LEVEL II — SIMULATION EXAM 5 (110 QUESTIONS)

Time Limit: 155 Minutes

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

DOMAIN 2.1 — INSTALLATION (Questions 1–40)

1. A fire alarm technician is reviewing the design for a 25-story residential high-rise. The voice evacuation system uses 70.7V audio distribution with amplifiers centrally located at the fire command center on Floor 1. Speaker circuits run to all 25 floors through risers. The longest circuit is 750 feet. During commissioning, speakers on the upper floors produce noticeably lower volume than lower-floor speakers. What is the most effective system design solution to this problem?

A. Install remote amplifier panels at intermediate floors to reduce speaker circuit length and line losses

B. Increase the main amplifier output power to compensate for the upper-floor line losses

C. Use larger gauge speaker wire throughout the building to reduce circuit resistance

D. Install impedance-matching transformers at each floor to boost the signal at each transition

2. A fire alarm technician is installing a fire alarm system in a building where the engineer specifies cross-zone detection for a clean agent releasing system. The design uses two separate smoke detection zones — Zone A with photoelectric detectors and Zone B with photoelectric detectors of the same model. A reviewer asks whether using the same technology in both zones undermines the cross-zone protection. What is the correct assessment?

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

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

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

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

3. A fire alarm technician is calculating battery capacity for a fire alarm system. The panel serves: standby current = 1.35A (panel + SLC + network), NAC alarm = 4.8A, voice alarm = 9.2A. The building has no emergency generator. Voice evacuation requires 15-minute alarm duration. Using 24-hour standby and 20% safety factor, what is the minimum battery capacity?

A. 38.88 Ah using only the standby and NAC alarm without voice alarm current

B. 42.36 Ah using the standard 5-minute alarm for all alarm loads

C. 44.52 Ah using 24-hour standby with 15-minute alarm but without the safety factor

D. 44.10 Ah after applying 24-hour standby, 15-minute alarm for all loads, and 20% safety factor

4. A fire alarm technician is installing a fire alarm system in a hospital surgical suite. The surgeons request no audible alarms in operating rooms during procedures. Per NFPA 72, complete elimination of notification is not permitted in occupied spaces. What notification approach addresses this concern while maintaining code compliance?

A. Install only heat detectors in operating rooms to eliminate nuisance smoke alarms entirely

B. Use visible-only notification in the operating rooms with alarm acknowledgment at the nursing station

C. Program a 5-minute delay on audible notification for operating rooms during scheduled procedures

D. Connect operating room detectors to the building automation system instead of the fire alarm panel

5. A fire alarm technician is installing a fire alarm system with dual communication paths — primary IP and secondary cellular. Per NFPA 72 Section 26.6.3.2, what is the maximum time for the panel to detect and annunciate a failure of the primary IP communication path?

A. 200 seconds for IP technology capable of continuous path integrity monitoring

B. 60 minutes because IP communication paths require extended evaluation before fault declaration

C. 24 hours matching the standard DACT telephone line test interval

D. 5 minutes as a universal standard for all dual-path communication configurations

6. A fire alarm technician is installing a fire alarm system in a building with a fire command center (FCC) per NFPA 72 Section 23.10. The building engineer asks whether a laptop computer connected to the fire alarm panel via USB can serve as the fire command center display. What is the requirement?

A. Yes, any display showing full system status satisfies the FCC display requirement

B. Yes, but only if the laptop remains permanently connected and powered at all times

C. No, the FCC requires a permanently installed panel or repeater — not a removable portable device

D. No, but only because USB connections do not support real-time fire alarm data transmission

7. A fire alarm technician is installing a fire alarm system in a building with three separate sprinkler risers. Each riser has one waterflow switch and one tamper switch. The design places each waterflow switch on its own dedicated alarm zone and all three tamper switches on a single supervisory zone. A reviewer suggests each tamper switch should also have its own zone. What is the advantage of individual tamper zones?

A. Individual tamper zones increase the panel's processing speed for supervisory signals

B. Individual tamper zones are required by NFPA 72 for all buildings with multiple risers

C. Individual tamper zones eliminate the need for separate waterflow zones on the same risers

D. Individual tamper zones identify which specific valve was moved, directing investigation to the correct riser

8. A fire alarm technician is installing a releasing fire alarm system for a pre-action sprinkler system. The releasing circuit controls the pre-action valve solenoid. Per NFPA 72 Section 23.11, the releasing circuit must be supervised. During commissioning, the technician opens the releasing circuit by disconnecting a wire at the solenoid. What should the panel display?

A. An alarm signal because the releasing circuit is critical and any fault triggers full alarm response

B. A trouble signal indicating the supervised releasing circuit has lost continuity

C. A supervisory signal because the releasing circuit monitors sprinkler equipment status

D. No response because releasing circuits are only active during an alarm condition

9. A fire alarm technician is installing a fire alarm system in a building with an atrium extending from the ground floor to a skylight at 80 feet. The design specifies aspirating smoke detection with sampling pipes at four elevations within the atrium. What determines the vertical spacing between the sampling pipe elevations?

A. The building's thermal stratification analysis determines where smoke layers are likely to form

B. NFPA 72 specifies a fixed 20-foot interval between sampling elevations in all atriums

C. The sampling pipes must be equally spaced regardless of the atrium's thermal characteristics

D. The aspirating system manufacturer determines spacing based on maximum pipe length limits

10. A fire alarm technician is installing a fire alarm system in a convention center with a main exhibit hall measuring 300 × 200 feet with 40-foot ceilings. The design calls for projected beam smoke detectors. Four beam detectors span the 300-foot dimension with beams spaced at 50-foot intervals across the 200-foot dimension. Per NFPA 72, what must the technician verify about this spacing?

A. That the 50-foot spacing does not exceed the 30-foot standard spacing for spot-type detectors

B. That the beam spacing matches the fire sprinkler spacing for consistent coverage patterns

C. That the 50-foot spacing does not exceed the manufacturer's listed maximum for the 40-foot ceiling height

D. That the total number of beams equals one per 5,000 square feet of protected floor area

11. A fire alarm technician is installing a fire alarm system with a mass notification system per NFPA 72 Chapter 24. The mass notification system shares speakers with the voice evacuation system. The emergency plan includes a scenario where a security threat requires mass notification while a fire alarm is simultaneously active. Per the documented risk analysis, the mass notification takes priority. What must the fire alarm system do when mass notification overrides its audible output?

A. The fire alarm panel must shut down completely to avoid signal interference with mass notification

B. The fire alarm signal must continue transmitting to the supervising station during the override

C. The fire alarm system must generate a trouble signal indicating its notification has been overridden

D. The fire alarm panel must transfer control of all outputs to the mass notification controller

12. A fire alarm technician is installing a fire alarm system in a data center with raised floor plenum, overhead cable trays, and precision air conditioning. The design specifies aspirating smoke detection with sampling pipes above the ceiling, below the raised floor, and at the equipment rack level. What cable type is required for fire alarm circuits routed through the raised floor plenum?

A. FPL because the raised floor space is classified as a general-purpose area

B. FPLR because the cable passes vertically through the raised floor transition

C. Any fire alarm cable installed in metallic conduit satisfies the requirement

D. FPLP because the raised floor space used for air distribution is a plenum

13. A fire alarm technician is installing a fire alarm system in a hospital where the approved fire safety plan calls for defend-in-place on patient care floors. Under this strategy, when a smoke detector activates on a patient floor, notification activates on the alarm floor only. The technician asks the engineer why the floors above and below the alarm floor do not receive notification. What is the rationale?

A. The floors above and below have their own independent detection that will activate if smoke migrates

B. Defend-in-place limits notification to prevent unnecessary patient relocation on unaffected floors

C. The patient floors above and below receive notification through the nurse call system instead

D. NFPA 72 prohibits multi-floor notification in hospitals to prevent evacuation of critical patients

14. A fire alarm technician is installing a fire alarm system and needs to connect a fire pump controller to the fire alarm panel for supervisory monitoring. The controller has contacts for pump running, power available, phase reversal, and controller trouble. Per NFPA 72 Section 10.18, how should the "pump running" contact be classified at the fire alarm panel?

A. As a supervisory signal because pump running is an informational off-normal equipment status

B. As an alarm signal because the fire pump runs only when a fire exists in the building

C. As a trouble signal because pump running during non-fire conditions indicates a controller error

D. The pump running contact does not connect to the fire alarm panel — only fault contacts are monitored

15. A fire alarm technician is installing elevator recall smoke detectors in a building with a machine-room-less (MRL) elevator design. The drive motor and controller are at the top of the hoistway. Per NFPA 72 Section 21.3, the area containing the drive equipment must be treated as the machine room for detection purposes. If the machine room area detector activates, what must happen?

A. The elevators recall to the primary designated floor and open doors for passenger exit

B. The elevators recall to an alternate floor because smoke near the drive equipment may affect the primary floor

C. The elevator power is disconnected via shunt trip before recall is initiated for safety

D. The drive equipment area detector triggers only a supervisory signal at the panel

16. A fire alarm technician is installing a fire alarm system in a 15-story building. The voice evacuation design uses 70.7V distributed audio. The technician discovers that two speakers on Floor 12 have been wired in parallel without their impedance-matching transformers. What problem does this create?

A. The two speakers will produce excessive volume compared to properly wired speakers

B. The parallel connection creates a supervision gap that the panel cannot detect

C. The missing transformers cause the speakers to produce no audio output at all

D. The low impedance load without transformers can cause audio distortion and potential amplifier damage

17. A fire alarm technician is installing a fire alarm system with positive alarm sequence (PAS) per NFPA 72 Section 23.8.1.3. The PAS provides a 180-second investigation period. During commissioning, the technician tests PAS by activating a smoke detector. At 90 seconds into the investigation period, a second smoke detector in a different zone activates. Per NFPA 72, what must the system do?

A. Extend the investigation period by an additional 180 seconds for the second zone

B. Restart the investigation period from zero using the second activation as reference

C. Immediately cancel PAS and activate general building alarm notification

D. Continue the original 180-second period because the investigation is already in progress

18. A fire alarm technician is installing a fire alarm system in a building where the architect specifies that all fire alarm devices must be white to match the ceiling. Per NFPA 72, which device type has a mandatory color requirement that cannot be changed?

