LEVEL III — SIMULATION EXAM 8 (115 QUESTIONS)

Time Limit: 170 Minutes

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

DOMAIN 3.1 — INSTALLATION (Questions 1–40)

1. A fire alarm designer is specifying a networked system for a military base with fifteen buildings. Security requirements mandate that fire alarm data cannot travel over any shared network infrastructure. The IT department offers a physically dedicated VLAN on the base fiber backbone. Per NFPA 72, is this acceptable?

A. Yes, a dedicated VLAN provides equivalent isolation to a standalone network

B. Yes, if the IT department guarantees 99.99% uptime on the VLAN

C. No, but a virtual private network tunnel over the shared fiber is acceptable

D. No, fire alarm networking requires listed pathways — a shared fiber backbone with VLAN does not qualify

2. A fire alarm designer calculates batteries for a voice evacuation system with a qualifying generator. Main panel loads: panel/SLC standby = 1.02A, voice standby = 1.98A, network = 0.50A. Alarm: NAC = 5.6A, voice = 12.4A. Using 4-hour standby, 15-minute alarm, 20% safety factor, what is minimum main panel capacity?

A. 16.20 Ah without the safety factor

B. Approximately 19.44 Ah after applying all factors

C. 30.00 Ah using 24-hour standby

D. 22.80 Ah using 5-minute alarm duration

3. A fire alarm designer specifies Level 2 pathway survivability for a 40-story high-rise. CI cable is used for all riser circuits. At each floor, CI cable transitions to standard FPLP in a 1-hour fire-rated corridor ceiling. A reviewer questions the Level 2 status of the horizontal FPLP runs. What is correct?

A. Level 2 is lost because 1-hour fire-rated construction does not meet the 2-hour requirement

B. Level 2 is maintained because FPLP in any fire-rated construction satisfies Level 2

C. Level 2 is maintained for the first 50 feet beyond the riser shaft exit

D. The 1-hour rating provides Level 1 but not Level 2 pathway survivability

4. A fire alarm designer specifies cross-zone releasing for a clean agent system. Two server rooms share a common wall. Room 1's Zone A detector is mounted on the shared wall. During Room 1's cross-zone test, the Zone A detector activates but the panel shows "ZONE A — TROUBLE" instead of "ZONE A — ALARM." What is the most likely cause?

A. The detector's address conflicts with another device on the SLC loop

B. The detector's sensitivity has drifted below the alarm threshold

C. The detector's SLC communication is intermittent due to a loose terminal connection

D. The detector is programmed as a supervisory point instead of an alarm point

5. A fire alarm designer specifies detection for a 105-foot atrium in a convention center. The atrium has a retractable glass roof that opens in warm weather. When the roof opens, outdoor air currents change the smoke behavior. What detection approach addresses both closed-roof and open-roof conditions?

A. Ceiling-mounted spot detectors rated for outdoor use

B. Projected beam detectors at mid-height only

C. Flame detection using UV/IR sensors aimed at ground-level displays

D. Aspirating detection at multiple heights with adjustable sensitivity for open-roof conditions

6. A fire alarm designer calculates NAC voltage drop: 14 AWG (3.14 Ω/1000 ft), round-trip 1,080 feet, 2.4 amps on 24 VDC. End voltage?

A. 21.50 VDC with generous margin

B. 15.86 VDC — below 16 VDC minimum requiring redesign

C. 24.0 VDC — negligible drop under 1,100 feet

D. 16.86 VDC — thin margin, redesign recommended

7. A fire alarm designer develops the sequence for a hospital with defend-in-place. The facility includes a hyperbaric oxygen treatment chamber. The chamber operates at elevated pressure with enriched oxygen. What is the most critical notification consideration for this space?

A. Notification must coordinate with chamber depressurization — patients cannot exit during treatment without a controlled decompression sequence

B. Standard audible notification is adequate because the chamber walls block exterior noise

C. Only visual notification is needed because the chamber is acoustically isolated

D. The chamber is exempt from notification because it has its own fire suppression

8. A fire alarm designer evaluates speech intelligibility for a voice evacuation system. STI of 0.50 minimum. Three spaces: an indoor aquatics center (humidity, hard tile, pool noise), an underground parking garage (vehicle exhaust, reflective concrete), and a data center server aisle (continuous 85 dB fan noise). Which space requires the most specialized speaker selection?

