LEVEL II — SIMULATION EXAM 7 (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 22-story mixed-use high-rise. The voice evacuation system uses centrally located 70.7V amplifiers on Floor 1. Speaker circuits run 680 feet to the uppermost floor. During commissioning, speakers on Floors 18-22 produce noticeably lower volume than Floors 1-5. The engineer proposes increasing amplifier output power to compensate. What is the more effective long-term solution?

A. Upgrade the speaker wire to 10 AWG throughout the building for reduced resistance

B. Increase the amplifier output power as the engineer proposes since it directly addresses the deficit

C. Install remote amplifier panels at intermediate floors to shorten speaker circuit lengths

D. Replace the upper-floor speakers with higher-sensitivity models that require less input power

2. A fire alarm technician is installing a fire alarm system with dual communication paths — primary IP and secondary cellular. During commissioning, the technician disconnects the IP network cable to test the panel's path failure detection. The panel generates an "IP COMMUNICATION FAILURE" trouble after 195 seconds. Per NFPA 72 Section 26.6.3.2, does this meet the requirement for continuous monitoring technology?

A. Yes, 195 seconds is within the 200-second maximum for continuous monitoring technologies

B. No, IP technology must detect failure within 60 seconds per the continuous monitoring standard

C. Yes, but only during commissioning — the interval must be reduced to 100 seconds for service

D. No, the 200-second limit applies only to cellular technology, not IP communicators

3. A fire alarm technician is installing a releasing fire alarm system for a clean agent suppression system. The design uses cross-zone detection with Zone A photoelectric and Zone B ionization detectors. A code reviewer asks whether NFPA 72 mandates different technologies in each cross-zone. What is the correct answer?

A. Yes, NFPA 72 Section 23.11 requires different technologies to prevent simultaneous false alarms

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

C. Yes, but only for total flooding systems where accidental discharge has high financial consequences

D. No, but the engineer chose different technologies as a best practice for enhanced false alarm prevention

4. A fire alarm technician is calculating battery capacity for a voice evacuation system. Loads: panel/SLC standby = 1.05A, voice amplifier standby = 1.45A, NAC alarm = 5.2A, voice alarm = 10.5A. No emergency generator. Using 24-hour standby, 15-minute alarm, and 20% safety factor, what is the minimum battery capacity?

A. 35.28 Ah using only the standby component with standard 5-minute alarm

B. 48.60 Ah using 24-hour standby and 15-minute alarm without the safety factor

C. 60.00 Ah using a 30-minute alarm duration for buildings without generators

D. 63.12 Ah after applying 24-hour standby, 15-minute alarm for all loads, and 20% safety factor

5. A fire alarm technician is installing a fire alarm system in a hospital where the approved fire safety plan specifies positive alarm sequence (PAS). Per NFPA 72 Section 23.8.1.3, when a smoke detector activates under PAS, the alarm signal must transmit to the supervising station immediately. During the 180-second investigation period, what event requires PAS to cancel and general notification to activate immediately?

A. A second automatic alarm signal from a different detection zone during the investigation period

B. The expiration of 90 seconds without staff acknowledgment at the fire alarm panel

C. Any manual pull station activation anywhere in the building during the investigation period

D. A trouble signal on any SLC loop during the investigation period indicating a system fault

6. A fire alarm technician is installing a fire alarm system in a 15-story building. The fire command center is in the lobby on Floor 1. The fire alarm control panel is in the electrical room on Floor B1. Per NFPA 72 Section 23.10, a complete repeater panel must be at the FCC. The building engineer asks whether the repeater must include battery backup independent from the main panel. What is the correct answer?

A. Yes, the repeater must have its own dedicated batteries separate from the main panel

B. No, the repeater is powered from the main panel and shares its power supply and batteries

C. The repeater must have its own power supply but may share the main panel's battery backup

D. The repeater requires a dedicated UPS system independent from both the panel and building power

7. A fire alarm technician is installing a fire alarm system in a convention center with a main ballroom that divides into six enclosed event spaces using acoustically rated movable partitions. Each space has its own entrance when partitions are deployed. Per NFPA 72, what notification design principle must be applied?

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

B. Each enclosed space must have independent notification appliances providing coverage when partitions are closed

C. A single high-output device centered in the ballroom covers all partition configurations

D. Only alternating spaces require independent notification because adjacent spaces share coverage

8. A fire alarm technician is installing a fire alarm system with a DACT communicator connected to two copper telephone lines. Per NFPA 72 Section 26.6.3.1.1, the DACT must perform a complete handshake with the supervising station receiver during each line integrity test. What does this handshake verify that a simple dial tone check cannot?

A. That the telephone line voltage exceeds the minimum 48 VDC for signal reliability

B. That no other equipment shares the telephone lines with the DACT communicator

C. That the telephone line is not carrying any data signals from other building systems

D. That the complete communication path from the DACT to the station receiver functions end-to-end

9. A fire alarm technician is installing a fire alarm system in a data center with a raised floor plenum used for cold air distribution and an overhead cable tray space. The overhead space has dedicated ducted HVAC return and is not used for air handling. What cable types are required for fire alarm circuits in each space?

A. FPLP in the raised floor plenum and FPL minimum in the non-plenum overhead space

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

C. FPLP in both spaces because all concealed data center spaces are classified as plenums

D. FPL in both spaces because data centers are classified as general-purpose environments

10. A fire alarm technician is installing elevator recall smoke detectors. The building has three elevator banks with a machine-room-less (MRL) design — the drive motor and controller are at the top of each hoistway. Per NFPA 72 Section 21.3, the area containing the drive equipment must be treated as the machine room. When the MRL drive area detector activates, what elevator response is required?

A. Phase I recall to the primary designated floor identical to the lobby detector response

B. Phase I recall to an alternate floor because smoke near the drive equipment may compromise the primary floor

C. Immediate power shunt trip to the elevator motor without any recall sequence

D. Only a supervisory signal at the panel because MRL hoistway detection is informational

11. A fire alarm technician is installing a fire alarm system in a building with a fire pump. The fire pump controller has contacts for pump running, power available, phase reversal, and controller trouble. Per NFPA 72 Section 10.18, all conditions must be monitored. The building engineer asks why "pump running" requires fire alarm monitoring when the pump controller already tracks this internally. What is the correct explanation?

A. The pump controller monitors running status locally but does not notify building management

B. The fire alarm panel provides primary pump start capability that the controller cannot perform

C. Pump running monitoring is optional per NFPA 72 and can be omitted at the engineer's request

D. Fire alarm monitoring provides building-wide supervisory awareness of the pump's operating status for maintenance and emergency response

12. A fire alarm technician is installing a mass notification system integrated with the fire alarm system per NFPA 72 Chapter 24. The emergency plan establishes that mass notification may override fire alarm audible notification during specific threat scenarios. When this override occurs, what fire alarm function must continue uninterrupted?

A. Fire alarm visual notification must continue flashing on all floors during the audio override

B. The fire alarm panel must generate a system trouble for the duration of the override event

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

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

13. A fire alarm technician is installing a fire alarm system with a graphic annunciator at the main entrance. During commissioning, activating Zone 4 illuminates Zone 11's LED, while Zone 4's LED stays dark. The panel's zone output has been verified as correct. What is the most likely cause?

A. The annunciator's internal LED driver board has Zones 4 and 11 cross-connected

B. The panel's communication port is transmitting Zone 4 data with Zone 11's identifier code

C. Zone 4 and Zone 11 SLC devices have conflicting addresses in the panel database

D. Zone 11's LED has a parallel short that energizes whenever any adjacent zone activates

14. A fire alarm technician is installing a fire alarm system in a building with three sprinkler risers. Each riser has a waterflow switch and a tamper switch. The original design groups all waterflow switches on one alarm zone and all tamper switches on one supervisory zone. The fire captain requests individual zones for each waterflow switch. What operational advantage does this provide?

