connected. NAC 4 shows no trouble signal on the panel. Is this acceptable?

- A. Yes, spare NAC circuits may remain unconnected and unused without generating trouble
- B. No, unused NAC circuits should be disabled in the panel programming to prevent confusion
- C. Yes, but only if the spare circuit has a terminating resistor to maintain supervision
- D. No, all panel circuits must have devices connected for the system to be considered complete

67. A fire alarm technician is troubleshooting a voice evacuation system. All speakers on the 6th floor produce a continuous high-pitched whine instead of the evacuation message. Speakers on all other floors produce clear audio. What is the most likely cause?

- A. All 6th floor speakers have identical internal component failures from a manufacturing defect
- B. The 6th floor amplifier channel or speaker circuit has a fault producing audio feedback or oscillation
- C. The 6th floor speaker wires have a partial short creating an impedance mismatch causing the whine
- D. The pre-recorded message audio file has a corrupt data segment affecting the 6th floor channel

68. A fire alarm technician discovers during annual testing that the building's as-built drawings show 178 devices on SLC 1 and 165 devices on SLC 2. The panel programming shows 186 devices on SLC 1 and 165 on SLC 2. The Record of Completion shows 175 devices on SLC 1 and 165 on SLC 2. What must be corrected?

- A. Only the as-built drawings need updating because they are closest to the panel's actual count
- B. Only the Record of Completion needs updating because it has the oldest and most outdated count
- C. All three documents must be reconciled to reflect the same verified device count for each SLC
- D. The panel must be reprogrammed to match the as-built drawings since they are the design reference

69. A fire alarm technician is testing the fire alarm system's interface with the building's access control system. When the fire alarm activates, all magnetically locked egress doors must unlock. The technician activates a smoke detector. All doors unlock except one emergency exit on the 2nd floor. What should be investigated first?

- A. The control module output, interface wiring, and power supply to the non-releasing lock
- B. The smoke detector because it may be generating a signal that does not trigger door release
- C. The access control panel because it may have overridden the fire alarm release command
- D. The NAC circuit serving the 2nd floor because the door lock may be powered from the NAC

70. A fire alarm system event log shows "BATTERY CHARGER FAULT" active for 10 days. The technician measures battery voltage at 21.8 VDC with the charger connected. AC power is confirmed at 120 VAC at the panel input. What is the system's risk status?

- A. Low risk because the batteries have 21.8 VDC remaining capacity for short-term backup
- B. Moderate risk because the AC power is present and the system continues to operate normally
- C. High risk because batteries are slowly depleting and will eventually be unable to sustain alarm conditions
- D. The batteries are discharging under standby load and will eventually fail to sustain the system during power outage

71. A fire alarm technician is performing annual sensitivity testing on smoke detectors. The panel's sensitivity report shows that 195 of 200 detectors are within the acceptable range of 0.5% to 3.7%. Three detectors read at 3.9%, 4.0%, and 4.2% respectively. Two detectors read at 0.3% and 0.4% respectively. What action is required?

- A. Only the three high-reading detectors need attention — the two low-reading detectors are more sensitive
- B. The three high-reading detectors must be cleaned and the two low-reading detectors must be investigated
- C. All five out-of-range detectors must be cleaned and retested per the manufacturer's procedures

D. The panel's sensitivity reporting thresholds must be recalibrated by the manufacturer's technician

72. A fire alarm technician discovers during inspection that a fire alarm panel's batteries are dated 8 years ago. A load test shows the batteries maintain 24.0 VDC under full alarm load for the required duration. Building management says the batteries pass the test and do not need replacement. What is the correct guidance?

A. The batteries technically pass the load test but their age warrants replacement as a preventive measure

B. The load test results override age considerations — batteries that pass testing may remain in service

C. NFPA 72 requires battery replacement every 5 years regardless of test performance

D. The batteries must be load tested quarterly due to their age until replacement is scheduled

73. A fire alarm technician is testing a fire alarm system in a building with a pre-action sprinkler system. The design uses a double-interlock configuration. During testing, the technician activates a smoke detector. The pre-action solenoid energizes and the valve opens. For a double-interlock system, is this the correct response?

A. Yes, the detection signal opens the valve as the first interlock condition

B. Yes, double-interlock and single-interlock respond identically to fire detection signals

C. No, the valve opened from detection alone but should require both interlocks to activate

D. No, double-interlock requires both detection AND a drop in supervisory air pressure before opening

74. A fire alarm technician is performing the annual battery load test. The test requires applying the full alarm load for a manufacturer-specified duration. The starting voltage is 27.0 VDC. After the test duration, the ending voltage is 19.6 VDC. The manufacturer's minimum acceptable end-voltage is 20.4 VDC. Do the batteries pass?

A. No, 19.6 VDC is below the 20.4 VDC minimum acceptable end-voltage and the batteries must be replaced

B. Yes, 19.6 VDC is within the standard 10% tolerance of the 20.4 VDC minimum specification

- C. No, but the batteries can remain in service for 30 days while replacements are ordered
- D. Yes, because the starting voltage of 27.0 VDC demonstrates the charger is providing adequate output

75. A fire alarm technician is testing the stairwell pressurization interface during annual testing. When a smoke detector activates, the fire alarm panel sends the pressurization command. The technician observes the fans start. The stairwell door on the 5th floor requires significantly more force to open than normal. On the 12th floor, the stairwell door opens normally with no resistance. What should be documented?

- A. Only the fan activation must be documented — door resistance testing is the mechanical engineer's responsibility
- B. Both observations should be documented because inconsistent pressurization suggests a duct damper or balancing issue
- C. The 5th floor passed and the 12th floor passed because some variation in door resistance is expected
- D. The test cannot be evaluated without a calibrated manometer reading at each floor

76. A fire alarm technician discovers during inspection that a building tenant has hung a large poster over a horn/strobe device in a corridor, completely covering both the horn and strobe. What must be documented?

- A. The poster affects only the strobe output — the horn sound is unaffected and continues to function
- B. The poster obstructs both audible and visible notification and must be removed immediately
- C. The poster can remain if it is made of non-combustible material that does not affect device operation
- D. Only the strobe obstruction needs documentation — the poster material does not significantly attenuate sound

77. Per NFPA 72, what is the required testing frequency for fire alarm system releasing device supervisory circuits that control suppression agent discharge?

- A. Semiannually to match the smoke detector testing frequency schedule
- B. Monthly because releasing circuits are life safety systems requiring frequent verification

- C. Only at initial acceptance with no recurring periodic testing required per NFPA 72
- D. Annually as part of the comprehensive releasing system functional test

78. A fire alarm technician is performing annual testing on a fire alarm system in a high-rise building. The building has a fire command center (FCC) with a panel repeater, voice evacuation controls, firefighter telephone, elevator controls, and HVAC controls. During testing, the technician discovers that the elevator status indicators on the FCC show "NORMAL" even when the elevators are in Phase I recall mode. What must be documented?

- A. The elevator status display at the fire command center is not accurately reflecting elevator operating mode
- B. Elevator status indicators are informational only and their failure has no operational significance
- C. The elevator status display is controlled by the elevator contractor and is outside fire alarm testing scope
- D. The indicator failure is cosmetic because the fire alarm panel correctly sends the recall command

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

79. A fire alarm technician is reviewing a shop drawing set for a 20-story high-rise building. The drawings include floor plans, a riser diagram, a sequence of operations, battery calculations, and voltage drop calculations. The voltage drop calculation for NAC Circuit 5 shows 15.8 VDC at the farthest appliance using 14 AWG conductors. The devices are listed for 16–33 VDC. What should the technician flag?

