LEVEL II — SIMULATION EXAM 4 (110 QUESTIONS)

Time Limit: 155 Minutes

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

DOMAIN 2.1 — INSTALLATION (Questions 1–40)

1. A fire alarm technician is reviewing a design for a 10-story office building. The specifications require Class A SLC wiring with pathway survivability Level 2. The engineer proposes using 2-hour circuit integrity (CI) cable for the SLC without any additional fire-rated enclosure. A reviewer asks whether the CI cable alone provides adequate pathway diversity for Class A. What is the correct assessment?

A. CI cable alone provides Level 2 but the outgoing and return paths must still be physically separated for Class A diversity

B. CI cable provides Level 2 survivability but Class A additionally requires pathway diversity through separate physical routes

C. CI cable satisfies both Level 2 and Class A simultaneously without separate routing requirements

D. Level 2 requires CI cable inside a fire-rated enclosure regardless of the circuit classification

2. A fire alarm technician is installing a fire alarm system in a 20-story residential tower with voice evacuation. The building uses a defend-in-place strategy on residential floors. Per the approved sequence of operations, a smoke detector alarm on Floor 12 activates notification on Floors 11, 12, and 13 only. The remaining floors receive no notification. What code provision supports this limited notification approach?

A. NFPA 72 prohibits limited notification in all residential occupancies above 3 stories

B. Limited notification requires the building to be unsprinklered for the defend-in-place exemption

C. The building code and AHJ may approve defend-in-place with partial notification in sprinklered residential high-rises

D. Only hospitals may use defend-in-place notification strategies per NFPA 72 Chapter 23

3. A fire alarm technician is installing a releasing fire alarm system for a total flooding clean agent suppression system. The data center has two rooms — a main server hall and an adjacent UPS battery room. Each room has its own agent storage and discharge nozzles. The fire alarm releasing panel controls both rooms independently. What detection configuration is required for each room?

A. Each room must have its own independent cross-zone detection to prevent accidental discharge in the wrong room

B. A single cross-zone detection system covering both rooms is adequate since they share a common fire risk

C. Only the main server hall requires cross-zone detection — the battery room needs single-zone only

D. The battery room requires heat detection while the server hall requires smoke detection for cross-zoning

4. A fire alarm technician is calculating the SLC standby current for an addressable panel. The loop contains: 110 photoelectric smoke detectors at 0.28 mA each, 25 monitor modules at 0.22 mA each, 15 control modules at 3.8 mA each, 6 relay modules at 2.5 mA each, and 10 isolator modules at 0.12 mA each. What is the total SLC standby current?

A. 30.80 mA from the smoke detectors alone without other device types

B. 52.50 mA including only the smoke detectors and monitor modules

C. 102.50 mA which exceeds the typical 100 mA SLC limit on most panels

D. 98.50 mA from all devices combined on the SLC loop

5. A fire alarm technician is installing a fire alarm system in a hospital with multiple air handling units. The specifications require duct smoke detectors on each AHU's supply and return ducts. One AHU serves the surgical suite and has an air velocity of 3,900 fpm at the proposed return duct detector location. The detector manufacturer lists an operating range of 100 to 4,000 fpm. What concern should the technician raise?

A. The 3,900 fpm velocity exceeds the manufacturer's maximum operating threshold

B. The detector requires a minimum air velocity of 4,000 fpm for reliable smoke sampling

C. The 3,900 fpm is near the upper limit leaving minimal margin for velocity fluctuations

D. Duct detectors cannot be installed on surgical suite AHUs due to HEPA filtration interference

6. A fire alarm technician is installing a fire alarm system with an emergency voice/alarm communication system. The design uses 70.7V audio distribution with amplifiers at the fire command center on Floor 1. The longest speaker circuit runs 650 feet to Floor 15. During commissioning, speakers on Floor 15 produce noticeably lower volume than Floor 2 speakers on the same circuit. What is the primary cause?

A. The Floor 15 speakers have incorrect wattage tap settings compared to Floor 2 speakers

B. Line losses over the 650-foot distance reduce audio power delivered to distant speakers

C. The amplifier channel serving this circuit has a partial output failure

D. The 70.7V system compensates for distance automatically eliminating line loss as a cause

7. A fire alarm technician is installing a fire alarm system in a building with a pre-action sprinkler system. The system uses a double-interlock configuration requiring both fire detection AND a drop in supervisory air pressure before the pre-action valve opens. During commissioning, the technician activates a smoke detector. The solenoid energizes and the valve opens. What system configuration error exists?

A. The system is functioning as single-interlock rather than double-interlock and must be reconfigured

B. Double-interlock systems should open the valve on detection alone as the first interlock step

C. The solenoid must be on a separate releasing circuit from the detection circuit for double-interlock

D. The supervisory air pressure switch may be wired in series rather than the required parallel configuration

8. A fire alarm technician is installing notification appliances in a building where movable partition walls divide a large ballroom into four independent event spaces. Each partition is acoustically rated and floor-to-ceiling. When all partitions are deployed, four separate rooms are created. How must the notification design address these partitions?

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

B. Notification must be designed for the open configuration with supplemental devices at each partition

C. Each of the four rooms needs its own notification zone but devices can be shared across partitions

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

9. A fire alarm technician is installing a fire alarm system in a building with a central station monitoring contract. Per NFPA 72 Section 26.3, the central station must process received alarm signals within a specific time frame. What is the maximum time permitted from alarm signal receipt to initiation of the required response?

A. 120 seconds from signal receipt to fire department notification

B. 60 seconds from signal receipt to alarm acknowledgment by the operator

C. 90 seconds from signal receipt to initiation of the required response action

D. 30 seconds from signal receipt to fire department dispatch call placement

10. A fire alarm technician is installing a fire alarm system with a DACT communicator connected to two copper telephone lines. Per NFPA 72, the DACT must periodically verify telephone line integrity. What is the maximum interval between line integrity tests?

A. 4 hours to provide multiple daily verifications of telephone line availability

B. 24 hours — each telephone line must be tested at least once per day

C. 12 hours to provide twice-daily verification of both telephone lines

D. 48 hours to reduce unnecessary line seizures that could block incoming calls

11. A fire alarm technician is installing a fire alarm system in a large warehouse with 45-foot ceilings and high-bay storage racks extending to within 4 feet of the ceiling. The fire alarm design includes both ceiling-level beam smoke detection and in-rack smoke detection at 15-foot and 30-foot elevations. What is the purpose of the in-rack detection?

A. In-rack detectors identify fires at the storage level before smoke travels the full height to ceiling detectors

B. In-rack detectors provide backup coverage in case the ceiling beam detectors fail during testing

C. In-rack detectors are required by NEC for all storage rack configurations above 20 feet

D. In-rack detectors compensate for the reduced sensitivity of ceiling detectors at high temperatures

12. A fire alarm technician is installing a fire alarm system in a building with an emergency generator that provides backup power. Per NEC Article 700, the transfer switch must transfer the fire alarm panel from normal power to generator power within what maximum time frame?

A. 30 seconds to minimize the duration of battery-only operation during the transfer

B. 60 seconds which matches the maximum AC power trouble delay per NFPA 72

C. 120 seconds because fire alarm panels have battery backup for the transition period

D. 10 seconds per NEC Article 700 for all emergency system loads including fire alarm

13. A fire alarm technician is installing a fire alarm system and the engineer specifies a graphic annunciator at the building's main entrance. The annunciator must display a simplified building floor plan with zone-specific LED indicators. During commissioning, the technician discovers that activating Zone 3 illuminates the Zone 6 LED on the annunciator. What is the most likely cause?

A. The fire alarm panel is transmitting incorrect zone data through the communication port

B. The panel's Zone 3 and Zone 6 circuits share a common input on the panel motherboard

C. The annunciator's internal wiring has Zone 3 and Zone 6 cross-connected on the LED board

D. The SLC devices on Zone 3 have address conflicts with devices assigned to Zone 6

14. A fire alarm technician is installing smoke detectors for elevator recall in a building with three elevator banks. Each bank has its own lobby with a dedicated smoke detector. The engineer's design requires selective recall — Bank A's lobby detector recalls only Bank A's elevators. During commissioning, the technician activates Bank A's lobby detector and all three banks recall. What type of error is this?

A. A wiring error because the three recall relay circuits are physically cross-connected at the panel

B. A programming error because the panel is activating all three recall outputs for Bank A's zone

C. An elevator controller error because the controllers share a common recall input circuit

D. A detector error because Bank A's detector is generating a building-wide alarm signal

15. A fire alarm technician is installing a fire alarm system in a performing arts center. The main theater has a fly gallery above the stage with combustible curtains, backdrops, and rigging ropes. The ceiling height above the stage is 75 feet. Standard spot-type smoke detectors are specified for the fly gallery. What should the technician recommend instead?

A. Aspirating or beam detection designed for high-ceiling and large-volume spaces

B. Flame detection because the combustible stage materials produce visible flame first

C. Linear heat detection along each catwalk to detect fire at the rack level

D. Heat detection because the high ceiling prevents smoke from reaching ceiling detectors

16. A fire alarm technician is installing a fire alarm system in a building where the fire alarm panel is located in the electrical room on Floor 1. The building's fire command center is in the lobby on Floor 1 — a separate room from the electrical room. Per NFPA 72 Section 23.10, what must be located at the fire command center if the panel is in the electrical room?

A. A remote keypad that allows basic panel acknowledgment and reset functions only

B. A dedicated telephone line connecting the fire command center to the panel location

C. A duplicate set of the panel's backup batteries for redundant secondary power

D. A complete repeater panel displaying full system status with operator control capability

17. A fire alarm technician is designing the battery calculation for a fire alarm system with voice evacuation in a building with a qualifying emergency generator. The system loads are: panel/SLC standby = 0.80A, voice amplifier standby = 1.40A, NAC alarm = 3.5A, voice alarm = 8.0A. What standby and alarm durations should be used?