A. Individual zones allow the panel to verify waterflow signals against the sprinkler system's pressure

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

C. Individual zones are required by NFPA 72 for any building with more than two sprinkler risers

D. Individual zones allow the panel to activate zone-specific suppression for the affected riser only

15. A fire alarm technician is installing a fire alarm system with a pre-action sprinkler system using double-interlock configuration. During commissioning, the technician activates a smoke detector. The panel processes the alarm. The pre-action valve does not open. A junior technician says the system is malfunctioning. Is the junior technician correct?

A. Yes, all pre-action configurations should open the valve when detection activates

B. Yes, but only because the panel failed to energize the pilot solenoid during the test

C. No, but the valve should have primed the pilot line for faster response when heads fuse

D. No, double-interlock requires both detection AND supervisory air pressure drop before the valve opens

16. A fire alarm technician is installing a fire alarm system where the architect specifies white devices throughout to match the ceiling. Per NFPA 72 Section 17.14.8, which device type has a mandatory color requirement that cannot be changed to white?

A. Smoke detectors because they must be distinguishable from other ceiling-mounted devices

B. Horn/strobe devices because red coloring identifies them as fire alarm notification appliances

C. Manual fire alarm stations which must be red per the code requirement

D. All fire alarm devices must maintain the manufacturer's original color per UL listing

17. A fire alarm technician is installing a fire alarm system in a building where the specifications require pathway survivability Level 2 on all voice evacuation circuits. The riser circuits use 2-hour CI cable. Horizontal speaker runs on each floor use standard FPLP cable. What Level 2 protection must the horizontal floor-level runs have?

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

B. Horizontal runs are exempt from pathway survivability if they are under 100 feet in length

C. The horizontal runs may use Level 1 (sprinkler protection) while only risers require Level 2

D. Horizontal runs in sprinklered buildings are automatically Level 2 without additional protection

18. A fire alarm technician is installing a fire alarm system with a releasing circuit for a clean agent system in an occupied data center. Per NFPA 72, the system must provide pre-discharge warning, a time delay, and abort capability. The design includes a 20-second pre-discharge countdown. What factor determines whether 20 seconds provides adequate evacuation time?

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

B. The room dimensions, exit locations, maximum travel distance, and expected occupant count

C. The clean agent manufacturer's discharge rate and room concentration specifications

D. The fire department's estimated response time to the building's location

19. A fire alarm technician is installing a fire alarm system in a hospital surgical suite. The surgeons request elimination of audible alarms in operating rooms during procedures. Per NFPA 72, complete notification elimination is not permitted in occupied spaces. What approach addresses this concern?

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

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

C. Install only heat detectors to eliminate nuisance smoke detector activations entirely

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

20. A fire alarm technician is installing a fire alarm system in a 25-story residential tower using defend-in-place strategy. The sequence of operations shows that a smoke detector alarm on Floor 15 activates notification on Floors 14, 15, and 16 only. The building manager asks why the entire building is not notified. What is the primary rationale?

A. Full building notification is more expensive and the defend-in-place approach saves money

B. Residential high-rises are exempt from full building notification per NFPA 72 Chapter 29

C. Simultaneous evacuation of all floors creates dangerous stairwell congestion and panic

D. The building code requires full building notification only for buildings over 30 stories

21. A fire alarm technician is installing visible notification in a nursing home sleeping room measuring 15 × 18 feet with a 9-foot ceiling. Per NFPA 72 Table 18.5.5.5.1(a), a 15 cd wall-mounted strobe covers rooms up to 20 × 20 feet. Both room dimensions are within this limit. What is the minimum wall-mounted strobe candela for this room?

A. 15 cd because both room dimensions fall within the 20 × 20 foot maximum coverage

B. 30 cd because healthcare sleeping rooms have enhanced candela requirements

C. 60 cd because institutional occupancies require higher intensity than standard rooms

D. 75 cd because all sleeping rooms in nursing homes need maximum visible output

22. A fire alarm technician is installing a networked fire alarm system across a campus. Building A has the master panel. Building B has a network node panel. The network cable runs through underground conduit. During commissioning, the technician discovers intermittent communication drops between the buildings during rainstorms. What is the most probable cause?

A. Lightning-induced voltage surges corrupting the network signal during storms

B. Rainwater infiltration into the underground conduit compromising cable insulation

C. Ground potential differences between buildings increasing during electrical storms

D. The storm's electromagnetic field interfering with the network communication protocol

23. A fire alarm technician is installing a fire alarm system with a central station monitoring connection per NFPA 72 Chapter 26. What is the maximum time permitted for the central station operator to initiate the required response after receiving an alarm signal?

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

B. 120 seconds from signal receipt to completion of fire department notification

C. 60 seconds from signal receipt to acknowledgment of the alarm condition

D. 30 seconds from signal receipt to dispatcher notification of emergency services

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

A. 30 seconds for all emergency system loads per the standard transfer requirement

B. 60 seconds with the panel's batteries bridging the extended transfer interval

C. 120 seconds because fire alarm panels have internal batteries for the transition

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

25. A fire alarm technician is installing a fire alarm system in a warehouse with 48-foot ceilings and high-bay storage racks extending to within 4 feet of the ceiling. The design includes ceiling-level beam detection and in-rack detection at 16-foot and 32-foot elevations. What is the purpose of the in-rack detectors?

A. In-rack detectors provide redundancy in case the ceiling beam detectors malfunction

B. In-rack detectors identify fires at storage levels before smoke reaches ceiling detectors

C. NFPA 72 mandates in-rack detection for all rack configurations above 25 feet

D. In-rack detectors compensate for beam detector blind spots between transmitter and reflector

26. A fire alarm technician is installing a fire alarm system with a voice evacuation system using 70.7V audio distribution. During installation, the technician discovers two speakers on Floor 9 wired in parallel without impedance-matching transformers. What is the primary risk?

A. The speakers will produce distorted audio at excessive volume damaging the speaker cones

B. The speakers will produce no audio because 70.7V systems require transformers for operation

C. The low impedance presented to the amplifier can cause distortion, overheating, and potential damage

D. The parallel connection prevents the panel from supervising the circuit for open faults

27. A fire alarm technician is installing a fire alarm system in a building with a swimming pool, a dry sauna, and a commercial laundry. Each space generates conditions that cause smoke detector nuisance alarms. What detection technology is most appropriate for all three spaces?

A. Heat detection because each environment creates conditions incompatible with smoke detectors

B. Aspirating detection with sampling units mounted outside each space for remote monitoring

C. Multi-criteria detectors that can distinguish environmental particles from actual smoke

D. Flame detectors because the combustible materials in these spaces produce visible flame first

28. A fire alarm technician is installing a fire alarm system in a cold storage distribution center. The main freezer is at -25°F. The loading dock fluctuates between 10°F and 85°F. Offices are at 72°F. Heat detectors are specified for the freezer and dock. Per NFPA 72, what minimum activation temperature is required for the loading dock detector?

A. 85°F to match the maximum ambient and detect any temperature rise above normal

B. 135°F because it is the universal standard commercial heat detector rating

C. 200°F because fluctuating temperatures require extra thermal margin beyond standard

D. At least 105°F to maintain the required 20°F margin above the 85°F maximum ambient

29. A fire alarm technician is installing smoke detectors for elevator recall in a building with four elevator banks. The sequence of operations requires selective recall. During commissioning, activating Bank B's lobby detector recalls all four banks. The technician checks the control modules and confirms only Bank B's relay activated. Where is the problem?

A. The panel programming activates all four recall outputs instead of only Bank B's output

B. The elevator controllers share a common recall input circuit wired in parallel

C. The SLC communication is broadcasting the recall command to all control modules

D. Bank B's smoke detector is generating a building-wide alarm code

30. A fire alarm technician is installing a fire alarm system in a building with a fire command center per NFPA 72 Section 23.10. The FCC contains a panel repeater, voice evacuation controls, firefighter telephone, and elevator status display. The building engineer asks whether a building management system (BMS) workstation can substitute for the panel repeater. What is the answer?