A. The parking garage because reflective surfaces create the most complex reverberation

B. The data center because continuous fan noise masks speech frequencies uniformly

C. The aquatics center because high humidity requires sealed, corrosion-resistant speakers rated for the environment

D. All three require identical specialty speakers

9. A fire alarm designer specifies communication paths. The building has IP primary and cellular secondary. Per NFPA 72, what is the maximum time for the IP communicator to detect path failure?

A. 60 seconds for all IP technologies

B. 24 hours matching DACT line test intervals

C. 5 minutes as the universal dual-path standard

D. 200 seconds for technologies with continuous monitoring

10. A fire alarm designer develops elevator recall. A building has four banks. Banks A-C serve the tower. Bank D serves only the penthouse restaurant via a direct-access car from the lobby. The machine room is on the roof. When the machine room detector activates, all banks must recall to alternate floors. Bank D normally parks at the lobby. What is Bank D's recall requirement?

A. Bank D is exempt because restaurant-only elevators are not required to have alternate recall

B. Bank D must recall to the penthouse as its alternate since smoke may affect the lobby

C. Bank D remains at the lobby because single-destination elevators have no viable alternate

D. Bank D must shut down in place rather than recall to any floor

11. A fire alarm designer specifies detection for a temperature-controlled wine storage facility. The facility maintains 55°F and 70% RH. The collection is valued at $12 million. Standard smoke detectors are acceptable for this environment. What detection technology provides the earliest warning for this application?

A. Aspirating detection at enhanced sensitivity for earliest possible warning at very low smoke concentrations

B. Standard photoelectric detectors at normal spacing

C. Rate-of-rise heat detectors for fastest thermal response

D. Multi-criteria detectors combining photo and thermal sensing

12. A fire alarm designer specifies conduit fill for 3/4-inch EMT carrying eight 14 AWG THHN, four 12 AWG THHN, and two 18 AWG THHN (14 total). Mixed sizes. What method must be used?

A. Compare each to Annex C maximum individually

B. Use Annex C for 12 AWG as controlling calculation

C. Calculate total conductor area from Table 5 and compare to 40% fill

D. Add counts and compare to smallest Annex C maximum

13. A fire alarm designer develops the FCC per NFPA 72 Section 23.10. The building has a lobby FCC with a dedicated repeater panel. The building owner asks whether the repeater must have the same operational controls as the main panel. Per NFPA 72, what is required?

A. The repeater must display status only — control remains at the main panel

B. The repeater needs only alarm and trouble LED indicators

C. A simplified zone annunciator satisfies the FCC repeater requirement

D. The repeater must provide full system status display and operator control capability

14. A fire alarm designer specifies the fire pump interface. The building has dual electric fire pumps — a primary and a backup. Each pump controller provides running, power, phase reversal, and trouble contacts. Per NFPA 72, must both pump controllers be monitored by the fire alarm panel?

A. Only the primary pump requires monitoring — the backup is inherently redundant

B. Both pump controllers must be independently monitored with separate supervisory zones

C. Both pumps share a single supervisory zone for simplified panel programming

D. Only the running contacts require monitoring — other contacts are optional for dual-pump systems

15. A fire alarm designer specifies visible notification for a large convention center exhibit hall with 55-foot ceilings. The hall measures 400 × 300 feet with no permanent interior walls. Wall-mounted strobes at standard heights cannot cover the room dimensions. What approach is most practical?

A. High-candela strobes mounted at multiple heights on structural columns distributed throughout the hall

B. Ceiling-suspended strobes hanging from the steel structure at 30-foot intervals

C. Portable strobe towers positioned by exhibitors during events

D. Visible notification provided only at exit locations since the hall is a transient-occupancy space

16. A fire alarm designer develops a pre-action releasing system for a museum artifact storage vault. The vault has dual pre-action sprinklers using double-interlock. The museum director asks what happens if a water pipe in the vault develops a pinhole leak. Per the double-interlock design, what occurs?