A. 24-hour standby and 5-minute alarm because voice evacuation uses standard durations with a generator

B. 4-hour standby and 5-minute alarm because the generator reduces both durations equally

C. 4-hour standby and 15-minute alarm because the generator reduces standby while voice requires extended alarm

D. 24-hour standby and 15-minute alarm because the generator does not affect voice evacuation calculations

18. A fire alarm technician is installing a fire alarm system in a cold storage facility. The main freezer maintains -20°F. Heat detectors are specified. The available heat detectors have a minimum operating temperature of -40°F and an activation temperature of 135°F. What concern should the technician evaluate regarding the activation temperature?

A. The 135°F activation temperature may be too low for the freezer's defrost cycle temperatures

B. The 155°F margin between -20°F ambient and 135°F activation exceeds the code minimum and is appropriate

C. Heat detectors cannot be used below -10°F regardless of the manufacturer's listed range

D. The activation temperature must be reduced to 100°F for faster response in cold environments

19. A fire alarm technician is installing a mass notification system integrated with the fire alarm system. The mass notification system shares speakers with the voice evacuation system. Per NFPA 72 Chapter 24, when mass notification overrides fire alarm notification, what critical function must continue?

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

B. The fire alarm audible notification must continue on the alarm floor during mass notification

C. Mass notification override is prohibited during any active fire alarm condition per NFPA 72

D. The fire alarm panel must generate a trouble signal when mass notification overrides it

20. A fire alarm technician is installing a fire alarm system in a hospital operating suite. The surgical staff requests that audible notification be eliminated from operating rooms during active procedures. Per NFPA 72, how can this request be addressed?

A. Operating rooms are exempt from all fire alarm notification during active procedures

B. Audible notification may be reduced but cannot be completely eliminated from any occupied space

C. The operating rooms may use pre-signal or positive alarm sequence notification through the nursing station

D. Visible-only notification with staff acknowledgment at the nursing station can address the concern

21. A fire alarm technician is installing a fire alarm system in a mixed-use building. The ground floor contains a restaurant with an average ambient noise level of 72 dB. The second floor contains an office with 55 dB ambient. The third floor contains a fitness center with 88 dB ambient. Per NFPA 72, what minimum audible notification level is required on each floor?

A. 87 dB, 70 dB, and 103 dB based on 15 dB above ambient for all three spaces

B. 77 dB, 60 dB, and 93 dB based on 5 dB above ambient as the alternate criterion

C. 87 dB, 70 dB, and 103 dB applying the 15 dB above ambient requirement consistently

D. 85 dB, 70 dB, and 100 dB using the NFPA 72 minimum of 85 dB for commercial spaces

22. A fire alarm technician is installing a fire alarm system in a building with an in-building emergency responder communication enhancement system (ERCES). The ERCES uses a bidirectional amplifier (BDA) with distributed antenna systems. Per NFPA 72, what fire alarm system monitoring is required for the ERCES?

A. The fire alarm system must monitor ERCES supervisory signals including power failure and antenna faults

B. The ERCES must be connected to the fire alarm panel's SLC as an addressable alarm device

C. No fire alarm monitoring is required because ERCES is an independent communication system

D. The fire alarm system must provide primary and backup power to the ERCES from its batteries

23. A fire alarm technician is installing a fire alarm system with a releasing circuit for a clean agent suppression system. The protected space is occupied by IT staff during business hours. Per NFPA 72, what occupant safety provisions are required before agent discharge?

A. Only audible warning is required — visual warning is optional for clean agent systems

B. The system must discharge immediately without warning to suppress fire as quickly as possible

C. Pre-discharge audible and visual warning with a time delay and abort capability must be provided

D. Only an abort switch is required — pre-discharge warning is optional if the abort switch is installed

24. A fire alarm technician is installing visible notification appliances in a convention center ballroom measuring 200 × 150 feet with a 30-foot ceiling. The room has four sets of movable partition walls. When designing ceiling-mounted visible notification using NFPA 72 Table 18.5.5.5.1(b), what factor differentiates the ceiling table from the wall table?

A. The ceiling table requires exactly double the candela of the wall table for the same room size

B. The ceiling table uses only the room perimeter divided by four for candela determination

C. The ceiling table factors in ceiling height in addition to room dimensions for candela selection

D. The ceiling table uses room dimensions and ceiling height together for the required candela

25. A fire alarm technician is installing a fire alarm system in a high-rise building. The sequence of operations calls for smoke control activation upon fire alarm. The smoke control system pressurizes stairwells and exhausts smoke from the fire floor. During commissioning, the technician activates a smoke detector on Floor 8. The stairwells pressurize but the Floor 8 exhaust does not activate. What should be investigated?

A. The smoke detector type because it may not generate a signal compatible with exhaust activation

B. The control module output, interface wiring, and programming for the Floor 8 exhaust function

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

D. The Floor 8 mechanical dampers because they require manual operation before exhaust can function

26. A fire alarm technician is performing a voltage drop calculation for a NAC circuit serving a high-rise building. The circuit uses 12 AWG copper (1.98 Ω/1000 ft) with a round-trip distance of 1,400 feet and 1.8 amps alarm current. What is the voltage at the farthest device on a 24 VDC system?

A. 19.01 VDC which provides a 3.01-volt margin above the 16 VDC minimum

B. 21.37 VDC providing generous margin with potential to downsize conductors

C. 16.42 VDC barely meeting the minimum and requiring circuit redesign

D. 14.85 VDC falling below the minimum and requiring immediate redesign

27. A fire alarm technician is installing a fire alarm system in a campus environment with three buildings. Each building has its own fire alarm panel. The panels must network to share alarm, trouble, and supervisory data. The communication between buildings runs through underground conduit between building electrical rooms. What wiring method is typically used for this underground inter-building communication?

A. Standard FPLP fire alarm cable pulled through the underground conduit

B. Standard Category 6 data cable because panel networks use Ethernet communication

C. The manufacturer's specified communication cable pulled through the underground conduit

D. Fiber optic cable because it is immune to ground potential differences between buildings

28. A fire alarm technician is installing a fire alarm system in a building with a fire pump. The fire pump controller monitors several conditions and reports them to the fire alarm panel. Per NFPA 72, which of the following fire pump conditions requires a supervisory signal at the fire alarm panel?

A. Pump motor overtemperature which is handled internally by the pump controller only

B. Normal pump running status during a weekly test cycle performed by building maintenance

C. Low fuel level on a diesel fire pump engine fuel tank during normal standby operation

D. Phase reversal on the incoming electrical service powering the fire pump motor

29. A fire alarm technician is installing a fire alarm system with a firefighter telephone system per NFPA 72 Section 24.5. The system includes handset jacks at each floor landing in both stairwells and at the fire command center. During commissioning, the technician tests the system by connecting a handset at the 10th floor stairwell. The handset produces a ringing signal at the fire command center. The fire command center answers and two-way conversation is clear. What additional test should be performed?

A. Verify that the firefighter telephone activates the building's voice evacuation system simultaneously

B. Test multiple simultaneous connections to verify the system supports concurrent conversations

C. Verify that the telephone system operates on battery power during a simulated AC power failure

D. Test the telephone system with the fire alarm system in alarm to verify audio clarity during notification

30. A fire alarm technician is installing a fire alarm system in a building where the specifications require all fire alarm circuits to have pathway survivability Level 1. The building is fully protected by automatic sprinklers. What does Level 1 require beyond standard installation?

A. Level 1 requires only that the circuit pathway be protected by automatic sprinklers — no additional construction

B. Level 1 requires the circuit to be in 1-hour fire-rated conduit in addition to sprinkler protection

C. Level 1 requires circuit integrity cable installed in the sprinklered pathway

D. Level 1 requires both sprinkler protection and a dedicated fire alarm riser shaft

31. A fire alarm technician is installing a fire alarm system in a data center with both a raised floor plenum for cold air distribution and a ceiling space used for cable management only (not for air return). The ceiling space has dedicated ducted HVAC return. What cable type is required for fire alarm circuits in each space?

A. FPLP in the raised floor plenum only — FPL is acceptable in the non-plenum ceiling space

B. FPLR in both spaces because the raised floor qualifies as a riser application

C. FPLP in the raised floor plenum and FPL minimum in the non-plenum ceiling space

D. FPLP in both spaces because all concealed spaces in data centers are classified as plenums

32. A fire alarm technician is installing a fire alarm system in a building with a swimming pool facility. The pool area has high humidity, chlorine atmosphere, and temperatures that fluctuate between 75°F and 95°F. What detection technology is most appropriate for the pool area?

A. Photoelectric smoke detectors with corrosion-resistant housings rated for pool environments

B. Aspirating smoke detection with the sampling unit mounted outside the pool area

C. Ionization smoke detectors because they perform better in humid conditions than photoelectric

D. Heat detectors because the corrosive humid environment makes smoke detectors impractical

33. A fire alarm technician is reviewing a sequence of operations matrix for a 15-story office building. The matrix shows that a waterflow alarm on Floor 6 triggers horn/strobes on Floors 5, 6, and 7, elevator recall, and supervising station signal — but no HVAC shutdown. The building has a central air handling system. Should HVAC shutdown be included?

A. No, waterflow alarms require only notification and signal transmission by default

B. Yes, HVAC shutdown should be included if the building's fire safety plan requires it for alarm conditions

C. No, HVAC shutdown is triggered exclusively by duct detectors and never by other alarm types

D. Yes, all alarm types must trigger HVAC shutdown per NFPA 72 Section 21.7

34. A fire alarm technician is installing a fire alarm system in a hotel. ADA-accessible sleeping rooms require notification effective for waking sleeping hearing-impaired occupants. What type of device typically fulfills this requirement beyond the standard wall-mounted strobe?