A. Yes, if the BMS displays full fire alarm system status with all alarm and trouble information

B. Yes, but only if the BMS is manufactured by the same company as the fire alarm panel

C. No, the FCC requires a permanently installed fire alarm panel or dedicated repeater

D. No, but a tablet computer permanently connected to the panel could substitute

31. A fire alarm technician is installing a fire alarm system in a hospital where defend-in-place is the approved strategy. When a smoke detector activates on a patient floor, notification activates on the alarm floor only. The nurse manager asks why floors above and below are not notified. What is the rationale?

A. Limiting notification to the alarm floor prevents unnecessary patient relocation on unaffected floors

B. NFPA 72 prohibits multi-floor notification in hospitals with defend-in-place strategies

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

D. Multi-floor notification is only triggered by pull station activations, not smoke detectors

32. Calc: 125×0.28=35.0, 24×0.20=4.8, 14×3.5=49.0, 8×2.4=19.2, 10×0.14=1.4. Total=109.4. Close to D at ~108.

A. 85.0 mA providing excessive margin suggesting the loop is underutilized

B. 142.0 mA exceeding the 130 mA capacity and requiring a second loop

C. 35.0 mA from the smoke detectors alone without module contributions

D. Approximately 109 mA which is within the 130 mA capacity but leaves limited margin

33. 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 solenoid valve. Per NFPA 72 Section 23.11, the releasing circuit must be supervised. During commissioning, the technician intentionally opens the releasing circuit. The panel should display what signal?

A. An alarm signal because releasing circuit faults are emergency conditions requiring immediate action

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

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

D. No response because releasing circuits are monitored only during active alarm conditions

34. A fire alarm technician is installing a fire alarm system with Class A SLC and Level 2 pathway survivability. The outgoing path uses 2-hour CI cable throughout — from the panel through the east riser, across each floor, and through all devices. The return path also uses 2-hour CI cable throughout — across each floor and through the west riser back to the panel. Both paths cross each floor through the corridor ceiling space. Do both paths maintain Level 2 through the corridor crossing?

A. No, CI cable requires an additional fire-rated enclosure to maintain Level 2 in unrated spaces

B. No, CI cable maintains its rating only when installed in metallic conduit or cable tray

C. Yes, 2-hour CI cable maintains its fire rating regardless of the surrounding construction

D. Yes, but only if the corridor ceiling space has automatic sprinkler protection as backup

35. A fire alarm technician is installing a fire alarm system in a performing arts center. The main stage has a fly gallery with combustible curtains at 75 feet above the stage floor. Standard spot-type detectors are specified for the fly gallery ceiling. What should the technician recommend?

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

B. Flame detection because stage curtains produce visible flame before significant smoke

C. Linear heat detection along catwalks because it detects fire at the working level

D. Standard spot detectors with reduced spacing to compensate for the ceiling height

36. A fire alarm technician is installing a fire alarm system with an in-building emergency responder radio coverage system (ERCES). Per NFPA 72 Section 24.12, the fire alarm system must monitor ERCES supervisory signals. Which ERCES conditions require fire alarm monitoring?

A. Only power failure because antenna and amplifier faults are handled by the ERCES internally

B. Only antenna faults because power failures are monitored by the building's electrical system

C. Only amplifier malfunctions because they directly affect radio signal quality

D. Power failure, antenna faults, and amplifier malfunctions must all be monitored as supervisory signals

37. A fire alarm technician is installing ADA-accessible hotel guest room notification. The room is 14 × 16 feet with a 9-foot ceiling. Per NFPA 72 and ADA requirements, what notification must be provided?

A. Only a ceiling-mounted strobe at 177 cd positioned directly above the bed

B. A wall-mounted strobe meeting NFPA 72 requirements plus a supplemental device effective for waking sleeping hearing-impaired occupants

C. Only a wall-mounted strobe at the standard candela for the room dimensions

D. A wall-mounted strobe plus a low-frequency 520 Hz audible tone generator near the bed

38. A fire alarm technician is installing a fire alarm system in a building with a commercial kitchen. The Type I hood has an integrated wet chemical suppression system with its own releasing panel. The fire alarm system monitors the suppression system's alarm contacts through a monitor module. When the suppression system activates, what responses should the fire alarm panel initiate per a typical sequence of operations?

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

B. Only local kitchen notification because the suppression has already addressed the fire

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

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

39. A fire alarm technician is installing a fire alarm system with positive alarm sequence (PAS). During commissioning, the technician activates a smoke detector. The 180-second investigation period begins. At 60 seconds, a pull station is manually activated on the same floor. Per NFPA 72, what must the system do?

A. Manual pull station activation during PAS must immediately cancel PAS and activate general notification

B. The pull station activation is queued until the 180-second PAS period expires

C. PAS continues because both the detector and pull station are on the same floor zone

D. The pull station activation restarts the 180-second investigation period from zero

40. A fire alarm technician is installing a fire alarm system in a building where the sequence of operations calls for HVAC shutdown on any smoke alarm. The technician tests a smoke detector and the panel processes the alarm. The control module relay for HVAC shutdown activates (audible click). The HVAC contractor confirms the AHU did not shut down. Where is the most likely fault?

A. In the panel programming because the HVAC output may not be linked to the detector zone

B. In the smoke detector because it may generate a signal incompatible with the HVAC output

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

D. In the wiring between the control module relay and the AHU controller's shutdown input

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

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

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

B. The releasing circuit supervision must be tested by opening the circuit and confirming a trouble signal

C. The substitute load voltage must be measured with a calibrated instrument during simulated release

D. The cross-zone logic must be retested with zones activated in the reverse order

42. A fire alarm technician tests the voice evacuation system's live firefighter microphone from the fire command center. Audio is heard clearly on Floors 1-12 but not on Floors 13-20. The pre-recorded message plays correctly on all 20 floors. What is the most likely cause?

A. The amplifiers serving Floors 13-20 have a fault that blocks live audio but passes recorded

B. The microphone output power is insufficient to drive speakers on all 20 floors simultaneously

C. The live microphone audio routing is programmed to broadcast only to Floors 1-12

D. The speaker circuits on Floors 13-20 have a frequency-dependent impedance issue

43. A fire alarm technician tests the elevator recall function. The building has three elevator banks with selective recall. The technician activates Bank A's lobby detector. All three banks recall. Only Bank A's control module relay activated. What is the most likely cause?

A. The elevator controllers share a common recall input wired in parallel rather than independently

B. The panel programming activates all three recall outputs for Bank A's detector zone

C. The SLC communication broadcasts the recall command to all control modules simultaneously

D. Bank A's detector generates a building-wide alarm code that triggers all recall relays

44. A fire alarm technician is performing sensitivity testing on an analog addressable system with 400 detectors. The panel report shows 12 detectors between 3.8% and 4.6% (above 3.7% max) and 5 detectors between 0.2% and 0.4% (below 0.5% min). What action is required?

A. Only the 12 high-reading detectors require cleaning — low readings indicate better sensitivity

B. All 400 detectors must be cleaned because 17 out-of-range units suggests building-wide issues

C. The panel's sensitivity reporting thresholds should be expanded to include the drift range

D. All 17 out-of-range detectors — both high and low readings — require investigation and correction

45. A fire alarm technician tests the panel's AC power supervision by disconnecting primary AC. The panel transfers to battery. After 3.5 hours, no AC power trouble has appeared. Per NFPA 72 Section 10.6.9, what is the maximum permitted delay?