- A. The calculation passes with adequate margin and no changes are needed for NAC 5
- B. The 15.8 VDC result is within tolerance of the 16 VDC minimum and should proceed as designed
- C. The 15.8 VDC is below the 16 VDC minimum listed voltage and the circuit must be redesigned
- D. The calculation must be verified with field measurements before any design changes are made

80. A fire alarm battery calculation for a voice evacuation system shows the following: panel/SLC standby = 0.92A, voice amplifier standby = 1.05A, NAC alarm = 4.5A, voice alarm = 8.2A. The building has no emergency generator. Using 24-hour standby, 15-minute voice alarm, and 20% safety factor, what is the minimum battery capacity?

- A. 28.44 Ah using only the standby loads with the standard 5-minute alarm duration
- B. The calculation yields approximately 60.84 Ah after correctly applying all values and safety factor
- C. 47.33 Ah using 24-hour standby and 15-minute alarm without the 20% safety factor
- D. 50.70 Ah after incorrectly rounding the intermediate calculation upward before applying the factor

81. A fire alarm sequence of operations matrix for a hospital shows that a smoke detector alarm on a patient floor triggers: notification on the alarm floor only (not building-wide), elevator recall, and supervising station signal transmission. It does not trigger HVAC shutdown. The building uses a centralized air handling system serving all patient floors. Is the absence of HVAC shutdown appropriate for a hospital?

- A. Yes, hospitals typically use defend-in-place strategy with limited notification and no HVAC shutdown
- B. No, HVAC shutdown should always be included for smoke detector alarms on patient floors
- C. Yes, hospital HVAC systems have their own duct detection that handles shutdown independently
- D. The sequence must be evaluated against the approved fire safety plan — HVAC shutdown may or may not be required based on the specific design

82. A fire alarm conduit schedule shows a 1-inch EMT conduit containing eight 14 AWG THHN conductors and six 16 AWG THHN conductors for a total of fourteen conductors. Per NEC, what method must be used to verify the conduit fill for this mixed-conductor installation?

- A. Calculate the total cross-sectional area of all conductors using Chapter 9 Table 5 and compare to the 40% fill limit
- B. Compare each conductor size to its individual maximum count in Annex C Table C1
- C. Use the maximum count for the largest conductor size as the controlling fill limit
- D. Add the conductor counts and compare the total to the lower of the two Annex C maximums

83. A fire alarm technician is reviewing floor plans for a building with an L-shaped corridor. The corridor measures 120 feet along the longer leg and 80 feet along the shorter leg, meeting at a 90-degree turn. Smoke detectors are shown at 30-foot spacing along both legs. A detector is also shown at the corner where the two legs meet. Is the corner detector necessary?

- A. No, the detectors along each leg provide adequate coverage through the corner transition
- B. Yes, the corner creates a change in direction that requires detection at the transition point
- C. A detector at the corner provides coverage where the two legs' detection patterns meet
- D. A detector at the turn ensures smoke traveling around the corner is detected without delay

84. A fire alarm device address schedule shows 195 devices on SLC 1 with a maximum capacity of 198. A renovation project will add 12 new devices. The designer proposes splitting the 12 new devices between SLC 1 (3 devices to reach 198) and a new SLC 3 (9 devices). Is this approach practical?

- A. No, adding only 3 devices to SLC 1 leaves it at maximum with no room for future additions
- B. Yes, this maximizes the use of existing SLC capacity while providing room for future growth on SLC 3
- C. No, all 12 devices must be on the same SLC loop for consistent polling and communication
- D. Yes, but only if the 9 devices on SLC 3 are all the same device type

85. A fire alarm shop drawing includes a riser diagram showing the fire alarm panel on the first floor connected to remote power supply panels on floors 5, 10, and 15 of a 20-story building. Each remote panel serves the NAC circuits for its floor zone. The riser diagram shows a supervised communication circuit from the main panel to each remote panel. What is the primary purpose of this configuration?

- A. To provide backup fire alarm control in case the main first-floor panel fails during a fire
- B. To provide local NAC power reducing voltage drop and distributing current capacity across floors
- C. To amplify the SLC signal for addressable devices on upper floors far from the main panel
- D. To provide additional SLC loop capacity for the addressable devices on the upper floors

86. A fire alarm technician reviews a smoke detector layout for a room measuring 60×40 feet with a smooth 10-foot ceiling. Six detectors are arranged in a 3×2 grid with spacing of 20 feet in both dimensions. The first detector in each row is 10 feet from the wall. What is the approximate distance from a room corner to the nearest detector?

- A. Approximately 14 feet which is within the 21-foot maximum per the 0.7 spacing factor
- B. Approximately 25 feet which exceeds the 21-foot maximum per the 0.7 spacing factor
- C. Approximately 21 feet which is exactly at the maximum limit of the 0.7 factor
- D. The corner distance cannot be verified without a site visit to measure actual detector positions

87. A reviewer asks why SLC 1 uses Class B while SLC 2 uses Class A. What is a valid design consideration for using different circuit classes?

- A. Cost reduction — Class B requires less cable making it more economical for the lower-floor loop
- B. The designer determined that the higher floors require greater circuit survivability due to longer egress times
- C. Class B provides faster polling rates than Class A for the lower-floor devices
- D. NFPA 72 prohibits mixing Class A and Class B loops on the same panel

88. A fire alarm shop drawing includes a sequence of operations matrix. The matrix shows that a pull station alarm on any floor triggers: all-building notification, elevator recall, HVAC shutdown, and supervising station signal. A duct detector alarm triggers: HVAC shutdown only with supervisory notification at the panel. The reviewer asks whether the duct detector response is adequate. What is the correct assessment?

- A. The duct detector should trigger general building notification in addition to HVAC shutdown
- B. Duct detectors triggering HVAC shutdown only is a common and code-permissible approach
- C. The duct detector must trigger elevator recall in addition to HVAC shutdown for occupant safety
- D. The duct detector response is consistent with NFPA 72 provisions for duct detection

89. A fire alarm technician is reviewing a specification that requires the installing contractor to provide a complete project documentation package at closeout. Per NFPA 72, which documents must be included in the package delivered to the building owner?

- A. As-built drawings, Record of Completion, operating instructions, and the sequence of operations
- B. Only the panel manufacturer's installation manual and the original bid documents
- C. Only the as-built drawings and a signed contractor warranty document
- D. The testing records and the supervising station's monitoring contract only

90. A fire alarm floor plan shows a large open retail space measuring 100×80 feet with a smooth 12-foot ceiling. The designer has placed 12 ceiling-mounted smoke detectors in a 3×4 grid. The spacing in the 100-foot dimension is approximately 25 feet (4 columns). The spacing in the 80-foot dimension is approximately 27 feet (3 rows). The default listed spacing is 30 feet. Does this layout comply with NFPA 72?

- A. No, both dimensions must use exactly 30-foot spacing for code compliance
- B. No, the 27-foot row spacing exceeds the 0.7 factor limit of 21 feet
- C. Yes, both the 25-foot and 27-foot spacings are within the 30-foot maximum listed spacing
- D. Yes, but only if each detector is a multi-criteria type rated for large-area coverage

91. A fire alarm drawing shows a releasing fire alarm system for a clean agent suppression system. The drawing indicates cross-zone detection with Zone A using photoelectric smoke detectors and Zone B using ionization smoke detectors. A note reads "Cross-zone requires both Zone A and Zone B activation before agent release." What advantage does using two different detection technologies provide?