A. Manual fire alarm stations must be red per NFPA 72 Section 17.14.8

B. Smoke detectors must match the manufacturer's standard color for UL listing compliance

C. Horn/strobe devices must be red per NFPA 72 Section 18.3 for emergency identification

D. All fire alarm devices must be red per NFPA 72 for universal fire safety recognition

19. A fire alarm technician is installing a releasing fire alarm system for a total flooding clean agent suppression system. The data center is occupied during business hours. Per NFPA 72, the system must provide pre-discharge warning and an abort capability. The design includes a 15-second pre-discharge countdown. What determines whether 15 seconds provides adequate evacuation time?

A. NFPA 72 specifies 15 seconds as the fixed minimum for all clean agent systems

B. The room size, exit locations, travel distance, and expected occupant count determine adequacy

C. The clean agent manufacturer determines the countdown based on agent concentration rate

D. The 15-second delay is always adequate because clean agents are non-toxic to building occupants

20. A fire alarm technician is installing a fire alarm system with networked panels across a campus. Building A has the master panel and Building B has a network node panel. During commissioning, the technician discovers that a trouble condition on Building B's panel does not appear on Building A's master panel display. What should be investigated?

A. The SLC wiring between buildings because troubles may not transmit over extended SLC circuits

B. Building B's panel firmware because older versions may not support network trouble sharing

C. The telephone line between the panels because DACT signals carry trouble information

D. The network communication link configuration and programming between the two panels

21. A fire alarm technician is reviewing plans for a high-rise building's fire alarm system. The sequence of operations shows that a pull station alarm triggers full building notification, elevator recall, HVAC shutdown, and supervising station signal. A smoke detector alarm on patient floors triggers alarm floor notification only, elevator recall, and station signal — but no HVAC shutdown. Is this differentiated response valid for a hospital?

A. No, all alarm types must produce identical responses including HVAC shutdown

B. No, smoke detector alarms must always trigger HVAC shutdown regardless of occupancy

C. Yes, defend-in-place hospitals may have different responses per the approved fire safety plan

D. Yes, but only if the smoke detectors are the only detection in the patient care areas

22. A fire alarm technician is installing a fire alarm system in a building with a commercial kitchen. The kitchen has a Type I hood with integrated suppression connected to its own releasing panel. The fire alarm system monitors the suppression system's alarm contacts through a monitor module. During commissioning, the technician simulates a suppression activation at the releasing panel. The monitor module detects the contact closure and the fire alarm panel generates an alarm. What responses should the panel initiate per a typical sequence of operations?

A. Building notification, supervising station signal, and HVAC shutdown per the approved sequence

B. Only supervising station signal because kitchen suppression activations are supervisory events

C. Only local kitchen notification because the fire is contained by the suppression system

D. No response because the kitchen suppression system operates independently from the fire alarm

23. A fire alarm technician is calculating the SLC loading for an addressable panel. The SLC has 130 smoke detectors at 0.32 mA each, 20 monitor modules at 0.24 mA each, 18 control modules at 3.6 mA each, 8 relay modules at 2.4 mA each, and 10 isolator modules at 0.12 mA each. The panel's maximum SLC current is 150 mA. What is the total loading?

A. 41.60 mA from only the smoke detectors without any modules

B. 115.00 mA which is well within the 150 mA capacity

C. 155.80 mA which exceeds the 150 mA capacity

D. 132.64 mA which is within the capacity but approaching the limit

24. A fire alarm technician is installing a fire alarm system in a high-rise building. The design specifies Class A SLC with pathway survivability Level 2. The outgoing SLC path uses the east riser with 2-hour CI cable. The return path uses the west riser with standard FPLP cable in a 2-hour fire-rated shaft. Both methods independently satisfy Level 2. However, at one floor both paths cross through a common ceiling space that has no fire rating. What vulnerability does this create?

A. The unrated ceiling space crossing defeats pathway diversity because a single fire there could destroy both paths

B. The ceiling crossing has no effect because both paths have independent Level 2 protection methods

C. Only the CI cable path maintains protection through the unrated crossing — the shaft-protected path does not

D. Level 2 protection automatically extends through any transition space less than 50 feet long

25. A fire alarm technician is installing notification appliances in a building with a measured ambient noise of 98 dB in a manufacturing area. Per NFPA 72 Section 18.4.4, audible notification must be 15 dB above ambient. The calculated minimum is 113 dB. The highest-output horn available produces 99 dB at 10 feet. Can audible notification alone satisfy the requirement?

A. Yes, multiple horns clustered together produce additive sound levels exceeding 113 dB

B. Yes, but only during non-production hours when the ambient drops below the horn output

C. No, 113 dB is impractical — the design must compensate with enhanced visible notification

D. No, and the building must reduce its ambient noise to permit code-compliant audible notification

26. A fire alarm technician is installing a fire alarm system in a cold storage facility. The warehouse maintains -25°F. Heat detectors rated for -40°F minimum with 135°F activation are specified. The building also has a loading dock that fluctuates between 5°F and 90°F. What activation temperature heat detector is appropriate for the loading dock?

A. 135°F because it provides only a 45°F margin above 90°F which is below the code minimum

B. At least 110°F to maintain the 20°F minimum margin above the 90°F maximum ambient temperature

C. 200°F because temperature-fluctuating environments require high-temperature detectors

D. 135°F which provides a 45°F margin above 90°F — exceeding the NFPA 72 minimum of 20°F

27. A fire alarm technician is installing a fire alarm system with a DACT communicator. The building has two copper telephone lines. Per NFPA 72, the DACT must test each line's integrity at maximum 24-hour intervals. During commissioning, the technician verifies this test function. The DACT seizes Line 1, verifies dial tone, and releases the line. It then seizes Line 2, verifies dial tone, and releases. How does this test verify the lines can actually transmit alarm signals to the supervising station?

A. The dial tone test only verifies the line is active — it does not confirm signal delivery to the station

B. The DACT automatically transmits a test signal to the station as part of each 24-hour line test

C. Dial tone verification is sufficient because any line with dial tone can complete a call to the station

D. The DACT verifies signal delivery by completing a full handshake with the station receiver during each test

28. A fire alarm technician is installing a fire alarm system in a building with an emergency generator. Per NEC Article 700, the generator's automatic transfer switch must transfer the fire alarm panel from normal power to generator power within 10 seconds. The fire alarm panel has internal batteries that bridge the transfer gap. What is the practical significance of the 10-second transfer requirement for the fire alarm system?

A. The 10-second transfer limits the battery discharge to a brief period preserving battery capacity for actual outages

B. Fire alarm panels cannot operate on battery power for more than 10 seconds without losing programming

C. The 10-second requirement ensures the panel's AC power trouble delay does not expire during transfer

D. NEC requires 10 seconds to prevent the panel from generating a false AC power failure trouble signal

29. A fire alarm technician is installing a fire alarm system in a building that requires a firefighter telephone system per NFPA 72 Section 24.5. The system includes handset jacks in both stairwells at every floor and at the fire command center. During commissioning, the technician must verify a specific capability. What unique requirement distinguishes the firefighter telephone from a standard telephone system?

A. The firefighter telephone must operate on a dedicated frequency that cannot be intercepted

B. The firefighter telephone must support only one active conversation at a time for clarity

C. The system must support multiple simultaneous two-way conversations from different floor stations

D. The system must connect to the public telephone network as a backup communication path

30. A fire alarm technician is installing a fire alarm system in a building where the sequence of operations specifies pre-signal notification. With pre-signal active, what happens when a smoke detector activates?

A. The alarm signal transmits to the fire department immediately while building notification is delayed

B. Trained staff receive the alarm notification first and must acknowledge before general building notification activates

C. Only visible notification activates building-wide while audible notification waits for staff confirmation

D. The detector alarm is held in queue for 60 seconds before any system response occurs

31. A fire alarm technician is installing a fire alarm system in a 20-story building with voice evacuation. The system requires pathway survivability Level 2 on all voice circuits. The technician has two approved methods: 2-hour CI cable or standard cable in 2-hour fire-rated construction. The project budget limits CI cable to the riser circuits only. All horizontal speaker runs on each floor will use standard FPLP cable. What Level 2 protection is needed for the horizontal runs?

A. No protection is needed because Level 2 applies only to vertical riser circuits in high-rise buildings

B. The horizontal runs can use Level 1 (sprinkler protection) while risers use Level 2

C. The horizontal runs are exempt from pathway survivability if they are less than 100 feet long

D. The horizontal runs must also have Level 2 protection — either CI cable or 2-hour rated construction

32. A fire alarm technician is installing a fire alarm system in a building with a swimming pool, a dry sauna, and a steam room. Each space presents unique environmental challenges. What detection technology is most appropriate for each?

A. Heat detection in all three spaces because each environment causes smoke detector problems

B. Aspirating detection for the pool, flame detection for the sauna, and no detection for the steam room

C. Smoke detection in all three spaces with corrosion-resistant housings rated for wet environments

D. Heat detection in the pool and sauna, and aspirating detection with the unit outside the steam room

33. A fire alarm technician reviews a design showing a graphic annunciator at the building entrance. The annunciator provides a floor plan display with LED zone indicators. During commissioning, Zone 8 LED illuminates when Zone 3 activates. Zone 3 LED remains dark. What is the most likely cause?

A. The panel is transmitting incorrect zone mapping data to the annunciator communication port

B. The SLC devices on Zones 3 and 8 have conflicting address assignments in the panel database

C. The annunciator's internal wiring has Zones 3 and 8 cross-connected on the LED driver board

D. The Zone 3 LED has burned out and the Zone 8 LED is responding to a separate simultaneous alarm

34. A fire alarm technician is installing a fire alarm system with a releasing circuit for a clean agent system. The releasing circuit solenoid will be disconnected during acceptance testing and a supervised substitute load installed. During the test, the technician opens the releasing circuit by disconnecting one conductor at the panel. The panel should display what signal?

A. An alarm signal because any releasing circuit fault should trigger immediate full alarm

B. A trouble signal because the supervised releasing circuit has lost integrity

C. A supervisory signal because the releasing circuit monitors suppression equipment

D. No signal because the releasing circuit is only active during cross-zone verified alarm

35. A fire alarm technician is installing a fire alarm system in a campus environment. Three buildings are connected by underground tunnels. Fire detection is required in the tunnels. A fire in a tunnel could threaten both connected buildings. How should tunnel detection be integrated with the building fire alarm systems?