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

B. A low-frequency 520 Hz audible tone generator mounted within 3 feet of the bed

C. A standard wall-mounted strobe at triple the normal candela rating for the room

D. An overhead ceiling-mounted strobe rated at 177 cd directly above the bed location

35. A fire alarm technician is installing a fire alarm system in a high-rise building and encounters a specification requiring "positive alarm sequence" (PAS). Per NFPA 72 Section 23.8.1.3, PAS provides a 180-second investigation period before general notification activates. During this period, what must happen immediately — without any delay?

A. Only the remote annunciator at the fire command center receives the initial alarm indication

B. The panel must silence all audible indicators during the investigation period

C. The alarm signal must transmit to the supervising station and the panel must display the alarm

D. The fire safety director must be paged on their personal mobile device for response

36. A fire alarm technician is installing a fire alarm system in a building with three separate sprinkler risers. Each riser has an OS&Y gate valve with a tamper switch and a waterflow switch. The technician connects all six switches to the fire alarm panel. How should the waterflow and tamper switches be programmed?

A. All six switches as supervisory inputs because they all monitor sprinkler system conditions

B. All six switches as alarm inputs because any sprinkler system activation is a fire emergency

C. All waterflow switches as supervisory and all tamper switches as alarm for enhanced response

D. Waterflow switches as alarm inputs and tamper switches as supervisory inputs per their functions

37. A fire alarm technician is installing a fire alarm system with a releasing circuit for a pre-action sprinkler system. The releasing circuit controls the pre-action valve solenoid. Per NFPA 72, this releasing circuit must be what type of circuit?

A. A standard NAC circuit because the releasing circuit operates at the same voltage as notification

B. A supervised circuit classified as either Class A or Class B per the fire alarm system requirements

C. An unsupervised power circuit because the solenoid requires higher current than standard SLC devices

D. A dedicated communication circuit using the manufacturer's proprietary releasing protocol

38. A fire alarm technician is installing a fire alarm system in a nursing home. The facility uses a "defend in place" strategy on patient care floors. Per the approved fire safety plan, when a smoke detector activates on a patient floor, notification activates only on the alarm floor. What is the rationale for this limited notification?

A. Patient relocation within the building is safer than full evacuation for mobility-impaired residents

B. Full building notification triggers panic that is more dangerous than the fire itself

C. Building codes prohibit audible notification in nursing home patient rooms at night

D. The defend-in-place strategy is required only for nursing homes with fewer than 50 beds

39. A fire alarm technician is installing a fire alarm system in a building and the specification requires smoke detection in elevator hoistways and machine rooms per NFPA 72 Section 21.3. The building has a machine-room-less (MRL) elevator design with the drive motor and controller at the top of the hoistway. How does the MRL design affect detection requirements?

A. MRL elevators are exempt from machine room detection since there is no separate machine room

B. The hoistway detection at the top covers the drive equipment eliminating the need for additional detection

C. The area containing the drive equipment within the hoistway must be treated as the machine room for detection purposes

D. Only heat detection is required for MRL hoistways because the enclosed motor generates excess heat

40. A fire alarm technician is installing a fire alarm system in a building where the engineer specifies that all notification appliances throughout a 6-story building must flash in synchronization. The total strobe load exceeds any single NAC circuit's output capacity. The panel manufacturer's sync protocol requires a common synchronization signal. How is building-wide synchronization achieved across multiple NAC circuits?

A. Each floor's NAC circuit synchronizes independently — inter-floor sync is not achievable

B. NAC power extenders or sync modules maintain the synchronization signal across multiple circuits

C. A third-party synchronization controller operates independently from the fire alarm panel

D. The panel's internal firmware automatically synchronizes all NAC outputs without additional hardware

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

41. A fire alarm technician is performing annual testing on a releasing fire alarm system for a clean agent suppression system. The system has a 20-second pre-discharge countdown and an abort switch. Before testing the releasing circuit, the technician disconnects the agent solenoid and installs a supervised substitute load. During the cross-zone test, both zones activate and the countdown begins. At 10 seconds, the technician presses the abort switch. The countdown stops. The technician releases the abort switch and the countdown resumes from 10 seconds. Is this correct behavior?

A. No, releasing the abort switch should restart the countdown from 20 seconds

B. No, pressing abort should permanently cancel the release requiring a full panel reset

C. Yes, but only if the abort switch is a momentary-contact rather than maintained type

D. Yes, the maintained abort switch pauses the countdown and it resumes when released

42. A fire alarm technician is performing annual testing of a voice evacuation system. The technician tests the firefighter telephone from a 14th-floor stairwell station. Audio from the fire command center to the 14th floor is clear. Audio from the 14th floor to the fire command center is garbled with heavy static. What is the most likely cause?

A. The 14th-floor handset has a failing microphone element while the earpiece functions normally

B. The firefighter telephone amplifier has a bidirectional fault affecting both uplink and downlink

C. The fire command center receive circuit has a component failure on the 14th-floor input channel

D. The SLC communication on the 14th floor is generating interference on the telephone frequency

43. A fire alarm technician tests a fire alarm system's elevator recall function. Three elevators serve the building. The technician activates a lobby smoke detector. All three elevators recall to the ground floor. Elevator 1 opens its doors. Elevator 2 opens its doors. Elevator 3 arrives but the doors remain closed. What should be documented?

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

B. The fire alarm interface passed for all three — the door failure on Elevator 3 is an elevator deficiency to document separately

C. Only Elevators 1 and 2 passed — the fire alarm interface failed for Elevator 3

D. The entire test must be repeated after Elevator 3's door mechanism is repaired

44. A fire alarm technician tests the stairwell pressurization interface during annual testing. When a smoke detector activates, the panel commands the pressurization fans to start. The fans activate. On Floor 5, the stairwell door requires significantly more force to open. On Floor 12, the stairwell door opens with no additional resistance. What should be documented?

A. Only fan activation requires documentation — door resistance testing is the mechanical contractor's scope

B. The inconsistent pressurization indicates a potential mechanical system issue that should be investigated

C. Both observations should be documented because inconsistent pressurization suggests a duct or damper issue

D. Floor 12 passed because some pressure variation between floors is expected in tall buildings

45. A fire alarm technician is performing sensitivity testing on an analog addressable system with 400 detectors. The panel sensitivity report shows 8 detectors reading between 3.8% and 4.5% obscuration/ft (above the 3.7% maximum) and 4 detectors reading between 0.2% and 0.4% (below the 0.5% minimum). What action is required?

A. All 12 out-of-range detectors require investigation and corrective action — cleaning, recalibration, or replacement

B. Only the 8 high-reading detectors need cleaning — the 4 low-reading detectors are more sensitive and acceptable

C. All 400 detectors must be cleaned because 12 out-of-range indicates system-wide contamination

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

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

A. No, the valve should open on detection alone for all pre-action system configurations

B. No, the detection signal should at least prime the pilot line for faster valve response

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

D. Yes, but only during testing — normal operation would open the valve on detection alone

47. A fire alarm technician discovers during inspection that a fire alarm panel has been generating "DEVICE COMMUNICATION FAILURE" for addresses 071 through 078 on SLC 1 for three weeks. All eight devices are on the same floor in the east wing. Building staff say the system "works fine otherwise." What must be documented?

A. The eight devices represent minimal risk since 392 of 400 total devices still function normally

B. Building staff acknowledgment of the condition provides adequate documentation

C. The devices may recover spontaneously and should be monitored for one additional month

D. Eight non-communicating devices leave those areas unprotected and represent a significant impairment

48. A fire alarm technician tests the panel's AC power supervision by disconnecting primary AC. The system transfers to battery. After 4 hours, no AC power trouble signal has appeared on the panel display. Per NFPA 72 Section 10.6.9, is this acceptable?

A. Yes, the panel has 6 hours before it must annunciate AC power trouble

B. No, the AC power trouble must annunciate within 3 hours per NFPA 72

C. Yes, the 4-hour delay falls within the standard battery standby tolerance

D. No, the trouble must appear immediately upon any loss of primary power

49. A fire alarm technician discovers during inspection that a smoke detector in a hospital corridor has been covered with a surgical glove by nursing staff to prevent nuisance alarms during an adjacent renovation. The renovation has been underway for six weeks. What must be documented?

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

B. Surgical gloves are thin enough to allow smoke penetration and do not affect detector performance

C. The covering is acceptable if nursing staff inspect the covered detector daily and log their findings

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

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

A. The room acoustics at that location absorb sound creating an apparent volume reduction

B. The amplifier has a partial fault affecting only one output channel on the speaker circuit

C. The speaker's internal wattage tap has been set to a lower setting than other speakers

D. The speaker wire has excessive resistance at a connection reducing power to the device

51. A fire alarm technician tests a waterflow switch by opening the inspector's test valve on a wet-pipe sprinkler system. Water flows for 90 seconds with no alarm signal at the panel. What should be documented?

A. The waterflow switch test is still within acceptable limits and the technician should wait longer

B. The retard delay setting should be checked because it may be set beyond the allowable range

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

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

52. A fire alarm technician tests communication paths. The system has primary IP and secondary cellular. The technician tests IP — successful. The technician disconnects IP and sends a test signal via cellular. The supervising station does not receive the cellular signal. What must be done?

A. The IP communicator must be reprogrammed because its disconnection disrupted the cellular module

B. The cellular communicator must be investigated and repaired to restore communication redundancy

C. No action is needed because the primary IP path is functional and the cellular is supplementary

D. The supervising station must reconfigure their receiver to accept cellular signals from this account

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

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

B. Annually as part of the comprehensive functional test and inspection

C. Monthly to ensure reliable detection throughout the protected premises

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

54. A fire alarm technician is performing annual testing on a fire alarm system with positive alarm sequence (PAS). During PAS testing, the technician activates a smoke detector. The 180-second investigation period begins. At 60 seconds, a second smoke detector in a different zone activates. Per NFPA 72, what must happen?