- A. Different technologies have different nuisance alarm triggers reducing the chance of simultaneous false alarms
- B. Using two different technologies in cross-zone detection provides faster combined response to all fire types
- C. NFPA 72 requires different technologies in each cross-zone for the system to qualify as cross-zone detection

D. Two technologies provide broader spectrum fire detection — photoelectric for smoldering and ionization for flaming

92. A fire alarm technician reviews a voltage drop calculation for a NAC circuit. The calculation uses 14 AWG copper ($3.14 \Omega/1000 \text{ ft}$) with a round-trip distance of 700 feet and alarm current of 2.6 amps. The calculation shows: $R = 700 \times 3.14/1000 = 2.198 \Omega$. $V_{\text{drop}} = 2.6 \times 2.198 = 5.71\text{V}$. End voltage = $24 - 5.71 = 18.29 \text{ VDC}$. Devices are listed for 16–33 VDC. Is the calculation correct and does the circuit pass?

- A. The calculation is correct but the 2.29V margin is too thin for a high-rise installation
- B. The calculation has an error because the alarm current should be doubled for inrush
- C. The calculation is correct and the circuit passes with a 2.29V margin above the minimum
- D. The calculation is correct and the circuit passes but 12 AWG would provide a better margin

93. A fire alarm technician is reviewing a specification that requires all fire alarm conduit penetrations through fire-rated assemblies to be firestopped with a listed firestop system. The specification further requires that the firestop system be "tested and rated for the specific through-penetrant type and the specific assembly type." What does this mean for the installing contractor?

- A. The firestop product must have a tested and listed assembly that matches the specific conduit size and the specific wall or floor rating
- B. Any listed firestop material can be used regardless of the specific conduit or assembly configuration
- C. The firestop requirement applies only to penetrations through 2-hour or greater rated assemblies
- D. The specification exceeds code requirements and the contractor may use any approved fire caulk

94. A fire alarm technician reviews battery calculations for a campus system. Each building's panel has its own calculation. The technician notices that Building A's calculation uses a 20% safety factor while Buildings B and C use a 15% safety factor. What should the technician flag?

- A. Each building may use a different safety factor based on its specific generator configuration
- B. The safety factor difference is insignificant and does not affect overall system reliability

- C. All three calculations should use the same 20% safety factor per NFPA 72 requirements
- D. Building B and C may use 15% because they are sub-panels with lower standby current

95. A fire alarm shop drawing shows a notification appliance circuit running through 5 floors of a building. The total circuit length is 1,100 feet using 12 AWG copper ($1.98 \Omega/1000 \text{ ft}$) with 2.0 amps alarm current. What is the voltage at the farthest appliance?

- A. 24.0 VDC because 12 AWG produces negligible voltage drop at any practical distance
- B. 19.65 VDC which provides margin above the 16 VDC minimum listed voltage
- C. 15.64 VDC which falls below the 16 VDC minimum requiring circuit redesign
- D. 21.82 VDC providing a comfortable 5.82V margin above the minimum voltage

96. A fire alarm technician is reviewing a floor plan for a conference room measuring 45×35 feet with a 10-foot ceiling. The drawing shows one wall-mounted strobe at 75 cd on the 45-foot wall. Per NFPA 72 Table 18.5.5.5.1(a), a 75 cd wall-mounted strobe covers a room up to 45×45 feet. Does this single strobe provide adequate coverage?

- A. No, the room requires a minimum of 110 cd because the total area exceeds 1,500 square feet
- B. Yes, both room dimensions are within the 45×45 foot coverage for a single 75 cd strobe
- C. No, the strobe must be centered on the longer wall for the coverage table to apply
- D. Yes, a 75 cd strobe covers rooms up to 45×45 feet and the 45×35 room is within this limit

97. A fire alarm technician is reviewing a specification for acceptance testing. The spec requires all notification appliances to be tested for sound level and visible coverage. The technician has a calibrated sound level meter but discovers the candela meter is out of calibration and won't be available for two weeks. What can the technician do about the visible testing?

- A. Skip the visible testing and document the appliances as "visually verified operational"
- B. Use a smartphone light meter app as a substitute for the calibrated candela meter
- C. Verify visible appliance operation visually and document the candela meter testing as a follow-up item

D. Proceed with the sound testing only and return when the candela meter is available for a separate visit

98. A fire alarm technician is reviewing an as-built drawing that shows the fire alarm panel's dedicated branch circuit. The drawing shows the circuit originating from a 20-amp breaker in the main electrical panel, running through 12 AWG conductors for 85 feet to the fire alarm panel location. The drawing notes indicate: "dedicated circuit, labeled, lock-on device installed, no GFCI/AFCI." What additional detail should the as-built drawing capture?

- A. The conduit type and routing path from the electrical panel to the fire alarm panel
- B. The voltage reading at the panel's input terminals to document the available voltage
- C. The circuit breaker manufacturer and model number for replacement part identification
- D. The name of the electrician who installed the circuit for warranty and liability purposes

99. A fire alarm technician reviews a fire alarm floor plan showing two corridor smoke detectors spaced 28 feet apart in a straight corridor section. The default listed spacing is 30 feet. A reviewer notes that the detectors are closer together than the maximum 30-foot spacing. Is this a problem?

- A. Yes, detectors closer than 30 feet create overlapping coverage that wastes project budget
- B. No, detectors may be spaced at or below the maximum listed spacing — closer is acceptable
- C. Yes, the exact 30-foot spacing must be used for the system to comply with the listing
- D. No, but the closer spacing must be noted on the as-built drawings with an explanation

100. A fire alarm shop drawing includes a device address schedule that assigns addresses 001 through 198 on SLC 1. The schedule shows 180 smoke detectors, 10 monitor modules, and 8 control modules. No isolator modules are listed in the schedule. The manufacturer recommends isolator modules every 25 devices. Should the reviewer flag this omission?

- A. No, isolator modules are recommended but not required for code compliance
- B. No, isolator modules are needed only on Class A circuits and this system uses Class B
- C. Yes, the absence of isolator modules means a single short fault could disable the entire SLC

D. Yes, but the number needed depends on the manufacturer's recommendation and the AHJ's requirements

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a junior technician has been installing smoke detector bases without verifying the compatibility marking against the approved device schedule. Seven bases have been installed using a base model from a different product series than specified. What corrective action is needed?

- A. Document the error but allow the bases to remain if the detector heads fit physically
- B. No action is needed because all bases from the same manufacturer are interchangeable
- C. Remove the seven incorrect bases and install the correct model specified in the device schedule
- D. Leave the bases installed and request a change order to update the device schedule

102. A fire alarm contractor is managing a project where the general contractor insists that fire alarm rough-in wiring must be completed before the ceiling space is closed with drywall. The fire alarm schedule shows rough-in completing two weeks after the drywall deadline. How should the fire alarm contractor respond?

- A. Prioritize the ceiling space rough-in and reschedule remaining work to meet the drywall deadline
- B. Refuse to change the schedule because the fire alarm work must proceed in the planned sequence
- C. Request the general contractor to delay the drywall installation by two weeks
- D. Install temporary wiring above the ceiling and replace it with permanent wiring after drywall

103. A fire alarm project manager receives a request from the building owner to add 15 devices to the fire alarm system that were not included in the original contract. The owner wants the work done immediately without a formal change order. How should the project manager respond?