A. The valve opens immediately because any pressure change triggers the interlock

B. The leak causes a gradual pressure drop that eventually opens the valve flooding the vault

C. The pressure drop generates a supervisory trouble but the valve remains closed because detection has not activated

D. The releasing panel ignores pressure changes and monitors only detection status

17. A fire alarm designer specifies the system for a 400-bed hospital with defend-in-place. The hospital has sixteen patient care floors, two surgical floors, an ED, a NICU, a psychiatric unit, and three support/administrative levels. How many distinct alarm response profiles does the designer need at minimum?

A. One universal profile with zone-based notification adjustments

B. Three profiles — patient care, surgical/critical, and administrative

C. Sixteen — one per floor because each has unique staffing

D. At least five — patient care, surgical, ED, NICU/psychiatric, and administrative

18. A fire alarm designer develops PAS for a large retail building. During the 180-second investigation, a duct detector activates in the HVAC system serving the same area. Per NFPA 72, does a duct detector activation cancel PAS?

A. No, duct detectors are classified differently and do not interact with PAS

B. Yes, a duct detector is an automatic detection device and a second zone activation cancels PAS

C. No, duct detectors generate supervisory signals that do not affect PAS

D. Yes, but only if the duct detector is configured as an alarm input

19. A fire alarm designer specifies the releasing circuit for a clean agent system. The data center has a raised floor plenum and above-ceiling cable tray. The agent system protects both spaces. The releasing panel must shut down HVAC, activate pre-discharge warning, run countdown, and release agent. Per the sequence, in what order must these occur?

A. HVAC shutdown at cross-zone verification, then pre-discharge warning and countdown, then agent release at countdown completion

B. Pre-discharge warning first, then HVAC shutdown at midpoint, then agent release

C. Agent release first, then HVAC shutdown to contain the agent concentration

D. All four actions occur simultaneously at cross-zone verification

20. A fire alarm designer specifies the system for a 42-story residential tower using defend-in-place. The building has two residential lobbies — main on Floor 1 and a mid-tower lobby on Floor 22. A smoke detector on Floor 30 activates. Floors 29-31 are notified. The property manager asks whether stairwell notification should activate. What determines the answer?

A. Stairwells are always notified during all alarm conditions regardless of defend-in-place

B. Stairwell notification is prohibited during defend-in-place to prevent evacuation

C. The fire safety plan determines stairwell notification during defend-in-place

D. Stairwells are notified only when more than three floors are in alarm

21. A fire alarm designer specifies notification for a building. The architect requests concealed pull stations behind flush-mounted panels with no visible indication. Per NFPA 72, is this acceptable?

A. Yes, if the panels are labeled "FIRE ALARM" in red lettering

B. Yes, if the panels are spring-loaded for easy access

C. No, but recessed pull stations with visible red handles are acceptable

D. No, pull stations must be conspicuous, visible, and accessible — concealment violates NFPA 72

22. A fire alarm designer develops notification for a library. The main reading room has 25 dB ambient. The reference section has 30 dB ambient. The computer lab has 55 dB ambient. Per NFPA 72, what minimum audible levels apply?

A. Reading: 40 dB, Reference: 45 dB, Computer: 70 dB — all at 15 dB above ambient

B. All three: 75 dBA minimum regardless of individual ambient levels

C. Reading: 25 dB, Reference: 30 dB, Computer: 55 dB — matching ambient

D. Reading: 75 dBA, Reference: 75 dBA, Computer: 70 dB — mixed criteria

23. A fire alarm designer evaluates voice evacuation for a 44-story building. Remote amplifiers on Floors 11, 22, and 33. Each has own batteries. The designer discovers Floor 22's remote serves Floors 17-27 with 9.4 amps alarm draw. Floor 11's remote serves Floors 6-16 with 6.2 amps. Floor 33's remote serves Floors 28-38 with 7.8 amps. Why must each have a separate battery calculation?

A. Each remote serves different floor counts with different loads — identical sizing would under-size or over-size batteries

B. Remote panels share the main panel battery bus — separate calculations are redundant

C. Only the highest-load remote requires calculation — others match its battery size

D. NFPA 72 requires identical batteries at all remote locations for standardized maintenance

24. A fire alarm designer specifies the kitchen hood suppression interface. The building has a main kitchen and a satellite kitchen on a different floor. Each has independent hood systems monitored by separate modules. When the satellite kitchen hood activates, what must the panel initiate?