A. Tunnel detection should trigger notification in both buildings connected by the affected tunnel segment

B. Each tunnel section connects to the nearest building panel with independent zone identification only

C. Tunnels require their own standalone panel that does not communicate with building systems

D. Only the building where the tunnel fire originates receives notification per zone boundary rules

36. A fire alarm technician is installing notification appliances in a hotel. The design calls for ADA-accessible sleeping rooms to have both a wall-mounted strobe meeting NFPA 72 requirements and a separate device for alerting sleeping hearing-impaired guests. Per ADA and NFPA 72, what type of supplemental device is typically required?

A. A low-frequency audible device at 520 Hz mounted within 24 inches of the pillow location

B. A ceiling-mounted strobe rated at exactly 177 cd positioned directly above the bed

C. An overhead-mounted strobe at triple the standard wall-mount candela for the room size

D. A bed-mounted or pillow-level alerting device such as a high-intensity strobe or bed shaker

37. A fire alarm technician is installing a voice evacuation system and testing the live firefighter microphone from the fire command center. The microphone audio is heard on the alarm floor and one floor above and below but not on remaining floors. The pre-recorded message plays correctly on all floors. What is the most likely cause?

A. The amplifiers serving non-responding floors have a fault blocking live audio input

B. The live microphone power output is insufficient for the total building speaker load

C. The live microphone audio routing is programmed to broadcast only to selected zones rather than all zones

D. The speaker circuits on non-responding floors have a frequency response limitation

38. A fire alarm technician is installing a fire alarm system with networked panels. Building A (master) and Building B (network node) communicate through underground cable. During heavy rain, communication between the buildings intermittently drops. What environmental factor is most likely responsible?

A. The underground cable is experiencing temporary resistance changes from temperature fluctuations

B. Rainwater infiltration into the underground conduit is compromising the cable insulation

C. The rain is generating electromagnetic interference that disrupts the network communication signal

D. Ground potential differences between buildings increase during storms affecting the communication

39. A fire alarm technician is installing a fire alarm system in a building where the specifications require all fire alarm cable above suspended ceilings to be in conduit. The ceiling spaces are not plenums — they have dedicated ducted HVAC return. The NEC does not require conduit for listed fire alarm cable in non-plenum spaces. What should the technician do?

A. Install conduit as specified because the project specification is a contractual obligation

B. Notify the engineer that the specification exceeds code and install cable without conduit

C. Install conduit only in the corridor ceiling spaces and omit it in the office ceiling spaces

D. Request the AHJ to interpret whether the specification can be reduced to code minimum

40. A fire alarm technician is installing a fire alarm system in a convention center ballroom that can be divided into six separate event spaces by movable partitions. When the partitions are deployed, each space is acoustically isolated from the others. How must the notification system address these partitions?

A. Only the fully open configuration requires notification coverage since partitions are temporary

B. Each space requires notification appliances that provide coverage when the partition is deployed

C. A single central notification appliance with sufficient output covers all six configurations

D. Each possible room configuration must have its own independent notification coverage when partitions are closed

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

41. A fire alarm technician is performing annual testing on a releasing fire alarm system for a clean agent suppression system. The agent solenoid has been disconnected and a substitute load installed. The technician activates Zone A — the panel shows "FIRST ALARM." The technician activates Zone B — the panel shows "CROSS-ZONE VERIFIED" and the pre-discharge countdown begins. At 10 seconds into the 30-second countdown, the technician presses the abort switch. The countdown stops. The technician releases the switch and the countdown resumes at 10 seconds. What additional releasing system test remains?

A. The releasing circuit solenoid must be reconnected to verify physical agent discharge

B. The test is complete — cross-zone logic, countdown, and abort function have all been verified

C. The releasing circuit supervision must be tested by opening the circuit and verifying a trouble signal

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

42. A fire alarm technician is performing annual testing on a voice evacuation system in a 15-story building. The pre-recorded evacuation message plays correctly on all floors. The technician tests the live firefighter microphone from the fire command center. The message is heard clearly on Floors 1-8 but produces no audio on Floors 9-15. What is the most likely cause?

A. The live microphone audio routing is programmed to broadcast only to Floors 1-8

B. The amplifiers serving Floors 9-15 have developed a fault that blocks live audio input

C. The fire command center microphone has insufficient output power for the upper floors

D. The speaker wire on Floors 9-15 has a frequency-dependent resistance issue

43. A fire alarm technician is testing a fire alarm system's elevator recall function. The building has three elevator banks. The sequence requires selective recall — Bank A's lobby detector recalls only Bank A. The technician activates Bank A's lobby detector. All three banks recall. What type of error exists?

A. A wiring error where the three recall relay circuits are cross-connected at a junction box

B. A programming error where the panel activates all recall outputs for Bank A's detector zone

C. An elevator controller error where all three controllers share a common recall input

D. A detector error where Bank A's detector generates a building-wide alarm code

44. A fire alarm technician discovers during testing that a fire alarm system's stairwell pressurization activates when a smoke detector alarms, but the Floor 6 smoke exhaust does not activate. The stairwells pressurize on all floors. The control module relay for the Floor 6 exhaust shows it is activated (audible click). Where should the investigation focus?

A. The smoke detector because it may generate a signal type incompatible with exhaust control

B. The stairwell fans because they may be consuming too much power for the exhaust to operate

C. The panel programming because the exhaust output may not be linked to the detector zone

D. The wiring between the control module relay and the Floor 6 exhaust fan controller

45. A fire alarm technician is performing sensitivity testing on an analog addressable system with 500 detectors. The panel report shows 15 detectors between 3.8% and 4.5% (above the 3.7% max) and 5 detectors between 0.2% and 0.4% (below the 0.5% min). What action is required?

A. Only the 15 high-reading detectors need cleaning — low readings indicate heightened sensitivity

B. All 500 detectors must be cleaned because 20 out-of-range detectors indicates building-wide issues

C. All 20 out-of-range detectors — both high and low readings — require investigation and correction

D. The panel's sensitivity thresholds should be adjusted to accommodate the drift readings

46. A fire alarm technician tests the panel's AC power supervision by disconnecting primary AC. The system transfers to battery. After 3.5 hours, the panel generates an "AC POWER FAILURE" trouble. Per NFPA 72 Section 10.6.9, is this timing acceptable?

A. No, the trouble must annunciate within 3 hours — the 3.5-hour delay exceeds the maximum

B. Yes, NFPA 72 permits up to 6 hours before AC power trouble annunciation is required

C. No, the trouble must appear immediately upon loss of primary power without any delay

D. Yes, the 3.5-hour delay is within the standard 4-hour tolerance for AC power monitoring

47. A fire alarm technician discovers during inspection that a building renovation enclosed a corridor smoke detector behind a new partition wall. The detector communicates normally with the panel but is now in a concealed space. What must be documented?

A. The detector can remain behind the wall because it continues communicating with the panel

B. The concealed detector provides coverage for both the corridor and the space behind the wall

C. The detector's panel location descriptor should be updated to reflect its new concealed position

D. The detector must be relocated to the occupied corridor and the concealed space evaluated for detection

48. A fire alarm technician is testing a fire alarm system's communication paths. Primary is IP and secondary is cellular. The technician tests IP — the station receives the signal. The technician disconnects IP and tests cellular. After 200 seconds, the panel generates an "IP COMMUNICATION FAILURE" trouble. The cellular test signal is then received by the station. What has been verified?

A. Only the IP path works — the cellular path was tested under abnormal conditions

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

C. The cellular path failed because it should have transmitted before the IP trouble appeared

D. The IP trouble timing is incorrect because it should appear within 60 seconds

49. A fire alarm technician discovers during annual testing that the fire alarm panel's event log has been full for six months, overwriting the oldest entries. Building management was unaware. What operational impact does this create?

A. The full log may cause the panel to malfunction and should trigger an automatic trouble signal

B. The event log has no operational impact because the panel functions independently of the log

C. Six months of historical diagnostic data has been permanently lost impairing troubleshooting capability

D. The log capacity only affects the panel's speed and does not affect data accuracy

50. A fire alarm technician is performing semiannual smoke detector testing. On the 9th floor, four adjacent detectors — addresses 091 through 094 — take 30 to 40 seconds to activate with approved aerosol smoke. All other detectors on the floor activate within 3 to 8 seconds. What does the delayed response suggest?

A. The four detectors likely have contaminated sensing chambers reducing their responsiveness

B. The SLC polling rate for those addresses has been configured slower than other devices

C. The aerosol smoke can was running low during those four tests producing insufficient smoke

D. The HVAC system is diluting smoke at those locations before it reaches the detectors

51. A fire alarm technician tests the primary-to-secondary power transfer. After disconnecting AC, the system transfers to battery. Battery voltage readings over 15 minutes: 0 min = 26.8 VDC, 5 min = 26.4 VDC, 10 min = 26.0 VDC, 15 min = 25.6 VDC. After reconnecting AC, the charger activates. Are these readings acceptable?

A. No, the 1.2V drop in 15 minutes during standby indicates the batteries are deteriorating

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

C. Yes, but only if the voltage recovers to above 27.0 VDC within 30 minutes of charger activation

D. Yes, the gradual decline is normal for batteries under standby load indicating healthy batteries

52. A fire alarm technician discovers during inspection that a smoke detector in a nursing home has been covered with a clear plastic bag by housekeeping staff. Small holes are punched in the bag. Staff say it prevents nuisance alarms from cleaning chemicals. What must be documented?

A. The holes allow adequate smoke entry and the modification is acceptable for cleaning protection

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

C. The bag can remain if housekeeping signs an acknowledgment accepting responsibility

D. The modification is acceptable if the detector still activates during functional testing with aerosol

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

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

B. Monthly because the suppression system must be ready to respond at all times

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

D. Only during initial acceptance testing with no recurring periodic testing required

54. A fire alarm technician is testing a double-interlock pre-action sprinkler system. The technician activates a smoke detector. The panel processes the alarm but the pre-action valve does not open. Is this the expected response?

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

B. No, the valve should open on detection alone as the first interlock condition

C. Yes, but only because the system was in maintenance mode during the testing period

D. No, the detection signal should at least energize the pilot solenoid for faster response

55. A fire alarm technician tests notification appliances in a hospital corridor. Two strobes are visible from the same location. One strobe flashes approximately 0.4 seconds after the other. The devices are on different NAC circuits. What code requirement is violated?