- A. Install the devices immediately to maintain the relationship with the building owner

- B. Require a formal change order documenting the additional scope, cost, and schedule impact before proceeding
- C. Install the devices and submit the additional cost on the final project invoice
- D. Refuse the request because any changes after contract signing are prohibited

104. A fire alarm technician is supervising a subcontractor who is pulling fire alarm cable through conduit. The technician observes that the subcontractor is using excessive force during the cable pull, and the pulling tension appears to exceed the cable manufacturer's specified maximum. What should the supervising technician do?

- A. Allow the pull to continue because experienced cable pullers know how much force is acceptable
- B. Document the observation but take no action because the subcontractor assumes liability
- C. Request the subcontractor to use a tension gauge to verify the pulling force is within specifications
- D. Stop the pull immediately and investigate the cause of the excessive resistance before continuing

105. A fire alarm contractor is scheduling the acceptance test for a newly installed fire alarm system. The system serves a 15-story high-rise with voice evacuation, elevator recall, smoke control, and stairwell pressurization interfaces. How should the contractor coordinate the acceptance test?

- A. Coordinate with the elevator, HVAC, and smoke control contractors to have their representatives present during interface testing
- B. Test only the fire alarm system components and leave interface testing to each respective contractor
- C. Perform a preliminary test of all interfaces and schedule the formal acceptance test for the following week
- D. Request the AHJ to coordinate all trade contractors for the acceptance test

106. A fire alarm project is 80% complete when the building owner requests a change in the notification appliance type from horn/strobe to speaker/strobe for voice evacuation. This change affects the panel configuration, the amplifier requirements, the NAC wiring, and the device specifications. How should the fire alarm contractor handle this request?

- A. Install the speaker/strobes immediately since they physically mount in the same locations
- B. Explain that the change requires engineering review, a revised design, and a formal change order
- C. A formal change order must document the design revision, cost impact, and schedule extension before any work proceeds
- D. Refuse the change because converting from horn/strobe to voice evacuation at 80% completion is impractical

107. A fire alarm contractor discovers during installation that the electrical contractor has installed the fire alarm panel's dedicated circuit with a combination AFCI/GFCI breaker instead of a standard breaker with a lock-on device. The fire alarm contractor needs the circuit corrected. Who should be contacted to make the correction?

- A. The fire alarm contractor should replace the breaker directly since it affects fire alarm compliance
- B. The general contractor should be notified to direct the electrical contractor to make the correction
- C. The AHJ should be contacted to issue a violation notice to the electrical contractor
- D. The building owner should be contacted to authorize the additional cost of replacing the breaker

108. A fire alarm project supervisor is training a new technician on documentation practices. The new technician asks whether photographs of the installation are necessary in addition to written records. What is the correct guidance?

- A. Photographs are required by NFPA 72 for every device installation and wiring connection
- B. Written documentation is sufficient — photographs are not required but are valuable as supplemental records
- C. Photographs are only necessary for concealed wiring that will be inaccessible after construction

D. Photographs are recommended as supplemental documentation for concealed work, complex installations, and deficiency records

109. A fire alarm contractor is managing a project where multiple fire alarm technicians work different shifts to meet the construction deadline. The morning shift technician programs the first 50 device addresses. The evening shift technician programs the next 50 device addresses. The next morning, the first technician discovers that the evening shift's programming contains errors in the location descriptors. What practice would prevent this type of error?

A. Implement a standardized programming verification process where each shift's work is reviewed before the next shift continues

B. Assign all programming to a single technician to eliminate multi-person coordination errors

C. Require each shift to reprogram the previous shift's work to verify accuracy

D. Use only factory-programmed devices to eliminate field programming errors entirely

110. A fire alarm project is nearing completion. The contractor must prepare the project closeout documentation package. Per NFPA 72, what is the minimum required documentation to be delivered to the building owner at project closeout?

A. Only the manufacturer's equipment manuals and warranty registration information

B. Only the as-built drawings and the installer's signed completion statement

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

D. The complete original bid documents, shop drawings, and internal testing worksheets

LEVEL II — SIMULATION EXAM 2: ANSWER KEY AND EXPLANATIONS

1. B — NFPA 72 Section 12.4.4 defines pathway survivability Level 2 as protection by either 2-hour fire-rated construction or 2-hour fire-rated cable (circuit integrity cable). CI cable listed for 2-hour fire resistance independently satisfies Level 2 without requiring a fire-rated shaft enclosure. The cable's listing certifies it will maintain circuit integrity for 2 hours during fire exposure.
2. D — A peer-to-peer or master-slave network using the manufacturer's proprietary panel networking protocol enables real-time sharing of alarm, trouble, and supervisory data across all connected panels. This provides a single monitoring point at the campus security office in Building A while maintaining independent panel operation at each building. Extended SLC, IDC/NAC, and DACT approaches are not designed for inter-panel networking.
3. A — NFPA 72 does not permit the complete elimination of notification from occupied spaces. However, the system can be designed so that operating rooms receive visible-only alerting while trained staff at the nursing station receive the alarm notification and initiate the appropriate response. This approach balances patient safety during surgery with fire safety notification requirements.
4. C — The 70.7V distributed audio system operates at a higher voltage than standard 24 VDC circuits, resulting in proportionally lower current for the same power delivery. Lower current means less voltage drop across the speaker wire resistance over long distances. This allows longer speaker circuit runs — essential in high-rise buildings — without the signal degradation that would occur at 24 VDC.
5. B — Smoke detectors: $120 \times 0.35 = 42.0$ mA. Monitor modules: $15 \times 0.25 = 3.75$ mA. Control modules: $8 \times 4.0 = 32.0$ mA. Isolator modules: $6 \times 0.10 = 0.60$ mA. Total = $42.0 + 3.75 + 32.0 + 0.60 = 78.35$ mA. This total must be compared to the panel manufacturer's maximum SLC current rating to verify the loop is within capacity.
6. A — NFPA 72 Section 23.11 requires releasing circuits to be supervised and installed per the requirements for classified circuits (Class A or Class B). The releasing circuit must be continuously monitored for opens, shorts, and ground faults because a fault on this circuit could prevent agent release during an actual fire. Standard NAC wiring methods do not satisfy the specific supervision requirements for releasing circuits.
7. D — Central vacuum outlets create localized suction that pulls air — and any test smoke — away from nearby smoke detectors. During testing with aerosol smoke, the vacuum suction draws the

test smoke toward the outlet rather than allowing it to rise naturally to the detector. This creates erratic activation behavior where detectors near vacuum outlets may take longer to activate or fail to respond consistently.