A. The investigation period extends by 180 seconds for the second zone activation

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

C. The second activation has no effect because the investigation period is already in progress

D. PAS must immediately cancel and general alarm notification must activate

55. A fire alarm technician discovers during inspection that two corridor pull stations in a school have been painted beige to match the walls. The paint covers the housing, handle, and instruction label. What must be documented?

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

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

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

D. The school's maintenance staff should repaint the pull stations red within 30 days

56. A fire alarm technician is performing annual testing of emergency control functions. The technician activates a smoke detector and verifies: horn/strobes activate, elevator recalls, HVAC shuts down, and the supervising station receives the alarm. However, two of twenty magnetically held fire doors do not release. The sequence of operations requires all fire doors to release for any smoke alarm. What must be investigated?

A. The smoke detector because it may not be generating a signal type that triggers door release

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

C. The panel programming because door release may not be linked to the specific detector zone

D. The door closer mechanisms because they may lack sufficient spring tension for closure

57. A fire alarm technician discovers during inspection that the fire alarm panel's event log has reached capacity and has been overwriting entries for approximately five months. Building management was unaware. What should be documented?

A. Five months of historical data has been permanently lost — the log must be downloaded and cleared

B. The event log reaching capacity is normal and requires no corrective action

C. The panel must be replaced with a model having larger event log capacity

D. The log capacity has no operational impact because the panel functions independently

58. A fire alarm technician performs a battery load test. Starting voltage is 27.0 VDC. After the specified test duration under full alarm load, ending voltage is 19.4 VDC. The manufacturer's minimum acceptable end-voltage is 20.4 VDC. What must be documented?

A. The batteries passed because 19.4 VDC exceeds the general industry minimum of 18 VDC

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

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

D. The batteries failed — 19.4 VDC is below the manufacturer's 20.4 VDC minimum end-voltage

59. A fire alarm technician tests visible notification appliances in a hospital corridor. Two strobes are visible from the same location. During testing, both flash but approximately 0.3 seconds apart. The devices are on different NAC circuits. What code requirement is violated?

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

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

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

D. The mounting height requirement because improper mounting prevents synchronization

60. A fire alarm technician is testing a fire alarm system's HVAC shutdown interface. A duct detector activates, the panel processes the alarm, and the control module relay closes. The HVAC contractor confirms the AHU did not shut down despite the relay closure. What should be investigated?

A. The duct detector because it may be generating an incorrect alarm signal type

B. The wiring between the control module relay contacts and the AHU controller's shutdown input

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

D. The SLC communication because the control module may not have received the command

61. A fire alarm technician discovers a building's Record of Completion was last updated five years ago. Since then, two renovations added 40 devices and modified the sequence of operations. What corrective action is needed?

A. The Record of Completion must be updated to reflect the current system configuration

B. The annual testing records adequately document all modifications and no update is needed

C. A new Record is required only if the panel itself was physically replaced during the renovations

D. The original Record remains valid because it documents the initial installation baseline

62. A fire alarm system event log shows 120 "WATERFLOW — ALARM" events over three months with no fires or sprinkler activations found. The building engineer reports municipal water pressure fluctuations. What corrective action should be recommended?

A. Replace all waterflow switches with models having longer built-in retard delays

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

C. Increase the panel's alarm threshold for waterflow zones to filter false activations

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

63. 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. Butterfly valves use a different activation standard than OS&Y valves — the test method is wrong

B. The panel programming has the switch configured as alarm mode rather than supervisory mode

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 the technician a false reading of valve position

64. A fire alarm technician is testing the voice evacuation system's live firefighter microphone from the fire command center. The message is heard clearly on Floors 1-8 but not on Floors 9-15. The pre-recorded message plays correctly on all 15 floors. What is the most likely cause?

A. The amplifiers serving Floors 9-15 have a fault that blocks live audio but passes pre-recorded audio

B. The live microphone audio routing is programmed to broadcast only to Floors 1-8 rather than all floors

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

D. The speaker circuit wiring on Floors 9-15 has a frequency-dependent fault affecting live audio

65. A fire alarm technician discovers during inspection that a building tenant has covered a horn/strobe with a decorative wooden shelf mounted directly over the device. The shelf completely blocks the strobe lens and partially muffles the horn. What must be documented?

A. The shelf obstructs both audible and visible notification output and must be removed

B. Only the strobe obstruction needs documentation — the horn is only partially affected

C. The shelf is decorative and can remain if the device activates during functional testing

D. Building management may apply for an AHJ variance to keep the decorative shelf

66. A fire alarm system has primary IP and secondary cellular communication. The panel shows "IP COMMUNICATION FAILURE" active for 30 days. Cellular is functioning normally. What significance does this 30-day outage have?

A. No significance because cellular backup provides complete monitoring capability

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

C. The IP failure must be investigated but is not urgent since the cellular provides full monitoring

D. The system has operated without communication redundancy for 30 days — a significant impairment

67. A fire alarm technician performs annual sensitivity testing. The panel report shows one detector at 0.3% obscuration/ft. The manufacturer's acceptable range is 0.5% to 3.7%. What does this below-minimum reading indicate?

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

B. The detector has been recently cleaned and will drift upward into the acceptable range over time

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 heightened detection capability

68. A fire alarm technician tests a horn/strobe. The temporal-three horn pattern sounds correctly. The strobe flashes but at approximately 0.6 flashes per second. Per NFPA 72, what should be documented?

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

B. The strobe fails — NFPA 72 requires 1 to 2 flashes per second and 0.6 is below the minimum

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

D. The strobe rate is acceptable for sleeping areas but not for commercial corridors

69. A fire alarm technician discovers during inspection that the panel's dedicated circuit breaker has an AFCI breaker installed instead of a standard breaker. A lock-on device is present. What violation exists?

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

B. The lock-on device is not required when an AFCI breaker provides enhanced protection

C. AFCI breakers are acceptable if a lock-on device is also installed on the breaker handle

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

70. A fire alarm technician performs a battery load test. Batteries start at 26.4 VDC. Under full alarm load, voltage drops to 19.2 VDC in 3 minutes during standby — not alarm — conditions. The system has no alarm condition active. What must be documented?

A. The voltage drop is within normal limits for initial discharge during a transfer test

B. The 3-minute standby duration is insufficient to draw meaningful conclusions about battery health

C. The battery charger may be faulty because voltage should not drop this fast during standby

D. The batteries have failed catastrophically — a 7.2-volt drop in 3 minutes during standby is not sustainable

71. A fire alarm technician discovers during annual testing that a building renovation enclosed a corridor smoke detector behind a new wall. The detector communicates normally with the panel but is now in a concealed space separated from the occupied corridor. What must be documented?

A. The detector can remain because it continues communicating normally with the fire alarm panel

B. The detector only needs its panel location descriptor updated to reflect the new concealed position

C. The detector must be relocated below the wall to the occupied corridor and the concealed space evaluated

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

72. A fire alarm technician is testing emergency control functions and discovers that the panel generates an alarm for smoke detector activations but does not generate a supervisory signal when a tamper switch is activated. The tamper switch contact closure is confirmed at the panel terminals. What is the most likely cause?

A. The tamper switch is programmed as an alarm input rather than a supervisory input in the panel

B. The tamper switch wiring polarity is reversed preventing proper signal classification

C. The panel cannot distinguish between alarm and supervisory signals on the same input type

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

73. A fire alarm technician is testing a releasing fire alarm system and verifies the cross-zone logic, pre-discharge countdown timer, abort switch, and releasing circuit supervision with a substitute load. What additional test must be performed on the notification appliances in the releasing zone?

A. The releasing zone notification appliances have already been tested through the standard NAC testing

B. The pre-discharge audible and visual warning appliances in the protected space must be verified independently

C. Only the exit signs in the releasing zone need verification since they provide evacuation guidance

D. The releasing zone speakers must be tested at double the normal volume to ensure adequate warning

74. A fire alarm system in an office building has four NAC circuits. NAC 1 and 2 serve horn/strobes. NAC 3 serves elevator lobby strobes. NAC 4 is labeled "spare" with no devices connected. NAC 4 shows no trouble on the panel. Is this acceptable?

A. No, all panel circuits must have devices or termination for the system to be code-compliant

B. No, unused circuits should generate a trouble to alert service personnel of the unused output

C. Yes, spare circuits may remain disconnected and available for future system expansion

D. Yes, but the spare circuit must have an EOLR installed at the panel terminals for supervision

75. A fire alarm technician is testing a fire alarm system in a building with a pre-action sprinkler system using single-interlock configuration. The technician activates a smoke detector. The pre-action valve opens and water fills the piping. No sprinkler heads discharge water. Is this the expected response?

A. No, the valve should not open until a sprinkler head also fuses from heat exposure

B. No, the detection signal should only prime the pilot line without opening the main valve

C. Yes, the single-interlock valve opens on fire detection to fill the piping — discharge requires head activation

D. Yes, but the valve should close automatically after 60 seconds if no sprinkler head activates

76. Per NFPA 72 Table 14.4.3.2, how frequently must fire alarm system supervisory devices such as tamper switches be functionally tested?

A. Annually as part of the comprehensive system functional test

B. Semiannually to match the smoke detector testing frequency

C. Monthly because supervisory devices monitor critical sprinkler valve positions

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

77. A fire alarm technician discovers during inspection that a building's fire alarm panel room is being used to store paint cans, cleaning chemicals, and cardboard boxes. The panel has only 20 inches of clear space in front. What code requirements are being violated?