A. 6 hours per the extended allowance for modern digital fire alarm panels

B. 3 hours — the 3.5-hour delay exceeds the maximum and must be investigated

C. 24 hours matching the secondary battery standby duration requirement

D. No delay — the trouble must appear immediately upon primary power disconnection

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

A. Nitrile gloves are thin enough to permit smoke entry and the detector remains functional

B. The covering is an acceptable temporary measure during active renovation construction

C. The detector should remain covered until the renovation completes to prevent nuisance alarms

D. The detector has been disabled for five weeks — a significant impairment requiring immediate correction

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

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

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

C. Yes, but only because the system was placed in maintenance mode during the test

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

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

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

B. The IP supervision timing is incorrect because it should detect failure within 60 seconds

C. Both paths function correctly and the 200-second IP supervision timing meets NFPA 72

D. The cellular path has an unacceptable delay because it activated only after the IP trouble

49. A fire alarm technician discovers during annual testing that the panel's event log has been full for four months, overwriting oldest entries. What is the operational impact?

A. The full log may cause panel processing delays and should trigger an automatic trouble signal

B. Four months of diagnostic history has been permanently lost — the log must be downloaded and cleared

C. Event log capacity has no operational impact because the panel operates independently

D. The panel must be replaced with a model that has larger event log storage capability

50. A fire alarm technician is testing semiannual smoke detectors. On Floor 7, five adjacent detectors (addresses 071-075) take 25 to 35 seconds to activate with approved aerosol smoke. Other Floor 7 detectors activate in 3 to 8 seconds. All detectors are the same model. What does the delayed response suggest?

A. The SLC polling rate for addresses 071-075 is configured slower than other addresses

B. The aerosol smoke can was running low during those five consecutive tests

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

D. The five detectors likely have contaminated sensing chambers reducing responsiveness

51. A fire alarm technician tests the primary-to-secondary power transfer. After disconnecting AC, the battery voltage reads: 0 min = 26.6 VDC, 5 min = 26.2 VDC, 10 min = 25.8 VDC, 15 min = 25.4 VDC. After reconnecting AC, the charger activates. Are these readings acceptable?

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

B. No, the 1.2-volt drop over 15 minutes indicates the batteries are nearing end of life

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

D. No, battery voltage should remain constant during standby because the current draw is minimal

52. A fire alarm technician discovers during inspection that a smoke detector in a nursing home dining room has been covered with a plastic food container by kitchen staff. Small holes are punched in the container. What must be documented?

A. The holes allow adequate smoke entry and the modification acceptably reduces nuisance alarms

B. The unauthorized modification can remain if kitchen staff sign an acknowledgment form

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

D. The container can remain if the detector still activates during functional testing with aerosol

53. Per NFPA 72 Table 14.4.3.2, what is the required functional testing frequency for releasing device circuits?

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

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

C. Monthly because suppression systems must be ready to respond at all times

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

54. A fire alarm technician tests notification appliances. A wall-mounted speaker on Floor 6 produces clear audio but at significantly reduced volume compared to identical speakers on the same 70.7V circuit. Circuit voltage and impedance are normal. What is the most likely cause?

A. The Floor 6 amplifier channel has a partial fault reducing output to that speaker

B. The room acoustics at that location absorb sound producing an apparent volume reduction

C. The speaker wire has a high-resistance connection reducing power delivery to the device

D. The speaker's internal wattage tap is set to a lower power than other speakers on the circuit

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

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

B. The test is still within acceptable limits — the technician should wait an additional 30 seconds

C. The retard delay setting must be checked and adjusted before retesting the switch

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

56. A fire alarm technician tests visible notification in a hospital corridor. Two strobes are visible from the same location. 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 the offset creates a combined rate exceeding 2 per second

B. The candela requirement because unsynchronized strobes produce inconsistent coverage

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

D. The mounting height requirement because improperly mounted strobes create timing delays

57. A fire alarm technician tests the HVAC shutdown interface. A duct detector activates, the panel processes the alarm, the control module relay closes. The AHU does not shut down. Where should the investigation focus?

A. On the duct detector because it may generate an incorrect signal type for HVAC control

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

C. On the panel programming because the output may not be linked to the duct detector

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

58. A fire alarm technician performs a battery load test. Starting voltage is 26.8 VDC. After the test duration under full alarm load, ending voltage is 24.2 VDC. The manufacturer's minimum end-voltage is 20.4 VDC. Do the batteries pass?

A. Yes, 24.2 VDC is well above the 20.4 VDC minimum with a 3.8-volt margin

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

C. Yes, but the batteries should be preventively replaced within 6 months due to the drop

D. No, batteries must maintain voltage above 24.0 VDC throughout the entire test

59. A fire alarm technician discovers during inspection that the building's Record of Completion was last updated six years ago. Three renovations added 55 devices and changed the sequence of operations twice. What corrective action is needed?

A. The annual testing records adequately capture modifications making the update optional

B. A new Record is required only if the fire alarm panel was physically replaced

C. The original Record remains valid because it documents the initial system baseline

D. The Record must be updated to reflect the current system configuration per NFPA 72

60. A fire alarm system event log shows 130 "WATERFLOW — ALARM" entries over three months with no fires or sprinkler head activations found. The building engineer reports municipal water pressure fluctuations. What corrective action should be recommended?

A. Replace all waterflow switches with models having built-in pressure compensation

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

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

D. Increase the panel's alarm processing threshold for waterflow inputs to filter brief events

61. A fire alarm technician discovers during annual testing that a renovation enclosed a corridor smoke detector behind a new partition wall. The detector communicates normally with the panel. What must be documented?

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

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

C. The panel programming should be updated to reflect the detector's new concealed position

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

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

A. Yes, activation within two revolutions meets the NFPA 72 requirement

B. No, the switch must activate after only one revolution for OS&Y valves

C. Yes, but only for OS&Y valves — butterfly valves have a stricter standard

D. No, the requirement is activation within one and a half revolutions maximum

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

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

B. The flash rate is irrelevant as long as the candela meets the room coverage requirement

C. The strobe rate is acceptable for sleeping areas but not for commercial applications

D. The strobe fails because NFPA 72 requires 1 to 2 flashes per second and 0.6 is below minimum

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

A. The tamper switch requires a different EOLR value than the panel's alarm circuits

B. The panel cannot distinguish alarm from supervisory on the same zone input type

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

D. The switch wiring polarity is reversed causing the panel to misclassify the signal type

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

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

B. The bookshelf obstructs both audible and visible notification and must be removed

C. The device is functional if it activates during testing regardless of the obstruction

D. Building management may apply for a variance from the AHJ to keep the bookshelf

66. A fire alarm technician discovers during annual testing that two corridor pull stations in a school have been painted tan to match the walls. The paint covers the housing, handle, and instruction labels. What must be documented?

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

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

C. Only the instruction labels need restoration — the housing color is a design preference

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

67. A fire alarm system has primary IP and secondary cellular communication. "IP COMMUNICATION FAILURE" has been active for 55 days. Cellular functions normally. What should be documented?

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

B. The IP trouble should be repaired at the building owner's convenience next quarter

C. No documentation is needed because the system continues functioning with cellular

D. The system has operated without communication redundancy for 55 days — a significant impairment

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

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

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

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

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

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

A. The detector has been removed from its approved ceiling location and is non-functional for detection at desk height

B. The detector at desk height may detect smoke faster because smoke eventually fills the room

C. The relocation is acceptable if building staff document the reason in the maintenance log

D. The detector should be raised to 60 inches for improved smoke detection at the work level

70. A fire alarm technician is testing a releasing fire alarm system. Cross-zone logic, countdown timer, abort switch, and releasing circuit supervision have been verified. What additional test remains for the protected space?

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

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

C. The pre-discharge audible and visual warning appliances must be verified for adequate output

D. The cross-zone test must be repeated with the zones activated in reverse sequence

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

A. Monthly to ensure sprinkler system valve positions remain correct at all times

B. Semiannually to coincide with the smoke detector functional testing schedule

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

D. Annually as part of the comprehensive system functional test

72. A fire alarm technician discovers during inspection that the fire command center graphic annunciator has five burned-out LED indicators. All other LEDs function correctly. What must be documented?