A. Only satellite kitchen local notification because the main kitchen is on a different floor

B. Only station signal because satellite kitchen events are supervisory

C. Full sequence — notification, station signal, and HVAC shutdown per the approved sequence

D. Main kitchen hood must also activate for comprehensive suppression coverage

25. A fire alarm designer specifies cable for a hospital. The corridor above the ceiling is a return air plenum. The patient rooms have ducted HVAC returns (non-plenum). Equipment rooms have no HVAC function above the ceiling (non-plenum). What cable types are required?

A. FPLP in the corridor plenum and FPL minimum in patient rooms and equipment rooms

B. FPLP in all three spaces because hospital environments require plenum-rated cable

C. FPL in all three because sprinkler protection reclassifies plenums

D. FPLP in corridor and patient rooms, FPL in equipment rooms only

26. A fire alarm designer specifies the system for a building with ten sprinkler risers serving different wings and floors. Each riser has waterflow and tamper — twenty zones. The fire marshal requests that the graphic annunciator display each waterflow zone on the corresponding wing of the floor plan. What is the primary operational benefit?

A. Eliminates the need for tamper monitoring on the same risers

B. Zone-specific display is required by NFPA 72 for buildings with more than six risers

C. Zone-specific display is prohibited — all waterflow must show as a single building-wide alarm

D. Responding firefighters can identify which wing has active water flow before entering

27. A fire alarm designer specifies heat detection for a cold storage facility. Walk-in cooler at 38°F. Blast freezer at -40°F. Loading dock fluctuates 0°F to 102°F. Per NFPA 72, what minimum activation temperature for the loading dock?

A. 135°F because it is the standard commercial rating

B. At least 122°F to maintain the 20°F margin above the 102°F maximum

C. 200°F because fluctuating environments need high-temperature ratings

D. 102°F for immediate response above normal maximum

28. A fire alarm designer develops elevator recall for a building. Three banks serve the tower. A fourth elevator is a hydraulic lift serving only Floors 1 and 2 for ADA access between the lobby and mezzanine. The machine room is in the basement. When the machine room detector activates, must the hydraulic ADA lift recall?

A. Yes, all elevators served by the machine room must recall to alternate floors regardless of type

B. No, hydraulic lifts serving only two floors are exempt from recall per NFPA 72

C. Yes, but only to its primary floor since a two-floor elevator has no viable alternate

D. No, ADA lifts are exempt from fire alarm recall requirements

29. A fire alarm designer specifies mass notification integrated with voice evacuation. The emergency plan requires simultaneous fire alarm and mass notification messages on different floors. Floor 8 has an active fire alarm. Floor 22 needs a tornado warning. Per NFPA 72, what is required?

A. Fire alarm takes priority on Floor 8, mass notification on Floor 22, and station transmission continues for the fire

B. Mass notification overrides fire alarm on all floors including Floor 8

C. Fire alarm and mass notification messages alternate on a 30-second cycle on all floors

D. Both messages play simultaneously on Floor 8 creating a dual-notification condition

30. A fire alarm designer develops the releasing circuit for a pre-action sprinkler using single-interlock. The system uses Class B releasing circuits. During testing, the technician opens the releasing circuit. The panel generates a trouble and the releasing function is disabled. Is this correct Class B behavior?

A. No, Class B circuits should maintain releasing function during an open fault

B. No, the panel should switch to emergency release mode during the fault

C. Yes, but only if the system is in commissioning mode during the test

D. Yes, Class B has no redundant path — an open fault disables the releasing function

31. A fire alarm designer specifies detection for a building with an indoor karting track, a pottery studio, and a commercial composting facility. Each has smoke detector compatibility issues. What detection is most appropriate?

A. Aspirating detection with filtration at sampling intakes

B. Heat detection because all three environments cause smoke detector problems

C. Multi-criteria detectors with environmental compensation

D. Flame detection because all three contain combustible materials

32. A fire alarm designer specifies ADA-accessible hotel guest room. Room is 17 × 19 feet, 9-foot ceiling. Per NFPA 72, 15 cd wall strobe covers up to 20 × 20 feet. What additional notification is required beyond the standard strobe?