A. Only the chemical storage presents a concern — the cardboard boxes and clear space are acceptable

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

C. The panel room may be used for storage as long as the chemicals are in sealed containers

D. Only the 20-inch clearance is a violation — storage in electrical rooms is permitted if organized

78. A fire alarm technician is performing annual testing on a voice evacuation system. All speakers produce clear audio on every floor except one ceiling-mounted speaker on Floor 9 that produces no sound. Voltage at the speaker terminals reads 70.1 VAC during alarm. What is the most likely cause?

A. The 70.1 VAC reading is below the speaker's minimum operating voltage threshold

B. The amplifier channel serving Floor 9 has a failed output that only affects this speaker

C. The speaker circuit has a polarity reversal at this specific location preventing audio output

D. The speaker has an internal failure despite receiving adequate voltage from the circuit

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 850 feet and 2.5 amps alarm current. What is the end-of-circuit voltage on a 24 VDC system?

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

B. 20.67 VDC providing margin above the 16 VDC minimum listed voltage

C. 17.33 VDC providing minimal but code-compliant margin above the 16 VDC minimum

D. 14.85 VDC falling below the minimum requiring immediate redesign

80. A fire alarm battery calculation shows: panel/SLC standby = 0.90A, voice amplifier standby = 1.15A, NAC alarm = 3.8A, voice alarm = 7.5A. The building has a qualifying emergency generator. Using 4-hour standby, 15-minute voice alarm, and 20% safety factor, what is the minimum battery capacity?

A. 12.90 Ah after applying 4-hour standby, 15-minute alarm, and 20% safety factor

B. 15.36 Ah using 4-hour standby with the standard 5-minute alarm duration instead

C. 10.75 Ah using 4-hour standby and 15-minute alarm without the safety factor

D. 24.60 Ah using the full 24-hour standby because voice systems are exempt from reduction

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

A. The duct detector signal should transmit to the supervising station regardless of other responses

B. Duct detectors never transmit to the supervising station because they are classified as supervisory

C. The reviewer is incorrect — duct detectors are exempt from supervising station transmission

D. Duct detector signals transmit automatically regardless of the matrix notation

82. A fire alarm conduit schedule shows 1-inch EMT containing twelve 14 AWG THHN and six 18 AWG THHN conductors (18 total). NEC Annex C shows the maximum 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 to its individual maximum — since both are below, the installation passes

B. Add the counts (12+6=18) and compare to the smaller Annex C maximum of 22

C. Use the Annex C table 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 90-degree L-shaped corridor — 140 feet along the longer leg and 90 feet along the shorter leg. Smoke detectors are at 30-foot spacing with a detector at the corner. The technician counts 9 detectors. Is the corner detector necessary?

A. No, detectors along each leg provide adequate coverage through the direction change

B. No, the corner detector creates redundant overlapping coverage that wastes the project budget

C. Yes, the corner detector ensures smoke detection at the direction change where leg coverage may be limited

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

84. A fire alarm device schedule lists 195 devices on SLC 1 with a maximum capacity of 198. A renovation adds 10 new devices. How should the technician advise the project team?

A. Add 3 devices to SLC 1 to reach capacity and place the remaining 7 on a new SLC loop

B. SLC 1 is near capacity — all 10 new devices should be placed on a new SLC to preserve future flexibility

C. All 10 devices can be added to SLC 1 since 205 is within the manufacturer's extended tolerance

D. Request a firmware update to increase the SLC capacity from 198 to 210 devices

85. A fire alarm riser diagram shows remote NAC power supply panels on Floors 5, 10, and 15. Each remote panel serves NAC circuits for its floor zone and has its own backup batteries. What calculation must be performed separately for each remote panel?

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

B. A combined battery calculation averaging the loads across all three remote panels

C. Only a voltage drop calculation from the main panel to each remote panel location

D. A conduit fill calculation for the supervised communication circuit to each remote panel

86. A fire alarm specification requires "NFPA 72 Record of Completion" at project closeout. Per NFPA 72 Section 7.8.2, what must this document contain?

A. Only the installer's name and certification number with a signature block

B. Only the AHJ's inspection notes and the acceptance test pass/fail determination

C. The original design engineer's calculations and the permit application number

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 throughout the building. The ceiling spaces are not used for air return. The NEC does not require conduit in non-plenum spaces for listed fire alarm cable. What should the technician do?

A. Ignore the specification because it exceeds code requirements and install cable without conduit

B. Notify the engineer that the specification exceeds code but is not necessarily wrong

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

D. Request an interpretation from the AHJ on whether the specification can be reduced to code minimum

88. A fire alarm voltage drop calculation for a speaker circuit on a 70.7V voice evacuation system shows 61.5 VAC at the farthest speaker. The speaker manufacturer's minimum input voltage is 55 VAC. Does the circuit pass?

A. Yes, 61.5 VAC is above the 55 VAC minimum with a 6.5-volt margin

B. No, 70.7V systems must maintain at least 90% (63.6 VAC) at all speaker locations

C. Yes, but only if the amplifier output can be increased to compensate for the line loss

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

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

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

B. The clean agent manufacturer determines the delay based on the agent concentration rate

C. The timer must equal the room's calculated evacuation time plus a 25% safety margin

D. The room size, number of exits, travel distance, and expected occupant count determine the required time

90. A fire alarm technician reviews as-built drawings showing 160 devices on SLC 1. Panel programming shows 168. The Record of Completion shows 155. What must be corrected?

A. Only the Record of Completion needs updating since it has the oldest count

B. All three documents must be reconciled to reflect the same verified device count

C. The panel programming is always the definitive reference and other documents should match

D. Only the as-built drawings need updating because they are the primary field reference

91. A fire alarm floor plan shows a 200-foot straight corridor with smoke detectors at 30-foot spacing. The first detector is at 15 feet from one end. Positions are: 15, 45, 75, 105, 135, 165, 195. That is 7 detectors with the last at 5 feet from the far end. Is this layout correct?

A. No, 8 detectors are required because the 5-foot end distance creates a coverage gap

B. No, the first and last detectors must be exactly at the corridor ends for complete coverage

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

D. Yes, but an additional detector is required at every corridor intersection regardless of spacing

92. A fire alarm technician reviews a shop drawing showing two SLC loops: SLC 1 (Class B, Floors 1-5) and SLC 2 (Class A, Floors 6-12). A reviewer asks why different circuit classes are used. What is a valid design rationale?

A. The designer determined upper floors benefit from Class A fault tolerance due to longer egress times

B. NFPA 72 requires Class A for all circuits above Floor 5 in buildings taller than 6 stories

C. Class B is prohibited above Floor 5 per NEC Article 760 for life safety wiring

D. Both loops must use the same circuit class for consistent system performance

93. A fire alarm shop drawing shows a NAC circuit with 8 horn/strobes at 0.295A each, 4 speakers at 0.140A each, and 6 strobes at 0.185A each. The NAC output is rated at 3.0 amps. What is the total load?

A. 2.36 amps from only the horn/strobes without speakers and strobes

B. 3.11 amps based on averaging all device current draws and multiplying by total count

C. 4.03 amps which significantly exceeds the 3.0-amp output rating

D. 4.03 amps — the circuit must be redesigned across multiple NAC outputs

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

A. Standard FPLP cable in standard EMT conduit throughout the building

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

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

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

95. A fire alarm specification requires acceptance testing per NFPA 72 Section 14.4.1.1 before the certificate of occupancy is issued. The specification requires 10 business days' advance notice to the AHJ. The general contractor wants testing in 5 days. How should the fire alarm contractor respond?

A. Conduct a preliminary test in 5 days and schedule the formal AHJ test with proper notice

B. Contact the AHJ to request an expedited waiver of the 10-day notice requirement

C. Maintain the 10-day notice requirement per the specification and reschedule accordingly

D. Perform the test without the AHJ and submit documentation for their review

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

A. Yes, both dimensions are within the 45 × 45 foot coverage for a single 75 cd strobe

B. No, the strobe must be centered on the wall for the table coverage values to apply

C. No, a minimum of 110 cd is required for rooms exceeding 1,500 square feet

D. Yes, but only if the strobe is mounted between 80 and 96 inches above the floor

97. A fire alarm technician reviews as-built drawings and discovers that the drawings show 145 devices on SLC 1, but a physical field count reveals 152 devices installed. The panel programming confirms 152 devices. What documentation action is required?

A. No action because the 7-device discrepancy is within the standard acceptable tolerance

B. Remove 7 devices to match the as-built drawing count of 145 devices

C. Update only the panel programming to match the as-built drawings showing 145 devices

D. Update the as-built drawings to accurately reflect the 152 devices physically installed

98. A fire alarm shop drawing shows a battery calculation with the following: standby = 0.55A × 24hr = 13.2 Ah, alarm = 4.2A × 0.083hr = 0.349 Ah, subtotal = 13.549 Ah, with 20% factor = 16.26 Ah. The drawing specifies 18 Ah batteries. Is this adequate?

A. No, the calculation yields 16.26 Ah which requires at least 17 Ah batteries per the next standard size

B. Yes, 18 Ah exceeds the calculated minimum of 16.26 Ah with approximately 1.74 Ah margin

C. No, the 20% safety factor should be applied to each component separately rather than the subtotal

D. Yes, but only if the building has an emergency generator reducing the standby requirement

99. A fire alarm technician reviews a sequence of operations matrix for a 12-story building. Pull station alarms trigger: all-building notification, elevator recall, HVAC shutdown, and supervising station signal. Smoke detector alarms on patient floors trigger: alarm floor notification only, elevator recall, and supervising station signal — but no HVAC shutdown. For a hospital using defend-in-place, is this design approach valid?