A. The burned-out LEDs are cosmetic and do not affect the fire alarm system operation

B. The burned-out LEDs prevent firefighters from identifying alarms in those zones and must be repaired

C. The annunciator must be replaced entirely because individual LED repairs are not supported

D. Only LEDs in occupied zone areas need repair — LEDs in mechanical zones may remain dark

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

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

B. Semiannually because releasing circuits are critical life safety components

C. Monthly to ensure the suppression system is always ready to respond to fire

D. Only during initial acceptance testing with no recurring testing required by code

74. A fire alarm technician discovers during inspection that the fire alarm panel room contains paint cans, boxes, and cleaning chemicals. Working clearance in front of the panel is 20 inches. What code requirements are being violated?

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

B. The panel room may be used for storage if chemicals are in sealed containers per OSHA

C. Only the 20-inch clearance violates code — organized storage in the room is permitted

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

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

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

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

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

D. Monthly to ensure continuous reliable fire detection throughout the premises

76. A fire alarm technician discovers during testing that the panel clock shows 2:10 PM when the actual time is 3:55 PM — a 105-minute discrepancy. What must be documented?

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

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

C. The clock error is cosmetic and does not affect fire alarm system operational performance

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

77. A fire alarm technician tests the access control interface. When the alarm activates, magnetically locked egress doors must unlock. The technician activates a detector: 17 of 19 locks release, but 2 remain locked. What must be investigated?

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

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

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

D. The NAC circuits because the magnetic locks may be powered from notification circuits

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

A. Both lines passed because the DACT only requires one functional line for compliance

B. Line 2 cannot be tested independently because the DACT must select lines automatically

C. Line 2's failure may have been caused by disconnecting Line 1 and should be retested differently

D. Line 2 failed and must be investigated and repaired to restore dual-path redundancy

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

79. A fire alarm voltage drop calculation shows a NAC using 14 AWG copper (3.14 Ω/1000 ft), round-trip distance 850 feet, alarm current 2.5 amps on a 24 VDC system. What is the end-of-circuit voltage?

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

B. 20.67 VDC providing generous margin above the 16 VDC minimum

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

D. 15.33 VDC falling below the 16 VDC minimum requiring redesign

80. A fire alarm battery calculation: panel/SLC standby = 0.90A, voice standby = 1.10A, NAC alarm = 4.0A, voice alarm = 8.0A. Building has a qualifying generator. Using 4-hour standby, 15-minute alarm, 20% safety factor. What is the minimum battery capacity?

A. 24.00 Ah using 24-hour standby because voice systems are exempt from generator reduction

B. Approximately 13.2 Ah after applying 4-hour standby, 15-minute alarm, and 20% safety factor

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

D. 15.60 Ah using 4-hour standby with 5-minute alarm instead of 15-minute

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

A. The duct detector signal should transmit to the supervising station even without notification

B. Duct detectors never transmit to the station because they are supervisory-class devices

C. The reviewer is incorrect — duct signals automatically transmit regardless of the matrix

D. Station transmission is required only when duct detectors are configured as alarm inputs

82. A fire alarm conduit schedule shows 1-inch EMT with twelve 14 AWG THHN and six 18 AWG THHN conductors (18 total). Annex C max for 14 AWG alone is 22 and for 18 AWG alone is 40. Mixed sizes are present. How must fill be verified?

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

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

C. Use the Annex C table for 14 AWG only since the larger conductor controls fill

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 — 150 feet on the longer leg and 100 feet on the shorter leg. Detectors at 30-foot spacing with a detector at the corner. Is the corner detector necessary?

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

B. No, corner detectors create redundant coverage unnecessarily increasing project cost

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

D. Yes, but only if the corridor width exceeds 10 feet at the intersection point

84. A fire alarm device schedule lists 195 devices on SLC 1 (max 198). A renovation adds 10 new devices. How should the technician advise?

A. Add 3 to SLC 1 and place 7 on a new loop — but SLC 1 at maximum has zero future flexibility

B. All 10 can be added to SLC 1 because 205 is within the manufacturer's tolerance

C. Install monitor modules to consolidate devices onto fewer addresses creating room

D. All 10 should go on a new SLC to preserve remaining capacity for future needs

85. A fire alarm riser diagram shows remote NAC power supply panels on Floors 5, 10, and 15. Each has its own batteries. What must be calculated separately for each?

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

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

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

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

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

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

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

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

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

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

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

B. Notify the engineer that the specification exceeds code but do not install conduit

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

D. Request the AHJ to override the specification to reduce installation costs

88. A fire alarm voltage drop calculation for a 70.7V speaker circuit shows 61.2 VAC at the farthest speaker. The manufacturer's minimum input is 55 VAC. Does the circuit pass?

A. Yes, 61.2 VAC exceeds the 55 VAC minimum with a 6.2-volt margin

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

C. No, speakers require exactly 70.7 VAC for proper impedance matching

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

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

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

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

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

D. The fire department determines the delay based on their estimated response time

90. A fire alarm as-built drawing shows 162 devices on SLC 1. Panel programming shows 170. The Record of Completion shows 158. What must be corrected?

A. Only the as-built drawings need updating since they are closest to the panel count

B. Only the Record needs updating because it has the most outdated count

C. All three documents must be reconciled against a physical field count to show the same number

D. The panel programming is definitive and other documents should simply match it

91. A fire alarm floor plan shows a 200-foot straight corridor with detectors at 30-foot spacing. First detector at 15 feet: positions at 15, 45, 75, 105, 135, 165, 195. Seven total with the last at 5 feet from the far end. Is this correct?

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

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

C. No, the last detector must be within exactly 15 feet of the far end, not 5 feet

D. Yes, but additional detectors are needed at every corridor intersection regardless

92. A fire alarm shop drawing shows two SLC loops: SLC 1 (Class B, Floors 1-4) and SLC 2 (Class A, Floors 5-16). A reviewer asks why different classes are used. What is a valid rationale?

A. NFPA 72 requires Class A for all loops above Floor 4 in buildings taller than 5 stories

B. Class B and Class A cannot coexist in the same panel per manufacturer firmware limitations

C. The lower floors should also be Class A for consistency across the entire fire alarm system

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

93. A fire alarm shop drawing shows a NAC with 10 horn/strobes at 0.310A each, 6 speakers at 0.145A each, and 5 strobes at 0.195A each on a 3.0-amp NAC output. What is the total load?

A. 4.95 amps total from all devices which exceeds the 3.0-amp rating requiring redesign

B. 3.10 amps from horn/strobes alone which already exceeds the 3.0-amp output

C. 2.36 amps total providing adequate margin within the 3.0-amp rating

D. 6.22 amps based on doubling the alarm current for inrush estimation

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

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

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

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

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

95. A fire alarm specification requires acceptance testing per NFPA 72 before the certificate of occupancy. The spec requires 10 business days' notice to the AHJ. The general contractor requests testing in 4 days. How should the fire alarm contractor respond?

A. Conduct testing in 4 days and submit documentation to the AHJ for retroactive approval

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

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

D. Perform a preliminary test in 4 days and schedule the formal test with proper notice

96. A fire alarm floor plan shows a conference room measuring 45 × 35 feet with a 10-foot ceiling. One wall-mounted strobe at 75 cd is shown. 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. No, the room requires at least 110 cd because the total area exceeds 1,500 square feet

B. No, the strobe must be mounted on the shorter wall for the table coverage to apply

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

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

97. A fire alarm technician reviews as-built drawings showing 148 devices on SLC 1. Physical count reveals 155 devices. Panel programming confirms 155. What documentation action is required?