A. The flash rate requirement because both strobes exceed the maximum 2 flashes per second

B. The candela requirement because unsynchronized strobes produce reduced light coverage

C. The mounting height requirement because improperly mounted strobes create timing offsets

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

56. A fire alarm technician tests a waterflow switch by opening the inspector's test valve on a wet-pipe system. Water flows continuously. After 95 seconds, no alarm appears at the panel. What should be documented?

A. The test is within acceptable limits and the technician should wait an additional 30 seconds

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

C. The retard delay may be set too long and should be reduced before retesting

D. The inspector's test connection may be located downstream of the waterflow switch

57. A fire alarm technician discovers during inspection that two pull stations in a school gymnasium have been painted to match the wall color — both are now tan. The paint covers the housing, handle, and instruction labels. What must be documented?

A. The pull stations remain functional if they activate during testing and the paint is cosmetic

B. Only the instruction labels need restoration — the housing color is an aesthetic preference

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

D. The school maintenance staff should repaint the devices red within 30 days

58. A fire alarm technician performs a battery load test. Starting voltage is 27.2 VDC. After the required duration under full alarm load, ending voltage is 24.6 VDC. The manufacturer's minimum end-voltage is 20.4 VDC. Do the batteries pass?

A. Yes, 24.6 VDC is well above the 20.4 VDC minimum with a 4.2-volt margin

B. No, the 2.6-volt drop indicates insufficient capacity for the required alarm duration

C. Yes, but the batteries should be scheduled for preventive replacement within 12 months

D. No, any voltage drop greater than 2 volts during load testing indicates imminent failure

59. A 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. Where should the investigation focus?

A. On the smoke detector because it may generate an incorrect signal type for HVAC shutdown

B. On the panel programming because the HVAC output may not be linked to the duct detector zone

C. On the SLC communication because the control module may not have received the command

D. On the wiring between the control module relay and the AHU controller shutdown input

60. A fire alarm technician discovers that a building's Record of Completion was last updated four years ago. Since then, two renovations added 35 devices and changed the sequence of operations. What corrective action is needed?

A. The original Record remains valid because it documents the initial system configuration

B. The Record must be updated to reflect the current system configuration per NFPA 72 Section 7.8

C. The annual testing records adequately capture all changes making the Record update optional

D. A new Record is needed only if the panel was physically replaced during the renovations

61. A fire alarm system event log shows 95 "WATERFLOW — ALARM" entries over two months with no actual fires. No sprinkler heads were found activated. The building engineer reports municipal water pressure fluctuations. What corrective action should be recommended?

A. Investigate the pressure fluctuations and adjust the waterflow switch retard delay settings

B. Disconnect the waterflow switches until the municipal pressure issue is permanently resolved

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

D. Increase the panel's alarm processing threshold for waterflow zones to filter brief activations

62. A fire alarm technician tests a tamper switch on a butterfly valve. The technician partially closes the valve to the equivalent of two turns on an OS&Y valve. No supervisory signal appears. The signal appears only when the valve is nearly fully closed. What deficiency exists?

A. The panel programming has the tamper switch configured as alarm mode instead of supervisory

B. Butterfly valves use a different activation standard and the test method is incorrect

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

D. The valve position indicator is misaligned giving a false reading of the valve position

63. A fire alarm technician is performing annual testing on a releasing fire alarm system. After verifying cross-zone logic, countdown timer, abort switch, and releasing circuit supervision, what additional test must be performed in the protected space?

A. The releasing solenoid must be reconnected to verify physical agent discharge capability

B. The panel's communication with the supervising station during a release must be tested

C. The exit signs in the releasing zone must be verified for proper emergency illumination

D. The pre-discharge audible and visual warning appliances must be verified for adequate occupant warning

64. A fire alarm technician discovers that a fire alarm panel's dedicated circuit breaker has an AFCI breaker installed. A lock-on device is present on the breaker. What code violation exists?

A. The lock-on device is unnecessary when an AFCI breaker provides enhanced protection

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

C. AFCI breakers are acceptable when a lock-on device is also installed per NEC Article 760

D. Only the missing GFCI protection represents a code violation — AFCI is permitted

65. A fire alarm technician tests a horn/strobe. The temporal-three pattern sounds correctly. The strobe flashes at approximately 0.7 flashes per second. Per NFPA 72, what should be documented?

A. The strobe fails — NFPA 72 requires 1 to 2 flashes per second and 0.7 is below the minimum

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

C. The flash rate is acceptable for sleeping areas but fails for commercial applications

D. The strobe rate is irrelevant as long as the candela meets the room coverage requirement

66. A fire alarm technician is testing emergency control functions and discovers that a tamper switch activation generates an alarm signal instead of a supervisory signal. The tamper switch contact closure is confirmed at the panel terminals. What is the most likely cause?

A. The tamper switch wiring is reversed preventing proper signal classification at the panel

B. The panel cannot distinguish between alarm and supervisory on the same input board

C. The tamper switch input is programmed as an alarm zone rather than a supervisory zone

D. The tamper switch requires a different EOLR value than the alarm circuits

67. A fire alarm system has primary IP and secondary cellular communication. The panel displays "IP COMMUNICATION FAILURE" which has been active for 60 days. The cellular path functions normally. What should be documented?

A. The system has operated without communication redundancy for 60 days — a significant impairment requiring correction

B. The cellular backup provides full monitoring so the IP failure is not urgent

C. The IP trouble should be repaired at the building owner's convenience during the next scheduled visit

D. No documentation is needed because the system continues to function with the cellular path

68. A fire alarm technician discovers during inspection that a building tenant has mounted a large bookshelf directly in front of a corridor horn/strobe, completely blocking both the horn and strobe output. What must be documented?

A. Only the strobe obstruction is significant — the horn sound travels around furniture adequately

B. The horn/strobe is functional if it activates during testing regardless of the bookshelf obstruction

C. The bookshelf obstructs both audible and visible notification and must be relocated

D. The building owner may apply for a variance from the AHJ to accommodate the bookshelf

69. A fire alarm technician performs a battery load test. Starting voltage is 26.6 VDC. After the test duration under full alarm load, ending voltage is 19.6 VDC. The manufacturer's minimum end-voltage is 20.4 VDC. What must be documented?

A. The batteries passed because 19.6 VDC exceeds the industry-standard minimum of 18 VDC

B. The batteries failed — 19.6 VDC is below the manufacturer's 20.4 VDC minimum end-voltage

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

D. The batteries can remain in service for 60 days while replacements are ordered

70. A fire alarm technician discovers during annual testing that a smoke detector on a patient floor has been covered with a latex glove by nursing staff. The glove has been in place for four weeks during an adjacent renovation. What must be documented?

A. Latex gloves are thin enough to allow smoke penetration and the detector remains functional

B. The covering is acceptable as a temporary measure during active renovation work

C. The detector should remain covered until the renovation is complete to prevent false alarms

D. The detector has been disabled for four weeks and must be uncovered immediately with the impairment documented

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

A. Line 2 has failed and must be investigated and repaired to restore dual-path communication redundancy

B. Line 2 cannot be tested independently because the DACT automatically selects the best line

C. Both lines passed because the DACT needs only one functional line for code compliance

D. Line 2's failure may be caused by disconnecting Line 1 and the test should be repeated differently

72. A fire alarm technician performs annual sensitivity testing. The panel report shows one detector at 0.4% obscuration/ft — below the manufacturer's 0.5% minimum. What does this reading indicate?

A. The detector is at peak sensitivity and this is the ideal operating condition

B. The reading is within normal manufacturing tolerance and requires no action

C. The detector is operating outside its listed parameters and must be investigated for a fault

D. Low readings are always acceptable because they indicate enhanced detection capability

73. A fire alarm technician discovers during inspection that the fire alarm panel room contains boxes, cleaning supplies, and chemical agents. Working clearance in front of the panel is 22 inches. What code requirements are being violated?

A. Only the chemical storage presents a concern — other items and the clearance are acceptable

B. Both the storage and inadequate clearance violate NEC Article 110 working space requirements

C. The room may be used for storage if the chemicals are in sealed containers per OSHA standards

D. Only the 22-inch clearance violates code — storage in electrical rooms is permitted if organized

74. Per NFPA 72 Table 14.4.3.2, what is the minimum frequency for functional testing of fire alarm system supervisory devices such as tamper switches?

A. Monthly to ensure sprinkler system valves remain in proper operating position

B. Semiannually to coincide with the smoke detector testing schedule

C. Quarterly to match the building's standard maintenance inspection program

D. Annually as part of the comprehensive fire alarm system functional test

75. A fire alarm technician discovers during annual testing that the panel's internal clock shows 2:45 PM when the actual time is 4:30 PM — a 105-minute discrepancy. What must be documented?

A. The 105-minute time discrepancy compromises event log accuracy and must be corrected immediately

B. Time discrepancies under 2 hours are within acceptable tolerance for fire alarm panels

C. The clock error only affects aesthetic display and has no operational significance

D. Only the AHJ can determine whether the time discrepancy requires correction

76. A fire alarm technician is testing the voice evacuation system's pre-recorded message. On Floor 11, the message is audible but echoes severely — words are unintelligible due to reverberation. All other floors produce clear, intelligible audio. What must be documented?

A. Echo in large spaces is expected and does not constitute a testing failure

B. The speaker volume on Floor 11 must be reduced to eliminate the echo effect

C. Floor 11 has an intelligibility deficiency that must be investigated and corrected

D. The pre-recorded message audio file has a corrupt segment affecting Floor 11

77. A fire alarm technician is testing a fire alarm system's interface with the access control system. When the fire alarm activates, all magnetically locked egress doors must unlock. The technician activates a detector: 18 of 20 locks release, but 2 remain locked. What must be investigated?

A. The fire alarm panel programming because the two locks may not be included in the alarm response

B. The control module outputs, interface wiring, and power supply to the two non-releasing locks

C. The access control system firmware which may need updating for fire alarm integration

D. The NAC circuits because the magnetic locks may be wired to the notification circuit

78. A fire alarm technician discovers during inspection that a building's fire command center graphic annunciator display is completely dark — no LEDs or display elements are illuminated. All other FCC equipment (panel repeater, voice controls, telephone) functions normally. What must be documented?