A. A supplemental device effective for waking sleeping hearing-impaired occupants

B. A ceiling-mounted strobe at 177 cd above the bed

C. A low-frequency 520 Hz audible generator near the bed

D. A second wall strobe at double candela on the opposite wall

33. A fire alarm designer specifies voice evacuation using 70.7V. A speaker circuit has five speakers. Four have transformers at 2-watt taps. The fifth has a 1/4-watt tap. During testing, the fifth speaker produces barely audible output. Circuit voltage at all speakers reads 69.5 VAC. What is the cause?

A. The fifth speaker has a defective voice coil reducing output

B. The wire run to the fifth speaker has excessive resistance

C. The 1/4-watt tap delivers far less power than the 2-watt taps on the other four

D. The 69.5 VAC is below the fifth speaker's minimum operating voltage

34. A fire alarm designer specifies beam detectors for a warehouse 520 × 320 feet with 58-foot ceilings. Beams span the 520-foot dimension with 52-foot lateral spacing. What must be verified?

A. Beam count equals one per 5,000 square feet

B. 52-foot spacing matches sprinkler spacing

C. 52-foot spacing does not exceed 30-foot spot detector spacing

D. 52-foot spacing does not exceed the manufacturer's listed maximum for the 58-foot ceiling

35. A fire alarm designer develops a phased construction project. Phase 1 (Floors 1-20) is operational and occupied. Phase 2 (Floors 21-40) construction begins with steel welding and grinding above Phase 1. Sparks and metal dust migrate to Floor 20 detectors through open floor penetrations. What coordination is required?

A. Phase 1 must be shut down during Phase 2 welding operations

B. Phase 1 Floor 20 zones must be bypassed with the monitoring station notified during active welding

C. No coordination needed — separate SLC loops isolate the phases

D. Phase 1 detectors near penetrations should be replaced with heat detectors

36. A fire alarm designer evaluates SLC distribution. Renovation adds 60 devices at 46 mA. Three loops: SLC 1 = 195/148 mA, SLC 2 = 190/142 mA, SLC 3 = 75/52 mA (max 198/150 mA each). Best distribution?

A. All 60 on SLC 3 because it has the most remaining capacity

B. Split 20/20/20 evenly across all three loops

C. 3 on SLC 1 reaching 198, 8 on SLC 2 reaching 198, and 49 on SLC 3

D. 5 on SLC 1, 5 on SLC 2, and 50 on SLC 3

37. A fire alarm designer specifies the central station connection per NFPA 72 Section 26.3.4. The maximum operator response initiation time after receiving an alarm is what?

A. 60 seconds from receipt to console acknowledgment

B. 120 seconds from receipt to fire department notification completion

C. 90 seconds from receipt to initiation of required response

D. 30 seconds from receipt to first dispatch contact

38. Per NEC Article 700, the maximum ATS transfer time for emergency systems is what?

A. 30 seconds for all emergency loads

B. 60 seconds with batteries bridging the transfer

C. 120 seconds because panels have batteries

D. 10 seconds per NEC Article 700

39. A fire alarm designer specifies in-rack detection for a pharmaceutical warehouse with 52-foot ceilings. Racks hold temperature-sensitive medications to within 5 feet of ceiling. In-rack detectors at 18-foot and 36-foot elevations plus ceiling beams. The facility manager asks why ceiling beams are needed in addition to in-rack. What is correct?

A. Ceiling beams are required by NFPA 72 for all warehouses above 45 feet

B. In-rack detectors only protect rack areas — ceiling beams cover open aisles and non-rack spaces

C. Ceiling beams compensate for in-rack detector blind spots between shelving levels

D. In-rack detectors at two heights eliminate the need for ceiling beams above 50 feet

40. A fire alarm designer develops the sequence for a mixed-use building with a ground-floor restaurant, a second-floor nightclub, and office floors above. The restaurant kitchen hood suppression activates. The nightclub manager requests a 10-minute notification delay for his space to avoid disrupting the evening's performance. Per the approved sequence, is a delay permissible?

A. The full sequence applies immediately — suppression activation is an alarm condition requiring immediate notification

B. A 5-minute delay is acceptable for entertainment venues per NFPA 72

C. The nightclub may use PAS to investigate before notification activates

D. The delay is acceptable if the nightclub has its own independent fire alarm system

DOMAIN 3.2 — MAINTENANCE AND INSPECTION (Questions 41–78)

41. A fire alarm technician performs annual releasing system testing. Solenoid disconnected, substitute load installed. Cross-zone, countdown, abort, supervision verified. What test remains?