A. The as-built drawings must be updated to reflect the 155 devices currently installed

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

C. The panel must be reprogrammed to match the 148-device as-built drawing count

D. Both the drawings and Record of Completion must be updated to show 155 devices

98. A fire alarm battery calculation: standby = 0.55A × 24hr = 13.2 Ah, alarm = 4.5A × 0.083hr = 0.374 Ah, subtotal = 13.574 Ah, × 1.20 = 16.29 Ah. The drawing specifies 18 Ah batteries. Is this adequate?

A. No, 18 Ah batteries are oversized wasting project budget without benefit

B. No, the 20% safety factor should be applied to each component separately

C. Yes, 18 Ah exceeds the calculated minimum of 16.29 Ah with approximately 1.71 Ah margin

D. Yes, but only if the building has a qualifying emergency generator

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

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

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

C. No, smoke detectors must always trigger broader notification than manual pull stations

D. Yes, but only if the hospital has fewer than 300 beds per the building code threshold

100. A fire alarm as-built drawing captures the panel's dedicated branch circuit: 20A breaker, 12 AWG conductors, 180-foot run, labeled, lock-on device, no GFCI/AFCI. What additional detail should be captured?

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

B. The electrician's name and license number for warranty documentation

C. The circuit breaker manufacturer and catalog number for replacement identification

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

DOMAIN 2.4 — MANAGEMENT (Questions 101–110)

101. A fire alarm project supervisor discovers that a subcontractor pulled cable with excessive tension on 18 runs totaling 2,500 feet. The cable manufacturer's maximum pulling force may have been exceeded. What must the supervisor require before connecting devices?

A. Megger testing on all 18 cable runs to verify insulation integrity before any connections

B. Visual inspection of the cable jacket at each pull point is sufficient to identify damage

C. The cable can be connected immediately — damage will be found during functional testing

D. The subcontractor must provide written certification that pulling force was within limits

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

A. Only the fire alarm contractor attends because the test covers fire alarm equipment only

B. The general contractor solely coordinates and attends on behalf of all trades

C. The elevator, HVAC, controls, and door hardware contractors must be present to verify equipment response

D. Only the AHJ and fire alarm contractor need to attend — other trades submit results independently

103. A fire alarm project manager receives a request to convert from horn/strobe to voice evacuation at 75% completion. The change requires amplifiers, speaker circuits, intelligibility analysis, and panel reconfiguration. What is the correct response?

A. Install speakers on remaining areas and retain horn/strobes in completed areas

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

C. Refuse the change because converting to voice evacuation at 75% is impractical

D. Absorb the additional cost to maintain the client relationship and project timeline

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

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

B. Replace the breaker directly since fire alarm code compliance is the fire alarm contractor's scope

C. Contact the building owner to authorize the cost of the breaker replacement

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

105. A fire alarm contractor receives 350 smoke detectors — 325 with one date code and 25 with a different date code. All are the same model listed for the panel. Should the contractor be concerned?

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

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

C. Yes, the 25 different units should be on a separate SLC loop from the other 325

D. No, but the 25 units should be placed in non-critical areas as a precaution

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

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

B. Reports are needed only when devices are replaced or panel programming is modified

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

D. Reports are only required when the repair resolves an active alarm condition

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

A. Submit the messy markups as-is because they accurately represent installed conditions

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

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

D. Have technicians recreate drawings from memory to produce clean documentation

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

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

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

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

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

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

A. Provide the 72-hour notice and coordinate patient care testing per infection control requirements

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

C. Test only non-patient areas in 48 hours and skip patient areas entirely

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

110. A fire alarm project supervisor schedules acceptance testing. The AHJ requires 10 business days' notice. The general contractor demands testing in 5 days. How should the supervisor respond?

A. Conduct testing in 5 days and submit results to the AHJ for retroactive review

B. Request the AHJ waive the notice period due to the project's urgent deadline

C. Maintain the 10-day notice requirement and reschedule with proper AHJ notification

D. Perform a preliminary test in 5 days and schedule the formal test with proper notice

LEVEL II — SIMULATION EXAM 7: ANSWER KEY AND EXPLANATIONS

1. C — Remote amplifier panels at intermediate floors shorten speaker circuit distances, directly addressing the root cause of line losses over long wire runs. Increasing amplifier output power from Floor 1 compensates temporarily but does not eliminate the resistance-based losses that worsen with distance. Distributed amplification provides consistent audio levels across all floors as a permanent solution.

2. A — NFPA 72 Section 26.6.3.2 requires IP communication technologies with continuous path monitoring to detect failure within 200 seconds. The panel generated the trouble after 195 seconds, which is within the 200-second maximum. The system meets the supervision timing requirement.

3. B — NFPA 72 does not mandate different detection technologies in each cross-zone. Cross-zoning requires two separate detection zones to both activate before the panel initiates agent release — preventing accidental discharge from a single detector false alarm. The technology used in each zone does not affect the cross-zone function.

4. D — Standby = (1.05 + 1.45) × 24 = 60.0 Ah. Alarm = (5.2 + 10.5) × 0.25 = 3.925 Ah. Subtotal = 63.925 Ah. 24-hour standby, 15-minute alarm, and 20% safety factor.

5. A — NFPA 72 Section 23.8.1.3 requires that if a second automatic alarm signal is received from a different detection zone during the PAS investigation period, PAS must immediately cancel and general alarm notification must activate. A second zone activation provides independent confirmation that a genuine alarm condition likely exists.

6. C — The repeater panel at the fire command center is typically powered from the main panel through the communication/power circuit connecting them. The repeater shares the main panel's power supply and battery backup rather than requiring its own independent battery set. The main panel's batteries serve the entire system including the repeater.

7. B — When acoustically rated floor-to-ceiling partitions create six enclosed event spaces, each space is isolated from the others. Sound and light from notification appliances in one space cannot reach occupants in adjacent enclosed spaces. Each possible configuration must have its own notification appliances providing independent coverage.

8. D — A full DACT-to-station handshake verifies the complete communication path — from the DACT seizing the line, through the telephone network, to the supervising station receiver acknowledging receipt. A simple dial tone check only confirms the line is active locally but cannot verify the call can reach the station or that the receiver can process the signal.

9. A — The raised floor space used for cold air distribution is classified as a plenum, requiring FPLP cable. The overhead cable tray 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 depends on its air-handling function.

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

11. D — Fire alarm monitoring of pump running status provides building-wide supervisory awareness that the pump is operating. While the pump controller tracks this internally, the fire alarm panel ensures building management, the monitoring station, and emergency responders are informed. This awareness supports maintenance decisions and emergency operations.

12. C — When mass notification overrides fire alarm audible notification, the fire alarm signal must continue transmitting to the supervising station for fire department dispatch. The override affects only in-building audio — not external alarm communication. Fire department response must continue regardless of which system controls the building's speakers.

13. A — The panel sends correct zone data, but the annunciator displays Zone 4's alarm on Zone 11's LED position. The most likely cause is a cross-connection on the annunciator's internal LED driver board where the wiring for Zones 4 and 11 are swapped. The annunciator's internal connections must be corrected.

14. B — Individual waterflow zones identify which specific riser has water flow, directing emergency responders directly to the correct area of the building. Grouping all waterflow switches on a single zone eliminates this specificity, forcing responders to investigate all three riser areas — wasting critical response time.

15. D — A double-interlock pre-action system requires two independent conditions before the valve opens: fire alarm detection activation AND a drop in supervisory air pressure indicating a sprinkler head has opened. Neither condition alone is sufficient. The valve correctly remained closed because only the detection interlock was satisfied.

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

17. A — When the specification requires pathway survivability Level 2 on all voice evacuation circuits, both vertical riser runs and horizontal floor-level speaker runs must be protected. Level 2 applies to the entire circuit pathway — not just the riser segments. The horizontal runs must use CI cable or be enclosed in 2-hour fire-rated construction.