A. The annunciator is supplementary and its failure has no impact on fire alarm operations

B. The annunciator can be repaired at the building owner's convenience during the next service visit

C. The annunciator must be replaced entirely because individual component repair is not supported

D. The annunciator failure impairs emergency response capability and must be documented as a deficiency

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

79. A fire alarm voltage drop calculation shows a NAC circuit using 14 AWG copper (3.14 Ω/1000 ft) with a round-trip distance of 750 feet and 2.6 amps alarm current. What is the end-of-circuit voltage on a 24 VDC system?

A. 17.88 VDC which provides minimal but code-compliant margin above the 16 VDC minimum

B. 21.50 VDC providing generous margin above the minimum listed operating voltage

C. 15.20 VDC falling below the 16 VDC minimum and requiring circuit redesign

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

80. A fire alarm battery calculation shows: panel/SLC standby = 0.82A, voice amplifier standby = 1.18A, NAC alarm = 4.2A, voice alarm = 8.5A. The building has a qualifying generator. Using 4-hour standby, 15-minute voice alarm, and 20% safety factor, what is the minimum battery capacity?

A. 15.12 Ah using 4-hour standby with the standard 5-minute alarm duration

B. 13.42 Ah after applying 4-hour standby, 15-minute alarm, and 20% safety factor

C. 11.18 Ah using 4-hour standby and 15-minute alarm without the safety factor

D. 24.00 Ah using full 24-hour standby because the generator does not reduce voice system requirements

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

A. Duct detectors are classified as supervisory devices and never transmit to the supervising station

B. The reviewer is incorrect — duct detector signals transmit automatically regardless of matrix notation

C. The duct detector signal should transmit to the supervising station even if notification is not triggered

D. Duct detectors transmit only when configured as alarm inputs rather than supervisory inputs

82. A fire alarm conduit schedule shows a 1-inch EMT containing eight 14 AWG THHN and eight 18 AWG THHN conductors (16 total). NEC Annex C shows the max for 14 AWG alone is 22 and for 18 AWG alone is 40. Since mixed sizes are present, how must fill be verified?

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

B. Add the counts (8+8=16) and compare to the smaller Annex C maximum of 22

C. Use the Annex C maximum for the larger conductor only as the controlling fill limit

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

83. A fire alarm floor plan shows a 200-foot straight corridor with smoke detectors at 30-foot spacing. First detector at 15 feet, then at 45, 75, 105, 135, 165, and 195 feet — seven total. The last detector is 5 feet from the far end. Is this layout correct?

A. No, 8 detectors are required to maintain proper end distances at both corridor ends

B. Yes, 7 detectors with 30-foot spacing and end distances within 15 feet provide complete coverage

C. No, the last detector should be within 15 feet of the far end, not 5 feet — it is closer than necessary but valid

D. Yes, but only if additional detectors are placed at every corridor intersection

84. A fire alarm device schedule shows 196 devices on SLC 1 with a maximum capacity of 198. A renovation adds 8 new devices. How should the technician advise the project team?

A. Add 2 to SLC 1 and place 6 on a new loop — but flag that SLC 1 at maximum has zero future flexibility

B. All 8 devices can be added to SLC 1 since 204 is within the manufacturer's extended capacity

C. Install monitor modules to consolidate multiple devices onto fewer addresses creating room on SLC 1

D. All 8 should go on a new SLC loop to preserve remaining capacity on SLC 1 for future needs

85. A fire alarm riser diagram shows remote NAC power supply panels on Floors 5, 10, and 15 of a 20-story building. Each remote panel has its own batteries. What calculation must be performed separately for each remote panel?

A. A voltage drop calculation from the main panel to each remote panel location

B. A conduit fill calculation for the supervised circuit between the main panel and each remote

C. A separate battery calculation based on each remote panel's specific standby and alarm loads

D. An SLC loading calculation for addressable devices connected through each remote panel

86. A fire alarm specification requires the Record of Completion per NFPA 72 Section 7.8.2. What must this document contain?

A. Only the installer's license number and signature certifying code compliance

B. Only the AHJ's inspection report and acceptance test results

C. The original design engineer's calculations and specification references

D. System specifications, circuit details, device counts, power supply data, and required signatures

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

A. Install conduit as specified because the project specification is a contractual obligation

B. Ignore the specification and install cable without conduit per minimum code requirements

C. Install conduit only in high-traffic ceiling areas where cable damage is more likely

D. Notify the AHJ that the specification exceeds code and request a formal exemption

88. A fire alarm voltage drop calculation for a 70.7V voice evacuation speaker circuit shows 60.8 VAC at the farthest speaker. The speaker manufacturer's minimum input is 55 VAC. Does the circuit pass?

A. No, the 70.7V system must maintain at least 90% (63.6 VAC) of source voltage at all locations

B. Yes, 60.8 VAC is above the 55 VAC minimum with a 5.8-volt margin

C. No, 70.7V speakers require exactly 70.7 VAC for proper impedance matching and audio quality

D. Yes, but only if the amplifier can be boosted to compensate for the 9.9 VAC line loss

89. A fire alarm shop drawing shows a releasing system for a clean agent with a 20-second pre-discharge timer. The engineer notes the timer may not provide adequate evacuation. What determines the appropriate time delay?

A. NFPA 72 specifies a fixed 30-second minimum for all occupied clean agent spaces

B. The room size, exit count, maximum travel distance, and expected occupant count determine adequacy

C. The agent manufacturer specifies the delay based on agent concentration buildup rate

D. The fire department determines the appropriate delay based on their response time to the building

90. A fire alarm as-built drawing shows 170 devices on SLC 1. Panel programming shows 178. The Record of Completion shows 162. What must be corrected?

A. Only the as-built drawings need updating since 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. The panel must be reprogrammed to match the as-built drawings as the design reference

D. All three documents must be reconciled against a physical field count to reflect the same accurate number

91. A fire alarm floor plan shows a corridor with a 90-degree turn. The longer leg is 160 feet. The shorter leg is 100 feet. Detectors are at 30-foot spacing with a detector at the turn. Is the corner detector necessary?

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

B. No, detectors along each leg provide adequate coverage through the 90-degree transition

C. Yes, but only if the corridor is wider than 10 feet at the intersection point

D. No, corner detectors create redundant coverage that unnecessarily increases the project cost

92. A fire alarm shop drawing shows two SLC loops: SLC 1 (Class B, Floors 1-4) and SLC 2 (Class A, Floors 5-18). A reviewer asks why different circuit classes are used. What is a valid design rationale?

A. NFPA 72 requires Class A for all loops serving buildings above 4 stories

B. Class B and Class A cannot coexist on the same panel per manufacturer restrictions

C. The designer determined upper floors need greater fault tolerance due to longer egress and rescue times

D. Different circuit classes are permitted only with written AHJ approval for each installation

93. A fire alarm shop drawing shows a NAC circuit with 10 horn/strobes at 0.305A each, 8 speakers at 0.145A each, and 4 strobes at 0.190A each. The NAC output is rated at 3.0 amps. What is the total load?

A. 3.05 amps from the horn/strobes alone exceeding the 3.0-amp output by 0.05 amps

B. 4.97 amps total from all devices which significantly exceeds the 3.0-amp rating

C. 2.16 amps total which is within the 3.0-amp rating with significant margin

D. 3.84 amps total based on multiplying only the highest-draw device type by total count

94. A fire alarm riser diagram shows "PATHWAY SURVIVABILITY LEVEL 2" on voice evacuation circuits. What cable or construction method satisfies Level 2?

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

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

C. Any listed fire alarm cable in rigid metal conduit with firestop at each floor

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

95. A fire alarm specification requires acceptance testing per NFPA 72 before the certificate of occupancy is issued. The specification requires 5 business days' advance notice to the AHJ. The general contractor requests testing in 2 days. How should the fire alarm contractor respond?

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

B. Conduct a preliminary test in 2 days and schedule the formal test with proper notice

C. Contact the AHJ to request an expedited waiver of the 5-day notice period

D. Proceed with testing in 2 days and submit results to the AHJ for retroactive approval

96. A fire alarm floor plan shows a conference room measuring 50 × 40 feet with a 10-foot ceiling. Two wall-mounted strobes are shown — one 60 cd on each 50-foot wall. Per NFPA 72, a single 60 cd strobe covers up to 45 × 45 feet. Do the two strobes provide adequate coverage?

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

B. No, the room requires four strobes — one on each wall — for code compliance

C. Yes, the two strobes on opposite walls provide overlapping coverage addressing the full room

D. Yes, but only if both strobes are synchronized and mounted at identical heights

97. A fire alarm technician reviews a fire alarm system drawing that shows 145 devices on SLC 1. A physical field count reveals 153 devices. Panel programming shows 153. What documentation action is required?

A. No action — the 8-device discrepancy is within acceptable tolerance

B. The as-built drawings must be updated to reflect the 153 devices currently installed

C. The panel must be reprogrammed to match the 145-device drawing count

D. Both the drawings and Record of Completion must be updated to 153 devices

98. A fire alarm battery calculation shows: standby = 0.62A × 24hr = 14.88 Ah, alarm = 5.0A × 0.083hr = 0.415 Ah, subtotal = 15.295 Ah, × 1.20 = 18.35 Ah. The drawing specifies 18 Ah batteries. Is this adequate?

A. Yes, 18 Ah is close enough to 18.35 Ah for practical purposes

B. Yes, the 18 Ah batteries are adequate because they use the same amp-hour rating category

C. No, 18 Ah is less than the 18.35 Ah calculated minimum — the next standard size must be used

D. No, 18 Ah batteries are below the calculated minimum and must be increased to at least 26 Ah

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

A. Yes, defend-in-place hospitals may have different responses for different alarm types per the fire safety plan

B. No, all alarm types must trigger identical building-wide notification responses

C. Yes, but only if the hospital has fewer than 200 beds per the building code threshold

D. No, smoke detectors must always trigger broader notification than manually activated devices

100. A fire alarm as-built drawing shows the fire alarm panel's dedicated branch circuit. The drawing captures: breaker size (20A), conductor size (12 AWG), circuit length (150 ft), breaker labeling, lock-on device, and absence of GFCI/AFCI. What additional detail should the as-built capture?

A. The voltage measurement at the panel terminals for baseline comparison during future testing

B. The name of the electrician who installed the circuit for warranty tracking

C. The conduit type, size, and routing path from the electrical panel to the fire alarm panel

D. The circuit breaker manufacturer and catalog number for replacement parts ordering

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a subcontractor pulled fire alarm cable with excessive tension, potentially exceeding the manufacturer's maximum pulling force. Twelve cable runs — totaling 1,800 feet — may have damaged conductor insulation. What should the supervisor require before the cable is connected to any devices?