8. C — Per NFPA 72 Section 24.5, the firefighter telephone system is a two-way communication system allowing simultaneous conversation between the fire command center and floor warden stations. Firefighters at any floor station can communicate directly with the incident commander at the fire command center. This real-time two-way capability is essential for coordinating firefighting operations across multiple floors.
9. A — Mounting the aspirating detection sampling unit outside the cold storage space allows the sensitive laser-based detection electronics to operate at normal temperatures while the sampling pipes extend into the -5°F freezer environment. The sampling pipes draw air from the cold space to the externally mounted detector for analysis. This eliminates the need to rate the electronics for extreme cold.
10. B — At 65 feet above the stage floor, smoke rising from a fire may cool and decelerate before reaching the ceiling, potentially stratifying at a height below the ceiling-mounted detectors. This stratification effect is pronounced in large-volume spaces like theater fly galleries. Alternative detection methods — such as beam detectors at multiple elevations or aspirating systems — should be considered for reliable detection.
11. D — When one zone's LED illuminates for a different zone's alarm, the most likely cause is a wiring error inside the graphic annunciator — the internal connections between the annunciator's communication board and the LED driver board have Zones 5 and 7 cross-connected. The panel is sending correct zone data, but the annunciator's internal wiring is routing the signals to the wrong LED positions.
12. C — NFPA 72 Chapter 24 requires mass notification voice messages to meet the same speech intelligibility performance standards as fire alarm voice evacuation systems. Occupants must be able to clearly understand the words being spoken regardless of whether the message pertains to fire evacuation, severe weather sheltering, or security threats. Unintelligible messages fail to serve their life safety purpose.
13. A — The emergency generator with the panel's internal secondary batteries provides adequate power protection for the fire alarm system. The generator starts automatically upon utility failure, and the panel's batteries bridge the brief transition period (typically 10–30 seconds) between utility loss and generator startup. Adding UPS connection is not required by code and introduces unnecessary complexity.
14. B — Above-grade open-air parking levels are exposed to vehicle exhaust, weather, and environmental contaminants that make smoke detectors impractical — heat detection is typically specified. Below-grade enclosed levels trap vehicle emissions including carbon monoxide,

potentially requiring CO detection in addition to fire detection depending on the applicable building code and ventilation design.

15. D — Diesel generator rooms contain exhaust particulates, fuel vapors, and combustion byproducts during normal operation that cause smoke detector nuisance alarms. Heat detection is the appropriate technology because it responds only to abnormal temperature increases and is unaffected by the airborne contaminants inherent to diesel engine operation.
16. C — In-rack smoke or heat detectors identify fires at the storage rack level — where fires originate among stored materials — before the smoke or heat travels the full distance to ceiling-mounted detectors at 35 feet. Early detection at the rack level provides faster alarm response, enabling quicker suppression activation and reducing potential fire damage to stored inventory.
17. A — NFPA 72 Section 21.3.5 requires elevator lobby smoke detectors to be located within the elevator lobby — the area bounded by the elevator bank and any lobby walls or partitions. The detector must be positioned where it can sense smoke entering the lobby before it reaches the elevator doors, ensuring timely Phase I recall before smoke fills the hoistway.
18. B — In tall atriums, smoke may stratify at different heights depending on the fire's heat output and the thermal layers within the space. A small fire produces less buoyant smoke that may stratify at a lower elevation, while a larger fire produces more buoyant smoke reaching higher levels. Beam detectors at multiple heights ensure detection regardless of where the smoke layer forms.
19. D — NFPA 72 Section 26.6.3.1.1 requires the DACT to verify the integrity of each telephone line at intervals not exceeding 24 hours. This ensures that a disconnected or failed telephone line is detected within one day and a trouble signal is generated. Without this periodic verification, a line failure could go undetected indefinitely, leaving the system unable to transmit alarm signals.
20. C — The CO detection system connects to its own dedicated controller for ventilation management. The fire alarm system monitors the CO system's alarm contacts through monitor modules to receive CO alarm signals for building notification and supervising station transmission. This interface approach keeps the CO ventilation control independent while providing fire alarm system awareness of CO alarm conditions.
21. A — An audio switching matrix or distributed amplifier system provides selective floor paging by routing specific audio messages to selected speaker zones independently. This allows the system to broadcast evacuation messages on fire-affected floors while sending different messages — such as "remain in place" — to unaffected floors simultaneously.
22. B — Fire alarm notification devices must be dedicated to the fire alarm system and listed for the specific purpose per NFPA 72 Section 18.3. Nurse call dome lights are not listed as fire alarm notification appliances and cannot serve dual duty. Fire alarm visible notification must use devices that are specifically listed and labeled for fire alarm use, ensuring they meet the candela, flash rate, and synchronization requirements.

23. C — When the kitchen suppression system activates, the fire alarm panel should execute the full sequence of operations: activate building alarm notification, transmit the alarm signal to the supervising station, and initiate HVAC shutdown. A kitchen suppression activation indicates a fire condition that requires building-wide response — not just local kitchen notification.
24. B — An STI of 0.45 falls below the required minimum of 0.50, meaning voice messages in the main lobby are not sufficiently intelligible. Occupants cannot clearly understand the spoken evacuation instructions. The lobby's acoustic conditions — likely excessive reverberation from hard surfaces — must be corrected through speaker repositioning, adding speakers, adjusting volume, or installing acoustic treatment.
25. D — In a single-interlock pre-action system, fire alarm detection is the single interlock. When detection activates, the pre-action valve opens allowing water to fill the piping. Water does not discharge until a sprinkler head fuses from heat. This design prevents water damage from accidental sprinkler head damage alone — the fire alarm system must confirm a fire condition before water enters the piping.
26. A — The medication room contains combustible materials including packaging, paper records, and some medication components that represent a fire load requiring detection coverage. All occupied and storage spaces within a healthcare facility require detection per the building code unless specifically exempted. The medication room's contents and function do not qualify it for exemption from smoke detection.
27. C — Whether HVAC shutdown is included in the response to a waterflow alarm depends on the building's approved fire safety plan and sequence of operations. Some designs include HVAC shutdown for all alarm conditions to prevent smoke distribution through the air handling system. The sequence of operations must be evaluated against the design intent — HVAC shutdown is not automatically excluded from waterflow responses.
28. D — NEC Article 700.12(B) requires emergency systems — including those serving fire alarm panels — to have automatic transfer capability within 10 seconds of utility power failure. This rapid transfer ensures that life safety systems experience minimal interruption during the transition from utility power to generator power.
29. B — In machine-room-less (MRL) elevator designs, the drive motor and controller are located within the hoistway — typically at the top. Per NFPA 72 Section 21.3, detection is still required in the hoistway, and the area containing the drive equipment is treated as the machine room space for detection and protection purposes even though there is no separate machine room.
30. A — The building owner is responsible for ensuring the ERCES is tested and maintained per the applicable standards — typically NFPA 1221 and the local fire code. While the ERCES was installed by a contractor, ongoing testing and maintenance responsibility transfers to the building owner, who must arrange for qualified personnel to perform the required periodic testing.

31. D — Standby energy = $(0.95 + 1.1) \times 4 = 8.2$ Ah. Alarm energy = $(3.8 + 7.2) \times 0.25 = 2.75$ Ah. Subtotal = 10.95 Ah. With 20% safety factor: $10.95 \times 1.20 = 13.14$ Ah. 4-hour standby (generator), 15-minute alarm (voice evacuation), 20% safety factor applied to the subtotal.
32. C — NFPA 72 Section 26.3.4 requires the central station to initiate the required response actions — including fire department notification — within 90 seconds of receiving an alarm signal. This 90-second window includes signal receipt, operator processing, verification of the account, and initiation of the dispatch call. Exceeding 90 seconds violates the central station's performance obligation.
33. A — A networked multi-panel system distributes the device load across multiple panels, each with its own SLC capacity. Each building has a panel with sufficient SLC loops to serve its devices, and all panels communicate through the manufacturer's network protocol. This architecture scales beyond any single panel's capacity while maintaining real-time data sharing across the campus.
34. B — A dedicated function fire alarm system serves only fire alarm functions — detection, notification, and communication. A non-dedicated function system shares fire alarm equipment with other building functions such as mass notification, security integration, or building management system interfaces. The distinction affects system design, testing requirements, and maintenance responsibilities.
35. D — NFPA 72 requires waterflow alarm signals to be received at the panel within 90 seconds of sustained water flow. The waterflow switch's retard delay — currently set at 90 seconds — consumes the entire allowable window, leaving zero margin for signal transmission and processing. The total time from sustained flow to panel alarm must not exceed 90 seconds including the retard delay.
36. C — The freezer at -10°F , the loading dock fluctuating to 80°F , and the office at 72°F each have different maximum ambient temperatures requiring different detector ratings per NFPA 72 Section 17.6.3.1.3. Each detector must be rated at least 20°F above the maximum expected ceiling temperature in its space. A single 135°F rating works for all three spaces mathematically, but a lower-rated detector in the freezer provides faster response to fire.
37. A — A dry-pipe sprinkler system uses pressurized air in the piping to hold the dry-pipe valve closed. A low-pressure supervisory switch monitors this air pressure. If the air pressure drops — indicating a leak, a broken fitting, or a fused sprinkler head — the switch generates a supervisory signal at the fire alarm panel alerting building management to investigate before the dry-pipe valve trips.
38. B — The 70.7V audio distribution system's higher voltage results in proportionally lower current for the same wattage delivered to speakers. Lower current means less I^2R power loss and less voltage drop across the speaker wire resistance. For 600-foot runs to the 15th floor, this reduction in current and voltage drop is essential for maintaining adequate audio quality and volume at distant speakers.