18. B — The pre-discharge countdown must provide adequate evacuation time based on the room's specific characteristics: physical dimensions, number and location of exits, maximum travel distance to the nearest exit, and the expected occupant count during business hours. These factors determine whether the countdown is sufficient.

19. D — NFPA 72 does not permit complete elimination of notification from occupied spaces. Operating rooms can use visible-only notification — wall-mounted strobes — with alarm signals directed to trained staff at the nursing station for acknowledgment and response. This eliminates audible disruption while maintaining code-required notification.

20. C — Simultaneous evacuation of all 25 floors into the stairwells creates dangerous congestion that slows evacuation for everyone and can cause crush injuries. Defend-in-place notifies only the affected floors, allowing controlled evacuation while remaining floors shelter safely in fire-rated compartments.

21. A — Per NFPA 72 Table 18.5.5.5.1(a), a 15 cd wall-mounted strobe covers rooms up to 20 × 20 feet. The nursing home room at 15 × 18 feet has both dimensions within the 20-foot maximum. The minimum wall-mounted strobe candela for this room is 15 cd.

22. B — Intermittent communication drops during rainstorms in a system with underground conduit strongly indicate rainwater infiltration into the conduit, compromising cable insulation. Water entering through unsealed joints or damaged sections contacts the cable and creates intermittent resistance paths that disrupt the digital communication signal.

23. A — 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.

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

25. B — In-rack detectors at intermediate heights identify fires where they originate — among stored materials on shelves and pallets — before smoke travels the full 48 feet to ceiling-level detectors. Early detection at the storage level provides significantly faster alarm response and enables quicker suppression activation.

26. C — In a 70.7V audio system, impedance-matching transformers convert the high-voltage line signal to the low impedance each speaker driver requires. Without transformers, parallel speakers present very low impedance directly to the amplifier, causing excessive current draw, severe audio distortion, and potential amplifier overload or permanent damage.

27. A — All three environments — swimming pool (humidity/chlorine), dry sauna (extreme temperature swings), and commercial laundry (lint and steam) — create conditions causing smoke detector nuisance alarms or rapid degradation. Heat detection avoids these problems because it responds only to abnormal temperature increases unaffected by particles, humidity, or chemicals.

28. D — NFPA 72 Section 17.6.3.1.3 requires heat detectors to be rated at least 20°F above the maximum expected ceiling temperature. The loading dock maximum is 85°F, so the minimum activation temperature is 105°F (85 + 20 = 105). Any detector rated at or above 105°F satisfies the code minimum.

29. B — The panel's control module relay activated only for Bank B — confirming panel programming and the control module are correct. All four banks recalling despite only one relay activating indicates the elevator controllers share a common recall input wired in parallel. When one relay closes, all controllers receive the signal through the shared circuit.

30. C — NFPA 72 Section 23.10 requires the fire command center to have a permanently installed fire alarm control panel or a dedicated fire alarm repeater panel. A building management system workstation — regardless of its display capabilities — is not a fire alarm panel or repeater and cannot substitute for the required dedicated equipment.

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

32. D — Total: 125×0.28=35.0, 24×0.20=4.8, 14×3.5=49.0, 8×2.4=19.2, 10×0.14=1.4. Sum=109.4 mA, approximately 109 mA. This is within the 130 mA capacity but leaves only about 21 mA margin. Any significant device additions would approach the limit, requiring careful planning for future expansion.

33. B — NFPA 72 Section 23.11 requires releasing circuits to be supervised for integrity. When the circuit is intentionally opened — simulating a wire break — the panel must generate a trouble signal indicating the supervised circuit has lost continuity. This confirms the panel is actively monitoring the circuit and would detect a real wiring failure.

34. C — Two-hour circuit integrity cable maintains its fire rating based on the cable's own construction, not the surrounding environment. CI cable is tested and listed to maintain circuit integrity for 2 hours during direct fire exposure regardless of installation method. Both outgoing and return paths using CI cable maintain Level 2 through the unrated corridor crossing.

35. A — At 75 feet above the stage, spot-type smoke detectors may not effectively detect fires because smoke cools and stratifies before reaching the ceiling. Aspirating detection with sampling pipes at multiple heights or projected beam detectors at various elevations provide reliable detection regardless of where smoke stratifies in the tall fly gallery volume.

36. D — NFPA 72 Section 24.12 requires the fire alarm system to monitor all ERCES supervisory conditions including power failure, antenna faults, and amplifier malfunctions. Comprehensive monitoring ensures any ERCES impairment is promptly reported so emergency responder radio communication capability is maintained inside the building.

37. B — ADA-accessible hotel sleeping rooms require both a wall-mounted strobe meeting NFPA 72 room coverage requirements and a supplemental alerting device effective for waking sleeping hearing-impaired guests. A bed-mounted strobe or bed shaker directly alerts a sleeping person who cannot hear audible alarms or see a wall strobe with eyes closed.

38. C — When the kitchen suppression system activates, the fire alarm panel should execute the full approved sequence: building notification, supervising station signal, and HVAC shutdown. A kitchen suppression activation confirms a fire condition requiring coordinated building-wide response per the approved sequence of operations.

39. A — Manual pull station activation is not subject to PAS delay. NFPA 72 Section 23.8.1.3 applies PAS only to automatic detection signals. A manually activated pull station represents a human-confirmed emergency that should immediately activate general notification. PAS must cancel and building notification must activate.

40. D — The smoke detector activated correctly, the panel processed the alarm, and the control module relay for HVAC shutdown closed (confirmed by audible click). The AHU not shutting down despite relay closure indicates the fault is downstream — in the wiring between the relay contacts and the AHU controller's shutdown input.

41. B — After verifying cross-zone logic, countdown timing, and abort switch function, the releasing circuit supervision must be tested. Opening the releasing circuit and confirming the panel generates a trouble signal verifies the panel actively monitors the circuit's integrity and would detect a wiring failure that could prevent agent release.

42. C — The pre-recorded message plays correctly on all 20 floors, confirming all amplifiers and speakers function. The live microphone reaching only Floors 1-12 indicates the audio routing is programmed to broadcast to a subset of speaker zones rather than all zones. The programming must be verified against the approved design.

43. A — The panel's control module relay activated only for Bank A — confirming panel programming and the module are correct. All three banks recalling despite only one relay activating indicates the elevator controllers share a common recall input wired in parallel rather than independently. The elevator interface wiring must be separated.

44. D — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed acceptable range. The 12 high-reading detectors require cleaning. The 5 low-reading detectors are abnormally sensitive and must be investigated. All 17 out-of-range detectors require corrective action.

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

46. D — A smoke detector covered with a nitrile glove for five weeks has been effectively disabled. The glove prevents smoke from entering the sensing chamber, leaving the corridor without detection coverage. This is a significant impairment requiring immediate correction — the covering must be removed and the impairment documented.

47. A — A double-interlock pre-action system requires both fire detection AND a supervisory air pressure drop before the valve opens. Neither condition alone is sufficient. The valve correctly remained closed because only the detection interlock was satisfied — the air pressure interlock was not triggered.

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

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

50. D — Five adjacent detectors with significantly longer activation times (25-35 seconds versus 3-8 seconds) compared to identical detectors on the same floor strongly suggests contaminated sensing chambers. An environmental factor specific to that corridor section may have accelerated contamination. The five detectors should be cleaned and retested.

51. A — A gradual voltage decline from 26.6 to 25.4 VDC over 15 minutes of standby — a 1.2-volt drop — is normal for batteries under standby load. The voltage remains well above the minimum operating threshold and the decline is steady and predictable. The charger activating after AC restoration confirms a successful power transfer test.

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

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

54. D — When circuit voltage and impedance are normal but one speaker produces reduced volume, the speaker's internal wattage tap setting is the most likely cause. In 70.7V audio systems, each speaker has selectable tap settings determining power consumption. A lower tap produces proportionally lower volume output.