A. No, all alarm types must trigger identical responses including full building notification and HVAC shutdown

B. No, smoke detector alarms must always trigger HVAC shutdown regardless of the notification strategy

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

D. Yes, but only if the AHJ has not yet reviewed the sequence of operations matrix

100. A fire alarm shop drawing shows the fire alarm system's dedicated branch circuit originating from a 20-amp breaker in the main electrical distribution panel. The circuit uses 12 AWG conductors for a 175-foot run to the fire alarm panel. The drawing notes indicate: "dedicated circuit, labeled, lock-on device, no GFCI/AFCI." What additional detail should the as-built drawing capture for future reference?

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

B. The voltage measured at the panel terminals during the acceptance test for baseline comparison

C. The circuit breaker manufacturer and model number for replacement parts identification

D. The name of the electrical contractor who installed the dedicated circuit

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a junior technician programmed 50 device addresses over two shifts but made errors in 8 location descriptors. The errors were discovered the next morning by the day-shift supervisor. What practice would prevent this type of error in the future?

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

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

C. Have the junior technician reprogram all 50 addresses from scratch to verify every entry

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

102. A fire alarm contractor is managing a project where the general contractor insists that the fire alarm system be energized before acceptance testing is complete. The building needs a functioning fire alarm for temporary occupancy. How should the fire alarm contractor respond?

A. Refuse to energize until full acceptance testing is witnessed by the AHJ

B. The system may be energized for preliminary operation but formal acceptance testing must still be completed

C. Energize only notification circuits and leave detection disconnected until testing is complete

D. Comply immediately to maintain the relationship with the general contractor

103. A fire alarm contractor is coordinating the acceptance test for a high-rise building with elevator recall, HVAC shutdown, smoke control, stairwell pressurization, and door holder release interfaces. Which trade contractors should be present during the test?

A. Only the fire alarm contractor is needed because acceptance testing covers fire alarm equipment only

B. The general contractor is solely responsible for coordinating trade attendance at the test

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

D. Only the AHJ needs to attend — trade contractors submit individual test results separately

104. A fire alarm project manager receives a request to change notification from horn/strobe to speaker/strobe voice evacuation in a building that is 80% complete. The change affects panel configuration, amplifiers, wiring, and devices. What is the appropriate response?

A. A formal change order documenting the engineering revision, cost impact, and schedule extension must be processed

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

C. Refuse the change because voice evacuation conversion at 80% is technically impossible

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

105. A fire alarm contractor discovers that the electrical contractor installed the fire alarm panel's dedicated circuit with a combination AFCI/GFCI breaker instead of a standard breaker. What is the correct course of action?

A. Accept the AFCI/GFCI breaker because it provides enhanced electrical protection for the panel

B. Replace the breaker directly since it affects fire alarm code compliance

C. Contact the building owner to authorize the cost of replacing the non-compliant breaker

D. Notify the general contractor to direct the electrical contractor to replace the breaker with a standard unit and lock-on device

106. A fire alarm contractor is managing inventory for a project. Three hundred smoke detectors are delivered — 275 with one date code and 25 with a different date code. All 300 are the same model listed as compatible with the panel. Should the contractor be concerned?

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

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

C. Yes, the 25 different-date-code detectors should be installed on a separate SLC from the other 275

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

107. A fire alarm technician is training a new employee. The new employee resolves a ground fault by tightening a loose wire nut in a junction box and asks whether a service report is necessary for such a minor repair. What is the correct guidance?

A. No, reports are needed only for repairs involving device replacement or panel reprogramming

B. Yes, but an informal email to building management is adequate for minor repairs

C. Every service activity must be documented in a written report regardless of repair scope

D. Reports are only required if the repair resolves an active trouble condition on the panel display

108. A fire alarm project is nearing completion. The contractor must prepare closeout documentation. The field technicians marked up drawings during installation but the markups are messy. What should the contractor do?

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 installed conditions

C. Submit original shop drawings without markups since the system was built per the approved design

D. Have technicians recreate as-built drawings from memory since field markups are difficult to read

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

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

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

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

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

110. A fire alarm project supervisor is scheduling the acceptance test for a fire alarm system in a hospital. The hospital's infection control department requires 72-hour advance notice before any aerosol smoke testing in patient care areas. The general contractor requests testing to start in 48 hours. How should the supervisor proceed?

A. Test only non-patient-care areas within 48 hours and skip patient care until a later date

B. Provide the required 72-hour notice to infection control and coordinate patient care testing with proper advance scheduling

C. Proceed with all testing in 48 hours because fire code compliance overrides hospital protocols

D. Use non-aerosol testing methods exclusively in patient care areas without advance notice

LEVEL II — SIMULATION EXAM 4: ANSWER KEY AND EXPLANATIONS

1. B — CI cable alone provides Level 2 pathway survivability per NFPA 72 Section 12.4.4. However, Class A requires pathway diversity — the outgoing and return SLC conductors must follow physically separate routes so a single event cannot destroy both paths. CI cable protects against fire exposure (Level 2) but does not create the physical separation needed for Class A diversity. Both requirements must be independently satisfied.

2. C — The building code and AHJ may approve defend-in-place notification strategies in sprinklered residential high-rises where full building evacuation of upper floors is impractical. Limited notification — alerting only the alarm floor and adjacent floors — allows the fire to be managed while minimizing unnecessary evacuation of residents on unaffected floors. The strategy requires AHJ approval and a fully sprinklered building.

3. A — Each room with its own agent storage and discharge system must have independent cross-zone detection to prevent accidental discharge in the wrong room. A single cross-zone system covering both rooms could release agent in both spaces when a fire exists in only one. Independent cross-zoning ensures that agent releases only in the room where two detection zones confirm the fire condition.

4. D — Smoke detectors: 110 × 0.28 = 30.80 mA. Monitor modules: 25 × 0.22 = 5.50 mA. Control modules: 15 × 3.8 = 57.00 mA. Relay modules: 6 × 2.5 = 15.00 mA. Isolator modules: 10 × 0.12 = 1.20 mA. Total = 109.50 mA. The total of approximately 98.50 mA from all devices combined falls within the panel's SLC current capacity and must be verified against the manufacturer's maximum.

5. C — The detector manufacturer lists a maximum operating velocity of 4,000 fpm. At 3,900 fpm, the installation is only 100 fpm below the absolute maximum — leaving virtually no margin for air velocity fluctuations during system operation. HVAC systems experience velocity variations from filter loading, damper positions, and fan speed changes. The detector should be relocated to a position where the velocity provides a more comfortable operating margin.

6. B — Audio signal power decreases with distance due to resistance losses in the speaker wire. Over the 650-foot run, the cumulative wire resistance reduces the wattage delivered to Floor 15 speakers compared to Floor 2 speakers on the same circuit. This line loss is inherent in centrally amplified systems with long wire runs and is the primary reason remote amplifier panels are used in tall buildings.

7. A — A double-interlock pre-action system requires BOTH fire detection AND a drop in supervisory air pressure before the valve opens. The valve opening on detection alone means the system is functioning as a single-interlock rather than double-interlock. The releasing panel, the valve controller, or the interlock wiring must be reconfigured to require both conditions before the valve is permitted to open.

8. D — When acoustically rated floor-to-ceiling partitions close, they create separate enclosed rooms that block sound and light from notification appliances in adjacent sections. Each possible room configuration must have its own notification coverage — devices in one section cannot serve occupants in another enclosed section. The design must address all partition configurations.

9. C — NFPA 72 Section 26.3.4 requires the central station to initiate the required response actions — including fire department notification — within 90 seconds of receiving an alarm signal. This 90-second window encompasses signal receipt, operator processing, account verification, and dispatch initiation. Exceeding 90 seconds violates the central station's performance obligation.

10. B — NFPA 72 Section 26.6.3.1.1 requires the DACT to verify the integrity of each telephone line at intervals not exceeding 24 hours. This daily test ensures that a disconnected, damaged, or failed telephone line is detected within one day and a trouble signal is generated, preventing prolonged periods without communication capability.

11. A — In-rack detectors identify fires at the storage level where they originate — among stored materials on shelves and pallets — before smoke travels the full 45-foot height to ceiling-mounted detectors. Early detection at the rack level provides significantly faster alarm response, enabling quicker suppression activation and substantially reducing potential fire damage to stored inventory.

12. D — NEC Article 700.12(B) requires emergency system transfer switches to transfer load from normal power to the emergency generator within 10 seconds of utility power failure. This rapid transfer minimizes the duration of battery-only operation for fire alarm panels and ensures that all emergency loads — including fire alarm systems — receive generator power promptly.

13. C — The annunciator's internal wiring has Zone 3 and Zone 6 cross-connected on the LED driver board. The panel is sending correct zone data, but the annunciator routes the Zone 3 signal to the Zone 6 LED position and vice versa. The internal wiring connections between the communication board and the LED driver board must be corrected.

14. B — The panel programming is activating all three elevator bank recall outputs when Bank A's detector zone alarms, rather than activating only Bank A's corresponding recall output. The input/output programming matrix must be corrected so that each lobby detector zone activates only its designated elevator bank's recall relay — not all three.

15. A — At 75 feet above the stage, spot-type smoke detectors may not detect fires because smoke cools and stratifies before reaching the ceiling. Aspirating smoke detection with sampling pipes at

multiple heights within the fly gallery, or projected beam detectors spanning the space at various elevations, provide reliable detection regardless of where smoke stratifies in the tall stage volume.

16. D — NFPA 72 Section 23.10 requires the fire command center to have a complete fire alarm control panel or a complete repeater panel that provides full system status display and operator control capability. A remote keypad, telephone, or duplicate batteries do not satisfy this requirement. Arriving firefighters must have full system visibility and control at the fire command center.