39. D — Cross-zone detection requires one detector from Zone A AND one detector from Zone B to both activate before the panel initiates agent release. If only above-ceiling detectors activate, that represents activation of only one zone — regardless of how many individual detectors in that zone activate. The below-ceiling zone must also confirm the fire condition before release is permitted.
40. C — NFPA 72 Section 18.4.4.1 requires audible notification at least 15 dB above the average ambient noise level. At 105 dB ambient: $105 + 15 = 120$ dB minimum. Achieving 120 dB throughout a nightclub is extremely challenging and may not be practical. The design may need to rely heavily on visible notification supplemented by high-output audible appliances to meet the combined notification requirements.
41. A — When all speakers on a single zone produce equally reduced volume while all other zones are normal, the fault is at the common source — the amplifier channel or audio routing serving that zone. A partial amplifier fault reduces the output power delivered to all speakers on the affected channel equally. Individual speaker failures would produce unequal volume variations.
42. B — When the abort switch is pressed, the pre-discharge countdown pauses — holding the release in a suspended state. When the switch is released, the countdown resumes from where it stopped. This maintained abort behavior gives personnel control to hold off discharge while they investigate, and the system resumes the release sequence when the switch is released, ensuring suppression proceeds if the abort is not maintained.
43. D — The kitchen hood suppression system is a separate specialized system that requires testing by a qualified suppression system contractor. The fire alarm technician's role is to monitor the fire alarm panel's interface and verify that the alarm signal is correctly received when the suppression contractor activates the test function. Each contractor tests their respective system components.
44. C — During routine semiannual smoke detector testing, PAS should be bypassed to prevent the 180-second investigation delay from occurring during every individual detector test. PAS functional testing is performed separately as a specific test of the PAS feature itself. Leaving PAS active during routine detector testing wastes significant time and does not add value to the individual device functional tests.
45. A — Three renovations adding 45 devices, removing 12, and modifying the sequence of operations represent significant system changes. The Record of Completion — which must reflect the current system configuration per NFPA 72 Section 7.8 — is now four years out of date and does not accurately represent the installed system. It must be updated to document the current configuration.
46. D — The sequence of operations specifies selective recall — only Bank A should recall from Bank A's lobby detector. All three banks recalling indicates the panel programming is activating all three recall outputs instead of only Bank A's output. The programming must be corrected so each lobby detector zone activates only its corresponding elevator bank's recall relay.

47. A — The abort switch passed its current functional test — it correctly stopped and resumed the countdown. However, three years of missed annual tests must be documented as a deficiency. NFPA 72 Table 14.4.3.2 requires annual functional testing of all releasing system components. The missed tests represent three consecutive years of non-compliance that must be noted in the inspection report.
48. C — NFPA 72 Section 10.6.9 permits a maximum delay of 3 hours before annunciating an AC power failure trouble signal. Four hours exceeds this maximum by one hour. The panel's AC power loss detection timing must be investigated and corrected to ensure the trouble signal appears within the permitted 3-hour window.
49. A — A smoke detector covered with a latex glove has been effectively disabled for two months — the glove prevents smoke from entering the sensing chamber. This is a significant impairment that leaves the corridor without detection coverage. The covering must be removed immediately, and compensatory measures should be evaluated for the duration of the adjacent renovation.
50. B — All other floor stations work correctly, confirming the fire command center equipment and the main system wiring are functional. The fault is isolated to the 12th floor station — either the handset itself has failed, the wiring connection at that specific station is broken, or the jack at that location has a fault. The 12th floor wiring and handset must be inspected individually.
51. C — When circuit voltage is normal but one speaker produces significantly reduced volume compared to identical speakers on the same circuit, the most likely cause is the speaker's internal wattage tap setting. Speakers on 70.7V audio systems have selectable tap settings that determine how much power they draw from the circuit. A lower tap setting produces proportionally lower volume output.
52. B — The duct detector activated correctly, the panel processed the alarm, and the control module relay closed as commanded. The HVAC contractor confirmed the AHU did not shut down despite the relay closure. The fault is downstream of the control module — in the wiring between the relay contacts and the AHU controller's shutdown input, or in the AHU controller's response to the relay signal.
53. A — A ground fault persisting for four months is a code deficiency that compromises SLC circuit supervision integrity. Ground faults can mask other faults, cause intermittent communication errors, and progressively worsen over time. The building owner's verbal acceptance does not satisfy code requirements. The deficiency must be documented with a recommendation for immediate repair.
54. D — The detector at address 112 reads 4.1% obscuration/ft — exceeding the manufacturer's maximum acceptable range of 3.7%. The detector must be cleaned per the manufacturer's procedures and retested. If cleaning restores the reading to within the acceptable range, the detector may remain in service. If the reading remains above 3.7% after cleaning, the detector must be replaced.

55. B — The primary IP path was tested and confirmed functional. The secondary cellular path was tested independently and failed — the station did not receive the cellular signal. The cellular communicator must be investigated and repaired or replaced to restore the designed communication redundancy. Operating with only one functional communication path eliminates the backup protection.
56. C — NFPA 72 requires tamper switches to activate within a specific travel distance — equivalent to two revolutions of an OS&Y valve wheel. A butterfly valve tamper switch must detect partial closure within the equivalent code-required travel. If the switch only activates when the valve is nearly shut, the adjustment is incorrect and must be corrected to detect partial closure earlier.
57. D — The stairwell pressurization activated correctly, confirming the panel processed the alarm and sent pressurization commands successfully. The 5th floor smoke 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 exhaust fan control programming needs investigation.
58. A — A dark graphic annunciator at the fire command center means arriving firefighters cannot use the building floor plan display to locate the alarm origin. This visual reference tool is a critical component of the fire command center that directly affects emergency response efficiency. The failure must be documented as a deficiency requiring repair.
59. B — The horn component operates correctly and circuit voltage is adequate at 22.8 VDC — well within the 16–33 VDC operating range. The strobe component in the same combination device is not functioning despite adequate voltage. This indicates an internal failure of the strobe component. The combination device must be replaced.
60. C — "Device Dirty" trouble signals indicate sensing chamber contamination that must be addressed through cleaning per the manufacturer's specific procedures. The proposal should include cleaning all 22 detectors, retesting each detector's sensitivity after cleaning, and replacing any detectors that cannot be restored to within the acceptable sensitivity range.
61. D — Fifty or more brief supervisory events from a tamper switch over three months — each lasting only seconds — without any reported maintenance work suggests minor valve movement from water pressure fluctuations or building vibration. These transient movements momentarily trigger the tamper switch before the valve settles back to its normal position. The valve and switch should be inspected and the switch adjustment verified.
62. A — A voltage drop from 26.4 VDC to 19.2 VDC in only 3 minutes during standby — not alarm — is a catastrophic battery failure. Standby current is far less than alarm current, yet the batteries cannot maintain voltage even under this lighter load. The batteries have negligible remaining capacity and must be replaced immediately before AC power is lost.