A. Releasing solenoid reconnected for live discharge

B. Cross-zone retested in opposite order

C. Substitute load voltage measured with instrument

D. Pre-discharge warning appliances verified for adequate output

42. A fire alarm designer reviews sensitivity for a 14-year-old system with 850 detectors. Report: 40 above 3.7% max, 15 below 0.5% min. What action?

A. Only the 40 high-reading detectors need cleaning

B. All 850 must be cleaned — 55 out-of-range indicates building-wide contamination

C. All 55 out-of-range detectors require investigation and correction

D. Panel thresholds expanded for 14-year drift

43. A fire alarm technician tests voice evacuation live microphone from FCC. Audio on Floors 1-24, not Floors 25-48. Pre-recorded message plays on all 48 floors. Most likely cause?

A. Live microphone routing programmed for Floors 1-24 only

B. Upper floor amplifiers have a fault blocking live audio

C. Microphone output insufficient for building load

D. Upper floor circuits have impedance faults

44. A fire alarm technician tests elevator recall. Seven banks with selective recall. Activating Bank C: only C recalls. Activating Bank G: Banks F and G both recall. Only Bank G's relay activated. Problem?

A. Panel programming activates both F and G outputs

B. Controllers for Banks F and G share a common recall input

C. Bank G's SLC interferes with Bank F's module

D. Bank G generates building-wide alarm code

45. A fire alarm technician tests AC power supervision. AC disconnected. After 3 hours 25 minutes, no trouble appeared. Per NFPA 72, assessment?

A. No delay permitted — trouble must appear immediately

B. 6 hours extended allowance for modern panels

C. 24 hours matching battery standby duration

D. 3 hours maximum — the 3:25 delay exceeds it and must be corrected

46. A fire alarm technician discovers a detector covered with a section of paper towel by janitorial staff. Covering in place eight weeks. Document?

A. Paper towel is thin enough to permit smoke entry

B. Covering acceptable if logged in maintenance records

C. Detector disabled for eight weeks — significant impairment requiring correction

D. Towel may remain until janitorial schedules next cleaning

47. A fire alarm technician tests a double-interlock pre-action system. Detector activates. Panel processes alarm. Valve remains closed. Correct?

A. Yes, double-interlock requires both detection AND air pressure drop

B. No, detection should open valve as first interlock

C. Yes, but only in maintenance mode

D. No, detection should energize pilot solenoid

48. A fire alarm technician tests communication — IP primary, cellular secondary. IP succeeds. Disconnects IP. After 197 seconds, panel shows "IP FAILURE." Cellular succeeds. IP timing pass?

A. No, IP must detect failure within 60 seconds

B. No, but firmware update can correct timing

C. Yes, 197 seconds within the 200-second maximum

D. Yes, 200-second limit has built-in tolerance

49. A fire alarm technician discovers event log full for seventeen months, overwriting entries. Impact?

A. Full log causes panel processing delays

B. Seventeen months of diagnostic history lost — log must be downloaded and cleared

C. Panel must be replaced with larger capacity

D. No operational impact

50. A fire alarm technician tests semiannual detectors on Floor 22. Twelve adjacent detectors take 38 to 55 seconds to activate. Others activate in 3 to 9 seconds. Delayed response indicates?

A. SLC polling configured slower for those addresses

B. Aerosol can running low during those tests

C. HVAC diluting smoke before reaching detectors

D. Twelve detectors likely have contaminated sensing chambers

51. A fire alarm technician tests power transfer. After AC disconnect, voltage: 0 min = 26.4V, 5 min = 26.0V, 10 min = 25.6V, 15 min = 25.2V. Charger activates after reconnection. Acceptable?

A. Yes, gradual 1.2V decline normal for batteries under standby load

B. No, 1.2V drop indicates near end of life

C. Yes, but only if recovery above 27.0V within 30 minutes

D. No, voltage should remain constant

52. A fire alarm technician discovers a detector covered with blue painter's tape by renovation crew. Tape in place five weeks. Document?