A. Visual inspection of the cable jacket at each junction box is sufficient to identify damage

B. The cable can be connected and tested — any damage will be identified during functional testing

C. The subcontractor must provide a signed statement certifying proper pulling technique was used

D. Megger testing must be performed on all 12 cable runs to verify insulation integrity before connection

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

A. Only the fire alarm contractor needs to attend because the test covers only fire alarm equipment

B. The elevator, HVAC, controls, and door hardware contractors must be present to verify their equipment responds

C. The general contractor is solely responsible for coordinating and attending the test

D. Only the AHJ and the fire alarm contractor need to be present for the acceptance test

103. A fire alarm project manager receives a change request to convert from horn/strobe notification to voice evacuation throughout a building that is 70% complete. The change requires new amplifiers, speaker circuits, and intelligibility analysis. How should this be handled?

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

B. The change is technically impossible at 70% completion and must be rejected

C. Install speakers on remaining floors and keep horn/strobes on completed floors

D. The project manager should absorb the additional cost to maintain the client relationship

104. A fire alarm contractor discovers the electrical contractor installed a combination AFCI/GFCI breaker on the fire alarm panel's dedicated circuit. The correct course of action is to:

A. Accept the breaker because it provides enhanced protection beyond code minimum requirements

B. Replace the breaker directly since it involves the fire alarm system's code compliance

C. Notify the general contractor to direct the electrical contractor to replace it with a standard breaker

D. Contact the AHJ to issue a violation against the electrical contractor for the non-compliant installation

105. A fire alarm contractor is managing inventory. A shipment of 250 addressable smoke detectors arrives — 230 with one date code and 20 with a different date code. All are the same model listed for the panel. Should the contractor be concerned?

A. Yes, date code mismatches indicate firmware incompatibility between production lots

B. Yes, the 20 different-date-code units should be installed on a separate SLC loop

C. No, but the 20 units should be placed in non-critical locations as a precaution

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

106. A fire alarm technician asks whether a service call to tighten a loose wire nut — resolving a ground fault trouble — requires a formal written service report. What is the correct guidance?

A. No, informal repairs under 30 minutes can be documented with a verbal confirmation only

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

C. No, written reports are required only when devices are replaced or panel programming is changed

D. Yes, but only if the repair resolves an active alarm condition rather than a trouble condition

107. A fire alarm project is nearing completion. The installing technicians' field markups are messy but contain accurate as-installed information. What should the contractor do for the closeout documentation?

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

B. Submit the messy field markups as-is because they represent actual conditions

C. Submit the original approved shop drawings since the installation followed the design

D. Have technicians recreate drawings from memory since the field markups are too difficult to read

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

A. Only the panel manufacturer's operating manual and warranty documentation

B. Only the as-built drawings and the contractor's completion certificate

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

D. The complete bid documents, shop drawings, and internal quality control records

109. A fire alarm contractor schedules acceptance testing for a hospital. The infection control department requires 48-hour advance notice before aerosol smoke testing in patient care areas. The general contractor wants testing to begin tomorrow. How should the fire alarm contractor proceed?

A. Proceed with all testing tomorrow because fire code requirements override hospital procedures

B. Use alternative non-aerosol testing methods exclusively in patient care areas without notice

C. Test only non-patient areas tomorrow and skip patient areas until proper notice is given

D. Provide the 48-hour notice and coordinate patient care testing per infection control requirements

110. A fire alarm project supervisor is scheduling the acceptance test for a newly installed system. The AHJ requires 10 business days' advance notice. The general contractor demands testing in 5 days to meet the project deadline. How should the supervisor respond?

A. Conduct a preliminary test in 5 days and document the results for AHJ review later

B. Maintain the 10-day notice requirement and reschedule the acceptance test with proper AHJ notification

C. Perform the test without the AHJ and submit a video recording for their review

D. Request the AHJ waive the notice period due to the project's urgent timeline

LEVEL II — SIMULATION EXAM 5: ANSWER KEY AND EXPLANATIONS

1. A — Remote amplifier panels at intermediate floors shorten the speaker circuit distances, reducing line losses that cause volume reduction at distant speakers. Centrally located amplifiers driving 750-foot circuits experience significant power loss over the wire resistance. Distributing amplifiers at mid-building locations keeps each circuit run short enough to maintain consistent audio levels on all floors.

2. C — Cross-zoning requires two separate detection zones to both activate before the panel initiates agent release. The purpose is to prevent accidental discharge from a single detector false alarm. The detection technology used in each zone does not affect the cross-zone function — using the same technology in both zones still requires two independent zone activations for release confirmation.

3. D — Standby = 1.35 × 24 = 32.40 Ah. Alarm = (4.8 + 9.2) × 0.25 = 3.50 Ah. Subtotal = 35.90 Ah. With 20% safety factor: 35.90 × 1.20 = 43.08 Ah, approximately 44.10 Ah with rounding variations in the alarm duration calculation. Voice evacuation requires 15-minute alarm duration. No generator means full 24-hour standby applies.

4. B — NFPA 72 does not permit complete elimination of notification from occupied spaces. However, operating rooms can use visible-only notification — wall-mounted strobes — with alarm signals directed to trained staff at the nursing station for acknowledgment and response. This eliminates audible disruption during surgery while maintaining code-required notification through visual means and staff alerting.

5. A — NFPA 72 Section 26.6.3.2 requires communication technologies capable of continuous path integrity monitoring to detect a path failure within 200 seconds. IP communicators with continuous monitoring capability must meet this 200-second detection window, ensuring prompt trouble annunciation when the primary path fails.

6. C — The fire command center requires a permanently installed fire alarm control panel or a complete repeater panel per NFPA 72 Section 23.10. A laptop computer is a removable, portable device that could be disconnected, moved, powered off, or stolen. The FCC display must be a permanent, dedicated installation that is always available for emergency responders.

7. D — Individual tamper zones for each sprinkler riser valve allow the fire alarm system to identify which specific valve has been moved from its normal position. This directs investigation to the

correct riser and the correct area of the building, saving response time. Grouping all tamper switches on a single zone eliminates this specificity.

8. B — NFPA 72 Section 23.11 requires releasing circuits to be supervised. When a supervised releasing circuit loses continuity — such as a disconnected wire — the panel must generate a trouble signal indicating the circuit integrity has been compromised. This alerts building management that the releasing circuit cannot deliver the release signal to the solenoid if needed.

9. A — Smoke stratification in tall atriums depends on fire size, heat output, and the building's thermal layers. A thermal stratification analysis identifies the elevations where smoke layers are likely to form based on the atrium's temperature profile. Sampling pipes are placed at these predicted stratification heights to ensure detection regardless of where the smoke layer stabilizes.

10. C — Beam smoke detector spacing must not exceed the manufacturer's listed maximum spacing for the specific ceiling height at the installation. At 40 feet, the manufacturer's listing establishes the maximum lateral distance between beams based on tested performance. NFPA 72 requires compliance with the manufacturer's listed spacing — not standard spot detector spacing.

11. B — When mass notification overrides fire alarm audible notification, the fire alarm signal must continue transmitting to the supervising station for fire department dispatch. The override affects only in-building notification. This ensures fire department response continues even when mass notification takes audible priority inside the building.

12. D — A raised floor space used for air distribution — whether supply or return — is classified as a plenum. FPLP cable is required for all fire alarm circuits routed through this under-floor plenum space. Lower-rated cables cannot substitute for FPLP in plenum applications regardless of whether the plenum is above a ceiling or below a raised floor.

13. C — Defend-in-place hospitals activate notification only on the alarm floor to prevent unnecessary relocation of patients on unaffected floors. Moving patients — especially those on ventilators, post-surgical, or critically ill — poses significant medical risk. Limiting notification allows the alarm floor staff to manage the fire response while other floors continue uninterrupted patient care.

14. A — Fire pump running status is classified as a supervisory signal because it indicates an off-normal equipment condition requiring awareness but not emergency response. The pump may run for testing, a system pressure drop, or an actual fire — the running status is informational. It is not an alarm signal because pump operation alone does not confirm a fire condition.

15. B — When the MRL elevator's drive equipment area detector activates, smoke near the motor and controller at the top of the hoistway may migrate down the shaft to the primary recall floor. Recalling elevators to a potentially smoke-contaminated floor endangers passengers. NFPA 72 Section 21.3 requires recall to an alternate floor when machine room detection activates.

16. D — In a 70.7V audio system, each speaker requires an impedance-matching transformer to convert the high-voltage line signal to the speaker driver's low impedance. Without transformers,

two parallel speakers present a very low impedance directly to the amplifier output, causing excessive current draw, severe audio distortion, and potential amplifier overload or damage.

17. C — NFPA 72 Section 23.8.1.3 requires that if a second automatic alarm from a different zone occurs during the PAS investigation period, PAS must immediately cancel and general alarm notification must activate. A second zone activation provides independent confirmation of a genuine alarm condition that overrides the investigation delay.

18. A — NFPA 72 Section 17.14.8 specifically requires manual fire alarm stations to be red. This is the only device type with a mandatory code-specified color requirement. Smoke detectors, heat detectors, horn/strobes, and speakers may be any color acceptable to the manufacturer and the project specifications.

19. B — The pre-discharge time delay must provide adequate evacuation time based on the room's specific characteristics: physical size, number and location of exits, maximum travel distance to the nearest exit, and the expected occupant count during business hours. The delay is determined by actual evacuation conditions, not a fixed code value or agent properties.

20. D — When a trouble on Building B's panel does not display on Building A's master panel, the most likely cause is a network communication configuration issue. The network programming between the two panels must be verified to ensure Building B is configured to transmit trouble data and Building A is programmed to receive and display it. SLC wiring, DACT lines, and firmware are not the typical cause.

21. C — Hospitals using defend-in-place strategies may have differentiated fire alarm responses for different alarm types as defined in the approved fire safety plan. Pull stations triggering full building notification and smoke detectors triggering floor-only notification are both valid approaches when documented in the approved plan and accepted by the AHJ.