63. C — Phase I elevator recall requires elevators to travel to the designated floor AND open their doors so passengers can exit safely. An elevator that stops between floors has failed to complete the recall sequence. This is a deficiency that must be documented and investigated — the cause may be in the elevator controller, the mechanical system, or the interface wiring.
64. B — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. If a corridor strobe and an office strobe are both visible from the same location — even through a glass partition — they must be synchronized regardless of circuit assignment. The glass partition does not provide visual separation.
65. B — Two critical functions were verified: the panel detected the IP path failure within 200 seconds (meeting the NFPA 72 supervision timing requirement), and the cellular backup path successfully transmitted the test signal to the supervising station. Both the supervision timing and the backup communication path are functioning correctly.
66. A — Spare or unused NAC circuits that are properly configured in the panel as inactive or disabled should not generate trouble signals. If the spare circuit has no supervision requirement configured, it may remain unused without generating a trouble. However, the panel configuration should clearly indicate the circuit is intentionally unused to prevent confusion during maintenance.
67. C — A continuous high-pitched whine from all speakers on a single floor — while all other floors produce clear audio — is characteristic of an impedance mismatch or partial short on the speaker circuit wiring for that floor. The impedance mismatch causes the amplifier to oscillate, producing the whine. The 6th floor speaker wiring connections and impedance must be investigated.
68. A — Three different device counts for SLC 1 across three documents — 178, 186, and 175 — indicate that system modifications were not consistently documented. The panel programming count of 186 most likely reflects the actual installed state since it is updated during device additions. However, all three documents must be verified against a physical field count and reconciled to show the same accurate number.
69. A — Fourteen of sixteen locks released correctly, confirming the panel's output and most interface connections are functional. The single non-releasing lock on the 2nd floor indicates a fault specific to that device — the control module output, the interface wiring, or the lock's power supply. The technician should investigate the control chain from the module to the specific lock.
70. C — A battery charger fault active for 10 days with batteries at 21.8 VDC means the batteries are slowly depleting under standby load without being recharged. If AC power fails, the batteries must sustain the system — but at 21.8 VDC, they are already significantly discharged and may not sustain alarm conditions for the required duration. This is a high-risk condition requiring immediate charger repair.
71. B — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's acceptable range. The three high-reading detectors are drifting toward

insensitivity from contamination and must be cleaned. The two low-reading detectors are abnormally sensitive and must be investigated for a fault, recalibrated, or replaced.

72. A — Eight-year-old batteries that pass a load test demonstrate current adequate capacity. However, battery age is a significant reliability factor — sealed lead-acid batteries typically have a 5-year service life, and failure can occur suddenly without warning after extended use. While NFPA 72 does not mandate age-based replacement, prudent maintenance practice warrants preventive replacement of batteries this old.
73. D — A double-interlock pre-action system requires BOTH fire detection activation AND a drop in supervisory air pressure (indicating a sprinkler head has opened) before the valve opens. If only the smoke detector activated (one interlock), the valve should not have opened. The system is responding as a single-interlock system, indicating a configuration error that must be corrected.
74. A — The batteries ended the load test at 19.6 VDC — below the manufacturer's minimum acceptable end-voltage of 20.4 VDC. The batteries cannot sustain the full alarm load without dropping below the voltage threshold where panel components may malfunction or shut down. The batteries must be replaced with a set that maintains voltage above 20.4 VDC throughout the load test.
75. B — The 5th floor door requires significantly more force (indicating positive pressure) while the 12th floor door opens normally (indicating little or no pressure). This inconsistency suggests the pressurization system is not distributing air evenly — possibly due to a closed damper, a duct obstruction, or a balancing issue on the upper floors. Both observations should be documented for the mechanical engineer's investigation.
76. B — A poster completely covering both the horn opening and the strobe lens blocks both audible sound output and visible light output from the notification appliance. This renders the device non-functional for both notification types. The poster must be removed immediately and building management informed that notification appliances must remain unobstructed.
77. D — NFPA 72 Table 14.4.3.2 requires releasing device supervisory circuits — including the circuits that control suppression agent discharge — to be functionally tested annually as part of the comprehensive releasing system test. This annual test verifies the entire releasing sequence including detection, cross-zone logic, countdown timers, abort switches, and supervised releasing circuits.
78. A — The fire command center's elevator status indicators provide critical real-time information to the fire incident commander about which elevators are in service, which are in recall mode, and which may be available for firefighter use. An indicator showing "NORMAL" during active Phase I recall provides false information that could lead to unsafe decisions. This deficiency must be documented.

79. C — At 15.8 VDC, the voltage at the farthest appliance falls below the 16 VDC minimum listed operating voltage. Devices operating below their listed range may not produce rated sound or light output and may fail to operate entirely. The NAC circuit must be redesigned using larger conductors, shorter runs, fewer devices, or a NAC booster to bring the end-of-circuit voltage above 16 VDC.
80. B — Standby = $(0.92 + 1.05) \times 24 = 47.28$ Ah. Alarm = $(4.5 + 8.2) \times 0.25 = 3.175$ Ah. Subtotal = 50.455 Ah. With 20% safety factor: $50.455 \times 1.20 = 60.55$ Ah, approximately 60.84 Ah with minor rounding variations. No generator means full 24-hour standby. Voice evacuation requires 15-minute alarm duration. The 20% safety factor ensures adequate margin.
81. D — Hospital fire alarm sequences vary significantly based on the facility's approved fire safety plan, which may incorporate defend-in-place strategies, zoned notification, and specific HVAC responses. Whether HVAC shutdown is included depends on the specific building design, the air handling system configuration, and the approved fire safety plan. The sequence must be evaluated against the design documentation rather than assuming a universal requirement.
82. A — When different conductor sizes share the same conduit, the pre-calculated Annex C tables cannot be used because they assume uniform conductor sizes. The actual cross-sectional area of each conductor must be obtained from NEC Chapter 9, Table 5. The total area of all conductors is then compared to the conduit's internal area using the 40% fill limit for three or more conductors.
83. B — A 90-degree corridor turn creates a change in direction where smoke traveling along one leg may not effectively reach detectors positioned beyond the turn in the other leg. A detector at the corner provides detection at the transition point where the two legs meet, ensuring smoke approaching from either direction is detected at the intersection without relying on it to travel around the corner.
84. B — Adding 3 devices to SLC 1 brings it to the maximum 198, utilizing all remaining capacity. The new SLC 3 with 9 devices provides substantial room for future expansion. This approach maximizes existing infrastructure investment while establishing a new loop with 189 available addresses for future growth, making it a practical and forward-looking solution.
85. B — Remote NAC power supply panels provide local notification appliance power close to the devices they serve. This reduces voltage drop on long NAC wire runs and distributes the total notification current capacity across multiple power sources. The supervised communication circuit from the main panel ensures the remote panels are monitored for trouble conditions and receive alarm commands.
86. A — With detectors at 10 feet from each wall in a 3×2 grid, the nearest detector to any corner is positioned at coordinates (10, 10) from the corner. Distance = $\sqrt{(10^2 + 10^2)} = \sqrt{200} \approx 14.14$ feet. This is well within the 21-foot maximum calculated by the 0.7 factor ($0.7 \times 30 = 21$ feet), confirming the layout provides adequate coverage.