A. Painter's tape is thin enough not to affect detection

B. Tape acceptable during renovation if logged

C. Tape completely blocks smoke entry — detector non-functional, must be removed

D. Tape may remain until painting completes

53. Per NFPA 72, smoke detector testing frequency?

A. Annually as part of comprehensive test

B. Semiannually using approved aerosol or calibrated source

C. Quarterly for consistency

D. Monthly for continuous detection

54. A fire alarm technician tests notification. Speaker on 70.7V circuit produces clear but reduced volume. Circuit voltage 70.1 VAC. Likely cause?

A. Amplifier has partial fault

B. 70.1 VAC below speaker minimum threshold

C. Wire has high-resistance splice

D. Speaker's wattage tap set lower than others

55. A fire alarm technician tests visible notification. Two strobes visible from same location flash 0.6 seconds apart on different NACs. Violated?

A. Flash rate — combined offset exceeds 2 per second

B. Candela — unsynchronized produces uneven coverage

C. Synchronization — same field of view must flash together

D. Mounting height — creates timing offsets

56. A fire alarm technician discovers pull stations painted gold in a hotel lobby. Paint covers housing, handle, and labels. Document?

A. Painted stations must be replaced — paint obscures required red color and labels

B. Only labels need restoration

C. Stations function if activated — paint is cosmetic

D. Hotel should repaint red within 30 days

57. A fire alarm technician performs battery test. Starting 26.8 VDC. After test, ending 18.0 VDC. Manufacturer minimum 20.4 VDC. Document?

A. Passed — 18.0 exceeds 18 VDC industry minimum

B. Failed — 18.0 below 20.4 VDC minimum, must be replaced

C. Inconclusive — repeat after recharge

D. Can remain 30 days while replacements ordered

58. A fire alarm technician tests HVAC shutdown. Duct detector activates, panel processes alarm, relay closes. AHU does not stop. Fault location?

A. In duct detector generating incorrect signal

B. In panel programming — output not linked to zone

C. In SLC — module did not receive command

D. In wiring between relay and AHU controller

59. A fire alarm technician discovers Record of Completion last updated thirteen years ago. Nine renovations added 140 devices and changed sequence eight times. Needed?

A. Annual testing records capture changes — update optional

B. Original Record remains valid as baseline

C. Record must be updated per NFPA 72 Section 7.8

D. New Record only if panel replaced

60. A fire alarm system log shows 300 "WATERFLOW — ALARM" entries over eleven months with no fires. Engineer reports water hammer from nearby construction. Recommend?

A. Investigate surges and adjust waterflow switch retard delay

B. Replace switches with pressure-compensated models

C. Increase panel threshold for waterflow zones

D. Disconnect switches until construction completes

61. A fire alarm technician discovers renovation enclosed a corridor detector behind a new wall. Detector communicates normally. Document?

A. Detector can remain — communicates normally

B. Detector must be relocated to occupied corridor and concealed space evaluated

C. Panel descriptor updated for concealed position

D. Concealed detector provides dual coverage

62. A fire alarm technician tests tamper on OS&Y valve. After two revolutions, supervisory appears. Pass?

A. No, must activate after one revolution

B. No, requirement is one and a half revolutions

C. Yes, but only for OS&Y — butterfly stricter

D. Yes, within two revolutions meets NFPA 72

63. A fire alarm technician tests horn/strobe. Temporal-three correct. Strobe at 0.65 flashes per second. Document?

A. Passes because below 2 per second

B. Rate irrelevant if candela meets coverage

C. Fails — NFPA 72 requires 1 to 2 flashes per second

D. Acceptable for sleeping areas only

64. A fire alarm technician discovers tamper generates alarm instead of supervisory. Contact confirmed. Cause?

A. Input programmed as alarm rather than supervisory

B. Tamper requires different EOLR

C. Panel cannot distinguish on same input type

D. Wiring polarity reversed

65. IP primary, cellular secondary. "IP FAILURE" active 85 days. Cellular functions. Document?

A. Cellular provides monitoring — not urgent

B. System without redundancy 85 days — significant impairment

C. Repair at owner's convenience

D. No documentation needed

66. A fire alarm technician discovers a decorative sconce mounted over a corridor horn/strobe blocking both outputs. Document?