22. A — When the kitchen suppression system activates, the fire alarm panel should execute the full approved sequence of operations: activate building notification, transmit the alarm signal to the supervising station, and initiate HVAC shutdown. A kitchen suppression activation indicates a confirmed fire condition requiring a coordinated building-wide response.

23. D — The total SLC standby current from all devices is approximately 132 mA, which is within the panel's 150 mA maximum capacity but leaves limited margin for future device additions. The technician should document the loading calculation and note that any significant device additions will approach or exceed the SLC's current capacity, potentially requiring a second loop.

24. A — Both SLC paths have independent Level 2 protection along their respective risers. However, at the floor where both paths cross through an unrated ceiling space, neither path has Level 2 protection during the crossing. A fire in the unrated ceiling space could damage both paths simultaneously, defeating the Class A pathway diversity despite each path's independent riser protection.

25. C — At 113 dB required (15 dB above 98 dB ambient), and the highest-output horn producing only 99 dB at 10 feet — which decreases further with distance — audible notification alone cannot achieve the code requirement. The design must compensate with enhanced visible notification to ensure occupants are alerted even when audible levels are insufficient.

26. B — NFPA 72 Section 17.6.3.1.3 requires heat detectors to be rated at least 20°F above the maximum expected ceiling temperature. The loading dock maximum is 90°F, so the minimum activation temperature is 110°F (90 + 20 = 110). Any detector rated at or above 110°F satisfies the code minimum. A 135°F detector provides a 45°F margin which exceeds the requirement.

27. D — The DACT performs a full handshake with the supervising station receiver during each periodic line test — not just a dial tone check. This end-to-end test verifies that the telephone line can successfully connect to the station, transmit data, and receive acknowledgment. Simple dial tone verification would not confirm the complete communication path to the station.

28. A — The 10-second transfer requirement limits the fire alarm panel's battery-only operation to a brief 10-second window during the transition from utility power to generator power. This minimal discharge preserves battery capacity for actual extended outages where the generator may not be available, ensuring the batteries retain their full charge for genuine emergencies.

29. C — Firefighter telephone systems must support multiple simultaneous two-way conversations from different floor stations to the fire command center. During a multi-floor fire response, the incident commander may need to communicate with firefighters on several floors simultaneously. This concurrent conversation capability distinguishes the firefighter telephone from standard single-call telephone systems.

30. B — Pre-signal notification per NFPA 72 Section 23.8.1.2 directs the initial alarm to trained staff who investigate the condition before general building notification activates. If staff confirm a fire, they manually activate general notification. If the alarm is not investigated within the specified time, the system automatically escalates to general building notification.

31. D — Pathway survivability Level 2 applies to all circuits designated as requiring that protection level — not just vertical risers. If the specification requires Level 2 on all voice circuits, both the vertical riser runs and the horizontal floor-level runs must be protected. The horizontal runs must use either CI cable or be enclosed in 2-hour fire-rated construction.

32. A — All three environments — swimming pool (humidity/chlorine), dry sauna (extreme heat fluctuations), and steam room (constant moisture/steam) — create conditions that cause smoke detector nuisance alarms or rapid deterioration. Heat detection avoids these problems because it responds only to abnormal temperature increases and is unaffected by humidity, chemicals, or steam.

33. C — When Zone 3 activation illuminates Zone 8's LED while Zone 3's LED remains dark, the annunciator's internal wiring has the two zones cross-connected on the LED driver board. The

panel sends correct zone data, but the annunciator routes Zone 3's signal to Zone 8's LED position. The internal wiring connections must be corrected.

34. B — NFPA 72 Section 23.11 requires releasing circuits to be supervised for integrity. When the technician opens the releasing circuit by disconnecting a conductor, the panel detects the loss of circuit continuity and generates a trouble signal. This confirms the panel is actively monitoring the releasing circuit and would detect a wiring failure that could prevent agent release.

35. A — Fire in a tunnel connecting two buildings can threaten both structures. Detection in the tunnel must trigger notification in both connected buildings so occupants in both buildings are alerted. The fire alarm systems in both buildings must be coordinated to ensure bilateral notification when tunnel detection activates.

36. D — ADA-accessible sleeping rooms require notification effective for alerting sleeping hearing-impaired occupants. A bed-mounted or pillow-level device — such as a high-intensity strobe near the pillow or a bed shaker — directly alerts a sleeping person who cannot hear audible alarms or see a wall-mounted strobe with their eyes closed.

37. C — The pre-recorded message plays on all floors (confirming all amplifiers and speakers function), but the live microphone audio reaches only selected floors. The live audio routing is programmed to broadcast to only certain speaker zones rather than all zones. The programming must be reviewed against the approved design to determine the intended live microphone coverage.

38. B — Intermittent communication drops during heavy rain strongly suggest rainwater infiltration into the underground conduit, compromising the cable insulation. Water entering the conduit through unsealed joints, damaged conduit sections, or compromised handhole entries creates intermittent paths that disrupt the digital communication signal between buildings.

39. A — Project specifications are contractual documents that the installing contractor must follow. Even though the NEC does not require conduit in non-plenum ceiling spaces for listed fire alarm cable, the specification is a binding obligation. If the contractor believes the requirement is excessive, the proper course is to formally request a specification change — not to deviate unilaterally.

40. D — When acoustically rated floor-to-ceiling partitions close, they create separate enclosed spaces that block sound and light from adjacent sections. Each possible room configuration must have independent notification coverage. Appliances in one section cannot serve occupants in another enclosed section when partitions are deployed.

41. C — After verifying cross-zone logic, countdown timing, and abort switch function, the releasing circuit supervision must be tested. The technician should open the releasing circuit and verify the panel generates a trouble signal, confirming the panel actively monitors the circuit's integrity. This ensures a wiring failure would be detected and reported before an actual fire event.

42. A — The pre-recorded message plays correctly on all floors, confirming amplifiers, speaker circuits, and speakers all function. The live microphone reaching only Floors 1-8 indicates the live audio routing is programmed for a subset of speaker zones rather than all zones. The programming must be reviewed to verify the intended live microphone broadcast coverage.

43. B — 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 when Bank A's detector zone alarms. The programming must be corrected so each lobby zone activates only its corresponding bank's recall relay.

44. D — The stairwell pressurization activated correctly and the control module relay for the Floor 6 exhaust clicked (confirming it received and executed the command). The exhaust fans did not start despite the relay closure. The fault is downstream — in the wiring between the control module relay contacts and the Floor 6 exhaust fan controller, or in the fan controller itself.

45. C — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 15 high-reading detectors require cleaning. The 5 low-reading detectors are abnormally sensitive and must be investigated for faults. All 20 out-of-range detectors require corrective action.

46. A — NFPA 72 Section 10.6.9 permits a maximum delay of 3 hours before annunciating an AC power failure trouble signal. The 3.5-hour delay exceeds this maximum by 30 minutes. The panel's AC power loss detection timing must be investigated and corrected to ensure the trouble appears within the 3-hour permitted window.

47. D — The smoke detector behind the new partition wall is now in a concealed space separated from the occupied corridor. Smoke from a corridor fire may not reach the concealed detector in time for effective early warning. The detector must be relocated to the occupied side of the wall, and the concealed space should be evaluated for its own detection needs.

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

49. C — Six months of lost historical event data impairs troubleshooting, incident investigation, and maintenance compliance documentation. The event log should be downloaded to external storage for archival, then cleared at the panel to restore full recording capacity for future events. Building management should be informed of the condition and the corrective action.

50. A — Four adjacent detectors with significantly longer activation times (30-40 seconds versus 3-8 seconds) compared to identical detectors on the same floor strongly suggests contaminated sensing chambers. An environmental factor specific to that corridor section — such as proximity to a

kitchen, construction dust, or HVAC discharge — may have accelerated contamination. The detectors should be cleaned and retested.

51. D — A gradual voltage decline from 26.8 to 25.6 VDC over 15 minutes of standby discharge — a drop of 1.2 volts — is normal and expected for batteries under standby load. The voltage remains well above the minimum operating threshold and the decline is steady and predictable. The charger activating after AC restoration confirms the power transfer test was successful.

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

53. C — NFPA 72 Table 14.4.3.2 requires releasing device circuits — including the circuits controlling suppression agent discharge — to be functionally tested annually as part of the comprehensive releasing system test. This includes cross-zone logic, countdown timers, abort switches, and releasing circuit supervision.

54. A — A double-interlock pre-action system requires two independent conditions: fire alarm detection activation AND a drop in supervisory air pressure indicating a sprinkler head has opened. Neither condition alone is sufficient. The valve correctly remained closed because only the detection interlock was satisfied — the air pressure interlock was not triggered.

55. D — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. Two strobes visible from the same corridor location must be synchronized regardless of circuit assignment. The 0.4-second offset violates this requirement and creates a potentially harmful disorienting visual effect.

56. B — NFPA 72 requires waterflow alarm signals to be received at the panel within 90 seconds of sustained flow. After 95 seconds with no alarm signal, the waterflow switch has failed its functional test. The switch, its retard delay setting, its wiring, and its panel connection must all be investigated and the deficiency documented.

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

58. A — The batteries ended the load test at 24.6 VDC — well above the manufacturer's minimum acceptable end-voltage of 20.4 VDC. The 4.2-volt margin above the minimum demonstrates adequate capacity to sustain the full alarm load for the required duration. The batteries pass the load test with comfortable margin.

59. D — The duct detector activated correctly, the panel processed the alarm, and the control module relay closed as commanded. 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 shutdown input, or in the AHU controller's response to the relay signal.

60. B — Two renovations adding 35 devices and modifying the sequence of operations represent significant system changes. NFPA 72 Section 7.8 requires the Record of Completion to reflect the current system configuration. A four-year-old document describing a substantially different system is a documentation deficiency that must be corrected.

61. A — Ninety-five nuisance waterflow alarms in two months with no actual fires indicates water pressure fluctuations causing brief paddle movements. The corrective approach should address both the root cause (investigating and mitigating pressure fluctuations) and the switch response (adjusting retard delay settings to filter pressure-related activations within the 90-second maximum).

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

63. D — After verifying cross-zone logic, countdown timer, abort switch, and releasing circuit supervision, the pre-discharge notification appliances in the protected space must be independently verified. Occupants must hear and see adequate audible and visual warning during the countdown to evacuate before agent discharge begins.

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

65. A — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash at a rate between 1 and 2 flashes per second. At 0.7 flashes per second, the strobe is below the minimum required rate. The device must be investigated and repaired or replaced to achieve a compliant flash rate within the 1-2 fps range.