87. B — Using Class A for upper floors and Class B for lower floors is a valid design approach when the designer determines that upper floors benefit more from circuit survivability due to longer egress distances, higher occupant vulnerability during extended evacuation, and greater difficulty for firefighters to access upper floors. The designer's risk assessment drives the circuit classification selection.
88. D — NFPA 72 Section 17.7.5.8 recognizes that duct smoke detectors are primarily intended to prevent HVAC systems from distributing smoke throughout the building. The code permits duct detectors to be configured for HVAC shutdown without requiring general building alarm notification. The design response shown — HVAC shutdown with supervisory notification — is consistent with NFPA 72 provisions.
89. A — NFPA 72 Section 7.7 requires the installing contractor to provide the building owner with as-built drawings, the completed Record of Completion, operating and maintenance instructions, and a copy of the approved sequence of operations. These documents enable the building owner to properly operate, maintain, and manage the fire alarm system throughout its service life.
90. C — Both the 25-foot column spacing and the 27-foot row spacing are within the default 30-foot maximum listed spacing for spot-type smoke detectors. Spacing detectors closer than the maximum is always acceptable — NFPA 72 establishes maximum spacing, not minimum. The 12-detector layout in a 3×4 grid with spacings at or below 30 feet complies with the code.
91. B — Using two different detection technologies in cross-zone detection provides complementary fire detection capabilities. Photoelectric detectors respond optimally to smoldering fires with large smoke particles, while ionization detectors respond faster to flaming fires with small particles. This dual-technology approach ensures at least one zone responds quickly regardless of the fire's development stage.
92. D — The calculation is mathematically correct: $R = 2.198 \Omega$, $V_{\text{drop}} = 5.71\text{V}$, end voltage = 18.29 VDC. The circuit passes with a 2.29V margin above the 16 VDC minimum. However, upgrading to 12 AWG would reduce the voltage drop and increase the margin, providing better protection against connection aging, temperature effects, and future device additions.
93. A — The specification requires a firestop system that has been tested and listed for the specific combination of through-penetrant (conduit type and size) and the specific assembly (wall or floor rating and construction type). This means the contractor must select a firestop product that has an engineering listing matching the exact conduit size penetrating the exact assembly type in the project.
94. C — NFPA 72 requires the 20% safety factor to be applied to all battery calculations. Buildings B and C using 15% instead of 20% produce undersized battery calculations that may not meet the code requirement. All three calculations must use the same 20% safety factor to ensure consistent code compliance across the campus system.

95. B — $R = 1,100 \times (1.98/1000) = 2.178 \Omega$. $V_{\text{drop}} = 2.0 \times 2.178 = 4.356\text{V}$. End voltage = $24 - 4.356 = 19.64\text{VDC}$, approximately 19.65 VDC. This provides a 3.65V margin above the 16 VDC minimum — adequate for the installation with room for future considerations.
96. D — Per NFPA 72 Table 18.5.5.5.1(a), a single 75 cd wall-mounted strobe covers rooms up to 45 × 45 feet. The conference room at 45 × 35 feet has both dimensions within the 45-foot maximum. A single 75 cd strobe provides adequate visible coverage for this room regardless of which wall it is mounted on.
97. C — A "City Tie" or "Municipal Fire Alarm Box" is a dedicated communication circuit from the fire alarm panel directly to the local fire department's alarm receiving office. This hardwired connection bypasses the commercial supervising station and transmits alarm signals directly to the fire department dispatch center. Some jurisdictions require this direct connection in addition to commercial monitoring.
98. A — As-built drawings for the dedicated branch circuit should capture the conduit type, size, and routing path from the electrical panel to the fire alarm panel. This information is essential for future maintenance, troubleshooting, and modifications — technicians need to know where the circuit runs, what type of raceway it uses, and how it is routed through the building to locate and access it.
99. B — Smoke detectors may be spaced at or below the maximum listed spacing. NFPA 72 establishes maximum spacing — not minimum or exact spacing. Detectors spaced at 28 feet in a corridor with a 30-foot maximum are fully compliant. Closer spacing provides equal or better coverage and is always acceptable.
100. D — While isolator modules are not universally required by code for every installation, their absence means a single short circuit fault anywhere on the 198-device SLC could disable communication with all devices on the entire loop. The reviewer should flag this for discussion — the manufacturer recommends isolators, and the AHJ may require them based on the building's risk level and the consequence of total loop failure.
101. C — Device bases from a different product series may have incompatible communication protocols, different pin configurations, or incorrect electrical characteristics even if they are from the same manufacturer. The seven incorrect bases must be removed and replaced with the correct model specified in the approved device schedule to ensure proper communication and listed compatibility.
102. A — Ceiling space rough-in — including conduit, junction boxes, cable pulls, and device base mounting — must be completed before the ceiling is closed with drywall. Once the ceiling is sealed, concealed work becomes inaccessible. The fire alarm contractor should prioritize the ceiling space work to meet the drywall deadline, rescheduling other tasks as needed to accommodate the construction sequence.

103. B — Additional devices beyond the original contract scope constitute a change in project scope that requires a formal change order. The change order documents the additional work, establishes the cost for the additional devices and labor, and addresses any schedule impact. Proceeding without a change order creates billing disputes and contractual liability issues.
104. D — Excessive pulling tension can stretch conductors, damage insulation, and break individual wire strands — creating latent failures that may not appear until months or years after installation. The supervising technician must stop the pull immediately, investigate the cause of the resistance (obstruction, inadequate lubrication, excessive fill, or too many bends), and resolve the issue before continuing.
105. A — Emergency control function interfaces — elevator recall, HVAC shutdown, smoke control activation, and stairwell pressurization — require the respective trade contractors to be present during acceptance testing. Each contractor must verify that their equipment responds correctly to fire alarm commands. The fire alarm contractor coordinates the test schedule with all affected trades.
106. C — Converting from horn/strobe to speaker/strobe voice evacuation is a fundamental design change affecting the panel's audio capabilities, amplifier sizing, speaker circuit design, NAC wiring requirements, and intelligibility calculations. A formal change order must document the revised design, the engineering review, the cost impact, and any schedule extension before work proceeds.
107. B — The fire alarm contractor should not modify the electrical contractor's work directly — this creates trade jurisdiction and liability issues. The general contractor is responsible for coordinating all trades and should be notified of the non-compliant breaker installation so they can direct the electrical contractor to replace it with a standard breaker and lock-on device.
108. D — Photographs are not required by NFPA 72 but are highly valuable supplemental documentation. They are particularly recommended for concealed wiring that will be inaccessible after construction is complete, complex installations where visual reference aids future maintenance, and documenting deficiencies found during inspection for the building owner's records.
109. A — A standardized programming verification process — where each shift's work is reviewed and verified by the next shift before continuing — catches errors before they compound. This quality control step ensures address assignments, device types, location descriptors, and zone associations are verified at each handoff point, preventing the accumulation of programming errors across shifts.
110. C — 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 package.