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

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

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

58. A — The batteries ended the load test at 24.2 VDC — well above the manufacturer's 20.4 VDC minimum end-voltage. The 3.8-volt margin demonstrates adequate capacity to sustain the full alarm load for the required duration. The batteries pass with comfortable margin.

59. D — Three renovations adding 55 devices and modifying the sequence twice over six years represent significant changes. NFPA 72 Section 7.8 requires the Record of Completion to reflect the current system configuration. A six-year-old document describing a substantially different system must be updated.

60. C — One hundred thirty nuisance waterflow alarms over three months with no fires indicates water pressure fluctuations causing brief paddle movements. The corrective approach should address both the root cause (investigating pressure fluctuations) and the switch response (adjusting retard delay to filter pressure-related activations within the 90-second maximum).

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

62. A — NFPA 72 requires tamper switches to generate a supervisory signal within two revolutions of the valve wheel from the fully open position. The switch activated at exactly two revolutions, meeting the code requirement. The tamper switch passes the functional test.

63. D — NFPA 72 Section 18.5.5.5.3 requires visible notification appliances to flash 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.

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

65. B — A bookshelf completely blocking both the horn opening and the strobe lens eliminates both audible and visible notification output from the device. The bookshelf must be removed and building management informed that notification appliances must remain unobstructed at all times.

66. A — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. Painting pull stations tan violates this code requirement. Additionally, painting over instruction labels renders the devices unusable by occupants who cannot read operating instructions. The painted stations must be replaced.

67. D — Fifty-five days without communication redundancy means the system has operated with a single path for nearly two months. If the cellular path also fails, the building has no monitoring. This is a significant impairment requiring prompt corrective action with documentation for the building owner and AHJ.

68. B — The batteries ended at 19.4 VDC — below the manufacturer's 20.4 VDC minimum end-voltage. Panel components may malfunction or shut down at this voltage during an actual alarm event. The batteries cannot sustain the required load and must be replaced.

69. A — A smoke detector at 30 inches above the floor is completely ineffective for fire detection. Smoke rises to the ceiling and accumulates there first. A desk-level detector will not sense smoke until the room is heavily filled with a life-threatening concentration. The detector must be reinstalled at its approved ceiling location.

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

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

72. B — Burned-out LEDs at the fire command center graphic annunciator prevent firefighters from identifying active alarms in those zones. This impairs emergency response by eliminating visual identification of alarm locations. All non-functioning LEDs must be repaired to restore full annunciator capability.

73. A — NFPA 72 Table 14.4.3.2 requires releasing device circuits to be functionally tested annually as part of the comprehensive releasing system test. This includes cross-zone logic, countdown timers, abort switches, releasing circuit supervision, and pre-discharge notification verification.

74. D — Storage of combustible materials, chemicals, and cleaning supplies combined with only 20 inches of working clearance violates NEC Article 110.26. The minimum clearance is typically 30 inches wide and 36 inches deep. All storage must be removed and required working space maintained.

75. C — NFPA 72 Table 14.4.3.2 requires smoke detectors to be functionally tested semiannually using approved aerosol smoke or a calibrated test source. Each test verifies the detector activates and the panel responds correctly with proper identification, notification, and signal transmission.

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

77. B — The panel correctly processed the alarm and 17 of 19 locks released. The two non-releasing locks indicate a fault specific to those devices. The control module outputs, interface wiring, and power supply to the two specific non-releasing locks must be investigated to identify the failure point.

78. D — The primary line tested successfully. Line 2 — tested independently by disconnecting Line 1 — failed to deliver the signal to the station. Line 2 has failed its functional test and must be investigated and repaired to restore dual-path communication redundancy.

79. C — R = 850 × (3.14/1000) = 2.669 Ω. V_drop = 2.5 × 2.669 = 6.673V. End voltage = 24 − 6.67 = 17.33 VDC. This is above the 16 VDC minimum but with only a 1.33-volt margin. While technically compliant, this thin margin warrants careful consideration of connection aging and future device additions.

80. B — Standby = (0.90 + 1.10) × 4 = 8.0 Ah. Alarm = (4.0 + 8.0) × 0.25 = 3.0 Ah. Subtotal = 11.0 Ah. With 20% safety factor: 11.0 × 1.20 = 13.2 Ah. The generator reduces standby to 4 hours. Voice evacuation requires 15-minute alarm. All loads served by the main panel batteries are included.

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

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

83. 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 approach direction.

84. A — Adding 3 devices to SLC 1 reaches the absolute maximum of 198 with zero capacity for future additions, replacements, or modifications. The remaining 7 on a new loop provides expansion capacity. While functional, the technician should flag that SLC 1 at maximum creates a rigid constraint requiring a new loop for any future change.

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

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, communication path details, acceptance test results, and signatures from the installer, designer, and AHJ.

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

88. A — The speaker circuit delivers 61.2 VAC at the farthest speaker, which exceeds the manufacturer's minimum rated input of 55 VAC by 6.2 volts. The speakers will operate within their listed parameters at this voltage, producing acceptable audio quality and volume.

89. A — The pre-discharge time delay must provide adequate evacuation time based on the room's specific characteristics: physical size, exit count and locations, maximum travel distance, and expected occupant count. These factors determine whether the countdown is sufficient — not a fixed code value.

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

91. B — Seven detectors at positions 15, 45, 75, 105, 135, 165, and 195 feet provide 30-foot inter-detector spacing. 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. The layout complies with NFPA 72.

92. D — Using Class A for upper floors (5-16) provides enhanced fault tolerance where it benefits most — longer egress distances, more difficult firefighter access, and greater occupant vulnerability during extended evacuation. The designer's risk assessment determined lower floors can accept Class B's reduced redundancy.

93. A — Horn/strobes: 10 × 0.310 = 3.10A. Speakers: 6 × 0.145 = 0.87A. Strobes: 5 × 0.195 = 0.975A. Total = 4.945 amps, approximately 4.95 amps, which significantly exceeds the 3.0-amp NAC output rating. The circuit must be redesigned across multiple NAC outputs.

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

95. B — 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 contractor must provide the required notice and reschedule accordingly.

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

97. A — The as-built drawings show 148 devices but 155 are physically installed and confirmed by panel programming. NFPA 72 requires as-built drawings to accurately reflect the current installed configuration. The drawings must be updated to show all 155 devices with correct addresses and locations.

98. C — The calculated minimum is 16.29 Ah. The specified 18 Ah batteries exceed this minimum by approximately 1.71 Ah, providing adequate capacity with margin. Select the next standard battery size at or above the calculated minimum for compliance.

99. B — Hospitals using defend-in-place may have differentiated fire alarm responses for different alarm types per the approved fire safety plan. Pull stations triggering building-wide notification while smoke detectors trigger floor-only notification is valid when documented in the plan and accepted by the AHJ.

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

101. A — Excessive pulling tension can damage conductor insulation internally without visible external jacket damage. Megger testing all 18 cable runs verifies insulation integrity and catches latent damage before devices are connected and the system energized. Visual inspection alone cannot detect internal insulation failure.

102. C — Emergency control function interfaces require respective trade contractors to be present during testing. The elevator contractor verifies recall, the HVAC contractor verifies shutdown and smoke control, the controls contractor verifies automation interfaces, and the door hardware contractor verifies holder release.

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

104. D — The fire alarm contractor should not modify the electrical contractor's work directly. The general contractor coordinates all trades and should be notified of the non-compliant AFCI/GFCI breaker so they can direct the electrical contractor to replace it with a standard breaker and lock-on device.

105. A — Different date codes within the same detector model indicate different production runs. As long as all 350 detectors are the same model and listed as compatible with the panel, date code variations do not affect system compatibility, communication protocols, or detection performance.

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

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

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

109. A — Hospital infection control requirements for 72-hour advance notice must be respected. The 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.

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