66. C — When a tamper switch activation generates an alarm signal instead of a supervisory signal, the device input is programmed as an alarm zone rather than a supervisory zone in the panel. The programming must be corrected to classify the tamper switch input as supervisory so it generates the correct signal type for valve position changes.

67. A — A communication path failure lasting 60 days means the system has operated without communication redundancy for two months. If the functioning cellular path also fails, the building

would have no monitoring. This is a significant impairment that must be documented, and the building owner and AHJ should be notified per impairment procedures.

68. C — A bookshelf completely blocking both the horn opening and the strobe lens eliminates both audible and visible notification output from the device. The bookshelf must be relocated and building management informed that notification appliances must remain unobstructed to function as designed.

69. B — The batteries ended the load test at 19.6 VDC — below the manufacturer's minimum acceptable end-voltage of 20.4 VDC. At this voltage, panel components may malfunction or shut down during an actual alarm event. The batteries cannot sustain the required alarm load and must be replaced.

70. D — A smoke detector covered with a latex glove has been effectively disabled for four weeks. The glove prevents smoke from entering the sensing chamber, leaving the patient floor area without detection coverage. This is a significant impairment that must be documented. The covering must be removed immediately and compensatory measures evaluated for the renovation duration.

71. A — The primary line tested successfully. The secondary line — tested independently by disconnecting Line 1 — failed to deliver the signal to the station. Line 2 has failed its functional test and must be investigated and repaired to restore the dual-path communication redundancy required for DACT systems.

72. C — A sensitivity reading of 0.4% falls below the manufacturer's minimum acceptable range of 0.5%. The detector is operating outside its listed parameters — it is abnormally sensitive and may produce nuisance alarms or indicate a sensor fault. The detector must be investigated, and the cause of the below-minimum reading determined and corrected.

73. B — Storage of combustible materials, chemicals, and cleaning supplies in the panel room combined with only 22 inches of working clearance violates NEC Article 110.26 requirements. The minimum clearance is typically 30 inches wide and 36 inches deep. All storage must be removed and required clear space maintained for safe panel access.

74. D — NFPA 72 Table 14.4.3.2 requires supervisory devices — including tamper switches and valve position indicators — to be functionally tested annually as part of the comprehensive system functional test. Each device must be physically activated and the panel's supervisory response verified.

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

76. C — Voice evacuation messages must be intelligible throughout all notification zones per NFPA 72. A floor where the message echoes severely with unintelligible words fails the intelligibility requirement. The acoustic conditions must be addressed through speaker repositioning, adding speakers, adjusting volume, or installing acoustic treatment.

77. B — The panel correctly processed the alarm and 18 of 20 locks released, confirming the output functions work for most devices. The two non-releasing locks indicate a fault specific to those devices. The control module outputs, interface wiring, and power supply to the two specific locks must be investigated to identify the failure point.

78. D — A dark graphic annunciator at the fire command center means arriving firefighters cannot use the building floor plan display to identify alarm locations. This visual reference tool directly affects emergency response efficiency and is a required component of the fire command center. The failure must be documented as a deficiency requiring repair.

79. A — R = 750 × (3.14/1000) = 2.355 Ω. V_drop = 2.6 × 2.355 = 6.123V. End voltage = 24 − 6.123 = 17.88 VDC. This is above the 16 VDC minimum but with only a 1.88-volt margin. While technically code-compliant, this thin margin warrants evaluation of connection aging, temperature effects, and future device additions.

80. B — Standby = (0.82 + 1.18) × 4 = 8.0 Ah. Alarm = (4.2 + 8.5) × 0.25 = 3.175 Ah. Subtotal = 11.175 Ah. With 20% safety factor: 11.175 × 1.20 = 13.41 Ah, approximately 13.42 Ah. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm. All loads on the main panel batteries are included.

81. C — Even when duct detectors are configured for HVAC shutdown only without general building notification, the detection signal should still transmit to the supervising station. This ensures building management and the monitoring service are aware of the detection event for investigation and follow-up, maintaining awareness of all fire-related conditions.

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

83. B — Seven detectors at positions 15, 45, 75, 105, 135, 165, and 195 feet provide 30-foot spacing between detectors. The first detector is 15 feet from one end and the last is 5 feet from the opposite end. Both end distances are within the 15-foot maximum, and the 30-foot inter-detector spacing complies with NFPA 72 corridor detection requirements.

84. A — Adding 2 devices to SLC 1 reaches the absolute maximum of 198 with zero capacity for future additions, replacements, or modifications. The remaining 6 devices on a new loop provides expansion capacity. While technically functional, the technician should flag that SLC 1 at

maximum creates a rigid constraint where any future change requires a new loop or device removal.

85. C — Each remote NAC power supply panel has its own backup batteries that must sustain the loads it serves during AC power failure. A separate battery calculation must be performed for each remote panel using its specific standby and alarm currents, applying the same NFPA 72 duration and safety factor methodology as the main panel.

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

87. A — Project specifications are contractual documents that must be followed. Even though NEC does not require conduit in non-plenum spaces for listed fire alarm cable, the specification is a binding contractual obligation. Deviating without formal approval exposes the contractor to contractual liability.

88. B — The speaker circuit delivers 60.8 VAC at the farthest speaker, which is above the manufacturer's minimum rated input of 55 VAC. The 5.8-volt margin ensures the speakers will operate within their listed parameters and produce acceptable audio quality and volume at the farthest locations.

89. B — The pre-discharge time delay must provide adequate evacuation time based on the room's specific characteristics: physical size, number and location of exits, maximum travel distance, and expected occupant count. The delay is determined by actual evacuation conditions — not a fixed code value or agent-specific calculation.

90. D — Three different device counts across three documents — 170, 178, and 162 — indicate that system modifications were not consistently documented. All three documents must be verified against a physical field count and reconciled to reflect the same accurate, verified device count.

91. A — A detector at the 90-degree turn ensures smoke detection at the direction change where coverage from detectors in either corridor leg may be limited. Smoke traveling along one leg may not effectively reach detectors beyond the turn in the other leg. The corner detector catches smoke at the intersection regardless of approach direction.

92. C — Using Class A for upper floors (5-18) provides enhanced fault tolerance where it benefits most — longer egress distances, more difficult firefighter access, and greater occupant vulnerability during extended evacuation. The designer's risk assessment determined lower floors can accept Class B's lower redundancy given shorter egress and easier access.

93. B — Horn/strobes: 10 × 0.305 = 3.050A. Speakers: 8 × 0.145 = 1.160A. Strobes: 4 × 0.190 = 0.760A. Total = 4.970 amps, which significantly exceeds the 3.0-amp NAC output rating. The

circuit must be redesigned by splitting devices across multiple NAC circuits or adding NAC booster power supplies.

94. D — NFPA 72 Section 12.4.4 defines pathway survivability Level 2 as requiring either 2-hour fire-rated cable (circuit integrity cable) or installation within 2-hour fire-rated construction. Standard cable in standard conduit, FPLR in 1-hour enclosures, and standard cable in RMC with firestop alone do not satisfy Level 2.

95. A — The specification requires 5 business days' advance notice to the AHJ before acceptance testing. This is a regulatory and contractual obligation that cannot be waived by construction schedule pressure. The fire alarm contractor must provide the required notice and schedule the test accordingly.

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

97. B — The as-built drawings show 145 devices but 153 are physically installed and confirmed by panel programming. NFPA 72 requires as-built drawings to accurately reflect the current installed configuration. The drawings must be updated to show all 153 devices with their correct addresses, locations, and circuit assignments.

98. D — The calculated minimum battery capacity is 18.35 Ah. The specified 18 Ah batteries fall below this minimum by 0.35 Ah. Batteries must equal or exceed the calculated minimum. The next standard battery size above 18.35 Ah must be selected — typically 26 Ah in standard commercial battery sizes.

99. A — Hospitals using defend-in-place strategies may have different fire alarm responses for different alarm types as documented in the approved fire safety plan. Pull station alarms triggering building-wide notification while smoke detector alarms trigger floor-only notification is a valid approach when approved by the AHJ and consistent with the defend-in-place strategy.

100. C — 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 location. This information is essential for future maintenance, troubleshooting, and circuit modifications — technicians need to know where the circuit runs and how to access it.

101. D — Excessive cable pulling tension can stretch conductors, damage insulation, and create latent ground faults or opens that may not appear until weeks or months later. Megger testing all 12 cable runs before connection verifies insulation integrity and catches damage before it causes system problems. Visual inspection alone cannot detect internal insulation damage.

102. B — Emergency control function interfaces require the respective trade contractors to be present during acceptance testing. The elevator contractor verifies recall, the HVAC contractor verifies

shutdown and smoke control, the controls contractor verifies building automation, and the door hardware contractor verifies magnetic holder release. Each trade confirms correct equipment response.

103. A — Converting from horn/strobe to voice evacuation is a fundamental design change requiring new amplifiers, speaker circuit calculations, wiring modifications, intelligibility analysis, and panel reconfiguration. A formal change order must document the engineering revision, cost impact, and schedule extension before any work proceeds.

104. C — The fire alarm contractor should not modify the electrical contractor's work directly. The general contractor coordinates all trades and should be notified of the non-compliant AFCI/GFCI breaker. The GC then directs the electrical contractor to replace it with a standard thermal-magnetic breaker and lock-on device.

105. D — Different manufacturing date codes within the same detector model number indicate different production runs. As long as all 250 detectors are the same model and listed as compatible with the installed panel, date code variations do not affect system compatibility, communication, or detection performance.

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

107. A — Field markups contain the actual as-installed information. The contractor must create clean, professional as-built drawings that accurately incorporate all field markup data. Submitting messy markups, unmarked originals, or memory-based recreations fails to provide the accurate, legible documentation required for the permanent record.

108. C — NFPA 72 Section 7.7 requires the installing contractor to deliver as-built drawings, the completed Record of Completion, the approved sequence of operations, and operating and maintenance instructions. These four documents constitute the minimum required closeout package for the building owner.

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

110. B — The AHJ's 10-business-day notice requirement is a regulatory obligation that cannot be waived by construction schedule pressure. Conducting testing without proper notice may result in the test being invalidated and a complete retest required. The supervisor must maintain the notice requirement and reschedule with proper advance notification.