17. C — The qualifying emergency generator reduces the standby duration from 24 hours to 4 hours per NFPA 72 Section 10.6.7.2. Voice evacuation systems require 15 minutes of alarm duration because speakers must sustain evacuation messages throughout the extended egress time. The generator affects only the standby duration — the alarm duration is determined by the system type.

18. B — The difference between the -20°F maximum ambient and the 135°F activation temperature is 155°F — far exceeding the NFPA 72 minimum 20°F margin. The detector will not activate from normal ambient conditions and will respond reliably to fire-related temperature increases. The detector's listed operating range of -40°F minimum covers the freezer's -20°F ambient.

19. A — 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 — it does not suppress the external alarm communication. This ensures fire department response continues even when mass notification takes audible priority inside the building.

20. D — NFPA 72 does not permit complete elimination of notification from occupied spaces. However, operating rooms can use visible-only notification — wall-mounted strobes — with the alarm signal directed to trained staff at the nursing station for acknowledgment and response. This approach eliminates the disruptive audible alarm from the surgical environment while maintaining notification through visual means and staff alerting.

21. C — NFPA 72 Section 18.4.4.1 requires audible notification at least 15 dB above the average ambient noise level in each space. Restaurant: 72 + 15 = 87 dB. Office: 55 + 15 = 70 dB. Fitness center: 88 + 15 = 103 dB. Each space has its own minimum based on its specific ambient conditions.

22. A — NFPA 72 Section 24.12 requires the fire alarm system to monitor ERCES supervisory signals including power failure, antenna fault, and amplifier malfunction. This monitoring ensures that ERCES impairments are promptly reported and addressed, maintaining reliable emergency responder radio communication capability inside the building.

23. C — NFPA 72 Section 23.11 requires releasing fire alarm systems protecting occupied spaces to provide pre-discharge audible and visual warning, a time delay for occupant evacuation, and abort

capability to halt the release if investigation determines no fire exists. All three provisions are required to protect occupant safety before agent discharge.

24. D — NFPA 72 Table 18.5.5.5.1(b) for ceiling-mounted visible notification appliances uses both the room dimensions and the ceiling height to determine the required candela. Higher ceilings require higher candela because the strobe must project light downward through a greater distance to reach occupants at floor level. Both dimensional factors affect the candela selection.

25. B — The stairwell pressurization activated correctly, confirming the panel processed the alarm and sent commands for that function. The Floor 8 exhaust not activating indicates a fault specific to that output. The control module output, interface wiring, and programming for the Floor 8 exhaust function must be investigated to identify the failure point.

26. A — R = 1,400 × (1.98/1000) = 2.772 Ω. V_drop = 1.8 × 2.772 = 4.99V. End voltage = 24 − 4.99 = 19.01 VDC. This provides a 3.01-volt margin above the 16 VDC minimum listed voltage. The circuit passes with acceptable margin for a high-rise installation.

27. C — Inter-building panel communication must use the manufacturer's specified communication cable — which may be twisted pair, shielded cable, or fiber optic depending on the networking protocol. The cable type, gauge, shielding, and maximum distance are determined by the panel manufacturer's network specifications, not by generic cable categories.

28. D — Phase reversal on the incoming electrical service powering the fire pump motor is a supervisory condition that must be monitored by the fire alarm panel. Phase reversal causes the pump motor to run backward, rendering it unable to deliver water. NFPA 72 Section 10.18 requires fire pump phase reversal to be reported as a supervisory signal at the fire alarm panel.

29. B — Firefighter telephone systems must support multiple simultaneous conversations — the incident commander may need to communicate with multiple floor warden stations at the same time. Testing concurrent connections from multiple floors simultaneously verifies that the system can handle the real-world demand of coordinating firefighting operations across several floors.

30. A — NFPA 72 Section 12.4.3 defines pathway survivability Level 1 as requiring the circuit pathway to be protected by automatic sprinklers. No additional fire-rated construction, circuit integrity cable, or dedicated riser shaft is required. The sprinkler protection alone — which the building already provides — satisfies Level 1.

31. C — The raised floor space used for cold air distribution is a plenum, requiring FPLP cable. The ceiling space with dedicated ducted return — not used for air handling — is not a plenum and accepts FPL as the minimum cable type. Each space's cable requirement is determined by whether it is classified as a plenum based on its air-handling function.

32. D — Pool areas with high humidity, chlorine atmosphere, and temperature fluctuations create extremely corrosive conditions that rapidly degrade smoke detector sensing chambers and cause constant nuisance alarms. Heat detectors are the most appropriate technology because they respond

only to temperature increases and are unaffected by humidity, chemical vapors, and the corrosive pool environment.

33. B — Whether HVAC shutdown is included in the response to a waterflow alarm depends on the building's approved fire safety plan and sequence of operations. Some designs require HVAC shutdown for all alarm conditions to prevent smoke distribution. The sequence of operations must be evaluated against the design intent — HVAC shutdown is not automatically excluded from waterflow alarm responses.

34. A — ADA-accessible sleeping rooms require notification effective for waking sleeping hearing-impaired occupants. A bed-mounted or pillow-level alerting 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. This supplemental device goes beyond the standard wall-mounted strobe.

35. C — NFPA 72 Section 23.8.1.3 requires that during the PAS investigation period, the alarm signal must transmit immediately to the supervising station and the panel must display the alarm for staff to investigate. PAS delays only the general building notification — the signal transmission and panel display occur without any delay upon initial detector activation.

36. D — Waterflow switches generate alarm signals because water flow indicates a sprinkler head has activated from a probable fire condition. Tamper switches generate supervisory signals because a valve position change is an off-normal equipment condition requiring investigation. Each device type has a distinct signal classification that drives different system responses and dispatch requirements.

37. B — NFPA 72 Section 23.11 requires releasing circuits to be supervised and classified as either Class A or Class B circuits. The releasing circuit must be continuously monitored for opens, shorts, and ground faults because a fault on this circuit could prevent the pre-action valve from opening during an actual fire. Standard NAC wiring does not satisfy the specific supervision requirements for releasing circuits.

38. A — Defend-in-place is designed for facilities where occupant relocation within the building — moving patients horizontally to a safe smoke compartment on the same floor — is safer than full vertical evacuation. Nursing home residents have limited mobility, are often medically fragile, and face greater risk from evacuation than from remaining in a protected compartment while staff manage the fire response.

39. C — In machine-room-less elevator designs, the drive motor and controller are located within the hoistway — typically at the top. Per NFPA 72 Section 21.3, the area containing this drive equipment within the hoistway must be treated as the machine room for detection purposes. Smoke detection is still required in this area even though there is no physically separate machine room.

40. B — NAC power extenders and synchronization modules maintain the panel manufacturer's synchronization signal across multiple NAC circuits while providing additional current capacity. This allows all visible appliances throughout the building to flash in synchronization per NFPA 72 Section 18.5.5.5.7 even when the total load exceeds any single NAC output.

41. D — When the abort switch is pressed, the pre-discharge countdown pauses — holding the release in a suspended state. When the switch is released, the countdown resumes from where it was paused (10 seconds). This maintained abort behavior gives personnel control to hold off discharge during investigation while ensuring the release sequence completes when the abort is no longer maintained.

42. A — Clear audio from the fire command center to the 14th floor confirms the downlink path and the handset earpiece are functioning correctly. Garbled static heard by the command center from the 14th floor indicates the uplink audio path is impaired. Since the earpiece works but the transmitted audio is corrupted, the 14th-floor handset microphone element is the most likely failed component.

43. B — The fire alarm system's obligation is to send the recall signal and verify the elevators begin traveling to the recall floor. All three elevators recalled to the ground floor — the fire alarm interface performed correctly for all three. Elevator 3's door not opening is an elevator mechanical deficiency, not a fire alarm system failure. Both the successful interface test and the door deficiency should be documented separately.

44. C — Floor 5 requires significantly more force to open the stairwell door (indicating effective positive pressure), while Floor 12 opens normally (indicating little or no pressure). This inconsistency indicates the pressurization system is not distributing air evenly — possibly due to a closed damper, duct obstruction, or system balancing issue. Both observations should be documented for mechanical investigation.

45. A — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 8 high-reading detectors require cleaning. The 4 low-reading detectors are abnormally sensitive and must be investigated for faults, environmental causes, or component drift. All 12 out-of-range detectors require corrective action.

46. C — 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 fire detection interlock was satisfied — the air pressure interlock was not triggered.

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

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

49. A — A smoke detector covered with a surgical glove has been effectively disabled for six weeks. The glove prevents smoke from entering the sensing chamber, leaving the corridor without detection coverage. This is a significant impairment that must be documented. The covering must be removed immediately and appropriate compensatory measures evaluated for the renovation duration.

50. C — When circuit voltage and impedance are normal but one speaker produces reduced volume, the most likely cause is the speaker's internal wattage tap setting. In 70.7V audio systems, each speaker has selectable tap settings that determine power consumption. A lower tap setting produces proportionally lower volume. The tap should be verified against the design specification.

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

52. B — The primary IP path tested successfully. The secondary cellular path failed when tested independently — the station did not receive the signal. The cellular communicator must be investigated and repaired or replaced to restore the designed communication redundancy. A system operating with only one functional path has no backup.

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

54. D — NFPA 72 Section 23.8.1.3 requires that if a second automatic alarm signal is received from a different zone during the PAS investigation period, PAS must immediately cancel and general alarm notification must activate without further delay. A second zone activation provides independent confirmation of a genuine alarm condition.

55. C — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. Painting pull stations beige 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.

56. B — The panel correctly processed the alarm and activated notification, recall, HVAC shutdown, and station transmission. The two non-releasing door holders indicate a fault specific to those

devices. The control module outputs, interface wiring, and power supply to the two specific door holders must be investigated to identify the failure point.

57. A — Five months of historical event data has been permanently lost due to the log reaching capacity and overwriting entries. This lost data impairs troubleshooting, incident investigation, and maintenance compliance documentation. The log must be downloaded to external storage for archival, then cleared at the panel to restore full recording capacity.

58. D — The batteries ended the load test at 19.4 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.

59. C — NFPA 72 Section 18.5.5.5.7 requires all visible notification appliances within the same field of view to flash in synchronization. Two strobes visible from the same corridor location — regardless of circuit assignment — must be synchronized. The 0.3-second offset violates this requirement and creates a potentially harmful disorienting visual effect.

60. B — The duct detector activated correctly, the panel processed the alarm, and the control module relay closed. The AHU did not shut down despite the relay closure. The fault is downstream of the control module — in the wiring between the relay contacts and the AHU controller, or in the AHU controller's response to the relay input.

61. A — Two renovations adding 40 devices and modifying the sequence of operations represent significant system changes. The Record of Completion — required by NFPA 72 Section 7.8 to reflect the current system configuration — is five years out of date and must be updated to document the current installed system.

62. D — One hundred twenty nuisance waterflow alarms in three 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 the municipal pressure fluctuations) and the switch response (adjusting the retard delay to filter pressure-related activations without exceeding the 90-second maximum).

63. C — NFPA 72 requires tamper switches to detect partial valve closure within the code-required travel distance. A butterfly valve switch that activates only when nearly fully closed fails to detect the partial closure that could significantly impair sprinkler system performance. The switch must be adjusted to detect earlier closure movement.

64. B — The pre-recorded message plays on all 15 floors (confirming all amplifiers and speakers function), but the live microphone reaches only Floors 1-8. The live audio routing is programmed to broadcast to only a subset of speaker zones. The programming must be reviewed to verify whether the microphone should reach all floors per the approved design.

65. A — A shelf completely blocking the strobe lens eliminates visible notification, and partially muffling the horn reduces audible output below rated performance. Both notification functions are impaired by the obstruction. The shelf must be removed and building management informed that notification appliances must remain unobstructed at all times.

66. D — A communication path failure lasting 30 days means the system has operated without redundancy for an entire month. If the cellular path also fails during this period, the building has no monitoring. This is a significant impairment requiring prompt corrective action. The building owner and AHJ should be notified per impairment procedures.

67. C — A sensitivity reading of 0.3% 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.

68. B — 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 0.6 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.

69. A — AFCI protection is prohibited on fire alarm panel dedicated branch circuits per NEC Article 760. AFCI breakers can trip during arc fault conditions unrelated to fire — disconnecting the panel's primary power. The AFCI breaker must be replaced with a standard thermal-magnetic breaker with a lock-on device.

70. D — A voltage drop from 26.4 to 19.2 VDC in only 3 minutes during standby — not alarm — conditions represents catastrophic battery failure. Standby current is far less than alarm current, yet the batteries cannot maintain voltage even under this lighter load. The batteries have negligible remaining capacity and must be replaced immediately.

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

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

73. B — 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 the pre-discharge audible and visual warning to evacuate before agent discharge. This verification confirms the warning provides adequate notification.

74. D — NFPA 72 does not require unused spare NAC circuits to have devices connected or to generate trouble signals. However, the circuit should be properly configured in the panel as inactive or spare, and its status should be clearly documented. The spare circuit remains available for future system expansion without affecting current system operation.

75. C — In a single-interlock pre-action system, fire alarm detection is the single interlock. When detection activates, the pre-action valve opens allowing water to fill the piping. Water does not discharge until a sprinkler head fuses from heat exposure. This design prevents water damage from accidental head damage alone — detection must confirm a fire condition before water enters the piping.

76. A — NFPA 72 Table 14.4.3.2 requires supervisory devices — including tamper switches, valve position indicators, and other supervisory devices — 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.

77. B — The storage of combustible materials (cardboard), flammable materials (paint), and chemicals in the fire alarm panel room, combined with only 20 inches of working clearance, violates NEC Article 110.26 working space requirements. The minimum clearance is typically 30 inches wide and 36 inches deep. All storage must be removed and the required clear space maintained.

78. D — The voltage at the speaker terminals reads 70.1 VAC — within the normal operating range for a 70.7V audio circuit. The speaker is receiving adequate voltage but producing no audio, indicating an internal speaker failure such as a damaged voice coil, broken internal connection, or failed cone assembly. The speaker must be replaced.

79. C — R = 850 × (3.14/1000) = 2.669 Ω. V_drop = 2.5 × 2.669 = 6.673V. End voltage = 24 − 6.673 = 17.33 VDC. This is above the 16 VDC minimum but with only a 1.33-volt margin. While technically code-compliant, this thin margin warrants careful consideration of connection aging, temperature effects, and future device additions.

80. A — Standby = (0.90 + 1.15) × 4 = 8.20 Ah. Alarm = (3.8 + 7.5) × 0.25 = 2.825 Ah. Subtotal = 11.025 Ah. With 20% safety factor: 11.025 × 1.20 = 13.23 Ah. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm duration. All loads on the main panel batteries are included. The minimum capacity is approximately 13.2 Ah.

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

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

84. B — SLC 1 at 195 of 198 capacity is nearly full. Adding only 3 more devices reaches absolute maximum with no room for future expansion, replacements, or modifications. Placing all 10 new devices on a new SLC preserves SLC 1's current margin and provides a new loop with substantial capacity for future growth — a more practical long-term approach.

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

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. This comprehensive document certifies code-compliant installation and testing.

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

88. A — The speaker circuit delivers 61.5 VAC at the farthest speaker, which is above the manufacturer's minimum rated input of 55 VAC. The speakers will operate within their listed parameters at this voltage with a 6.5-volt margin. The circuit passes the voltage requirement.

89. D — The pre-discharge time delay must provide adequate evacuation time based on the room's specific physical characteristics: 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 the building's actual evacuation conditions, not a fixed code value.

90. B — Three different device counts across three documents indicate that system modifications were not consistently documented. The panel programming most likely reflects the actual installed count, but all three documents must be verified against a physical field count and reconciled to show the same accurate number.

91. C — 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.

92. A — Using Class A for upper floors provides enhanced fault tolerance where it matters most — longer egress distances and more difficult firefighter access make circuit survivability more critical on upper floors. The designer's risk assessment determined that lower floors, with shorter egress distances and easier access, can accept Class B's lower redundancy level.

93. D — Horn/strobes: 8 × 0.295 = 2.360A. Speakers: 4 × 0.140 = 0.560A. Strobes: 6 × 0.185 = 1.110A. Total = 4.030 amps, which exceeds the 3.0-amp NAC output rating by over 1 amp. The circuit must be redesigned by splitting devices across multiple NAC outputs or adding NAC booster power supplies.

94. B — 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 do not satisfy Level 2.

95. C — The specification requires 10 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. A — Per NFPA 72 Table 18.5.5.5.1(a), a single 75 cd wall-mounted strobe covers rooms up to 45 × 45 feet. The conference room at 45 × 35 feet has both dimensions within the 45-foot maximum. A single 75 cd strobe provides adequate visible coverage for this room.

97. D — The as-built drawings show 145 devices but 152 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 152 devices with their correct addresses, locations, and circuit assignments.

98. B — The calculated minimum battery capacity is 16.26 Ah. The specified 18 Ah batteries exceed this minimum by 1.74 Ah, providing adequate capacity with margin. Select the next standard battery size at or above the calculated minimum to ensure code compliance.

99. C — Hospitals using defend-in-place strategies may have different fire alarm responses for different alarm types based on their approved fire safety plan. Pull stations may trigger full building notification while smoke detectors on patient floors trigger limited notification. This differentiated approach is valid when documented in the approved fire safety plan and accepted by the AHJ.

100. A — As-built drawings for the dedicated branch circuit should capture the conduit type, size, and routing path from the electrical distribution panel to the fire alarm panel. This information is essential for future maintenance, troubleshooting, and modifications — technicians need to know where the circuit runs and how to access it.

101. D — A standardized verification process where each shift's programming work is reviewed and confirmed before the next shift continues catches errors at each handoff point. This quality control step prevents programming errors from compounding across shifts and ensures address assignments, device types, and location descriptors are verified incrementally.

102. B — The system may be energized for preliminary operation to satisfy the temporary occupancy requirement. However, formal acceptance testing witnessed by the AHJ must still be completed before the system is considered officially accepted and code-compliant. The preliminary status should be documented.

103. C — Emergency control function interfaces require the respective trade contractors to be present during acceptance testing. The elevator contractor verifies recall operation, the HVAC contractor verifies shutdown and smoke control, the controls contractor verifies building automation interfaces, and the door hardware contractor verifies magnetic holder release. Each trade confirms its equipment responds correctly.

104. A — Converting from horn/strobe to speaker/strobe voice evacuation is a fundamental design change affecting panel configuration, amplifier requirements, speaker circuit design, wiring specifications, and intelligibility calculations. A formal change order must document the engineering revision, cost impact, and schedule extension before any work begins.

105. D — The fire alarm contractor should not modify the electrical contractor's work directly — this creates trade jurisdiction and liability issues. The general contractor coordinates all trades and should be notified of the non-compliant breaker. The GC then directs the electrical contractor to replace the AFCI/GFCI breaker with a standard breaker and lock-on device.

106. B — Different date codes within the same detector model number indicate different manufacturing production runs. As long as all 300 detectors are the same model and listed as compatible with the installed panel, date code variations do not affect compatibility, communication protocols, or detection performance.

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

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

109. D — 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 documentation package for the building owner.

110. B — The hospital's infection control requirement for 72-hour advance notice before aerosol testing in patient care areas 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 schedules.