A. Only strobe obstruction significant

B. Device functional if activates during testing

C. Building may apply for variance

D. Sconce blocks both outputs and must be removed or relocated

67. A fire alarm technician performs battery test. Starting 27.0 VDC. After test, ending 18.4 VDC. Manufacturer minimum 20.4 VDC. Document?

A. Passed — exceeds 18 VDC industry minimum

B. Inconclusive — repeat after recharge

C. Failed — 18.4 below 20.4 VDC minimum

D. Can remain 60 days while replacements ordered

68. A fire alarm technician discovers detector relocated from ceiling to top of a tall bookcase. Bookcase top is 7 feet above floor. Ceiling is 9 feet. Detector is 24 inches below ceiling. Per NFPA 72, spot detectors must be on the ceiling or within 12 inches. Assessment?

A. Detector at 24 inches below ceiling exceeds the 12-inch maximum and must be reinstalled at the ceiling

B. Detector at bookcase height provides adequate coverage

C. Acceptable if staff document the reason

D. 24 inches is within acceptable range for high-ceiling installations

69. Per NFPA 72, supervisory device testing frequency?

A. Monthly for valve verification

B. Annually as part of comprehensive functional test

C. Semiannually to match detector schedule

D. Quarterly for consistency

70. FCC graphic annunciator has thirteen burned-out LEDs. Document?

A. LEDs cosmetic — no effect

B. Burned-out LEDs impair emergency response — must be repaired

C. Only occupied-zone LEDs need repair

D. Annunciator must be replaced entirely

71. Releasing circuit testing frequency per NFPA 72?

A. Semiannually — more critical

B. Monthly for readiness

C. Only during initial acceptance

D. Annually as part of comprehensive releasing test

72. Panel room: paint, thinners, boxes, folding chair. Working clearance 13 inches. Violations?

A. Only chemicals are a concern

B. Room usable if chemicals sealed

C. Both storage and 13-inch clearance violate NEC Article 110

D. Only clearance violates — organized storage permitted

73. Smoke detector testing frequency?

A. Semiannually using approved aerosol or calibrated source

B. Annually as part of comprehensive test

C. Quarterly for consistency

D. Monthly for continuous detection

74. Stairwell pressurization test. Detector activates, fans start. Floor 7 requires significant force. Floor 28 opens normally. Document?

A. Only fan activation documented

B. Some variation expected — both pass

C. Only Floor 7 matters — confirms pressure

D. Both documented — inconsistent pressurization suggests duct or damper issue

75. Panel clock shows 9:30 AM, actual time 11:25 AM — 115-minute discrepancy. Document?

A. Discrepancies under 2 hours within tolerance

B. 115-minute discrepancy affects event log accuracy — must be corrected

C. Clock error only affects display

D. Only AHJ determines correction

76. Access control test. Alarm activates. 22 of 25 locks release, 3 locked. Investigate?

A. Panel programming — not in matrix

B. Access control firmware

C. Control module outputs, wiring, and power to the three non-releasing locks

D. NAC circuits — locks wired to notification

77. Waterflow test. Inspector's valve open, water flows. After 95 seconds, no alarm. Per NFPA 72?

A. Switch failed — must alarm within 90 seconds

B. 95 seconds close enough to pass

C. Acceptable for extended retard systems

D. Only retard failed — switch functional

78. Sensitivity testing. Detector reads 4.8% — above 3.7% max. Indicates?

A. Ideal for high-particulate environments

B. Acceptable — within 1.5% of maximum

C. Panel calibration drifted

D. Detector outside listed range — clean, retest, or replace

DOMAIN 3.3 — SUBMITTAL PREPARATION AND SYSTEM LAYOUT (Questions 79–100)

79. NAC voltage drop: 14 AWG (3.14 Ω/1000 ft), round-trip 960 feet, 2.9 amps on 24 VDC. End voltage?

A. 15.26 VDC — below 16 VDC requiring redesign

B. 16.26 VDC with thin margin, redesign recommended

C. 21.50 VDC with generous margin

D. 24.0 VDC — negligible drop

80. Battery calc: panel/SLC standby = 0.86A, voice standby = 1.14A, NAC alarm = 4.0A, voice alarm = 8.0A. Generator. 4-hour standby, 15-minute alarm, 20% safety factor. Minimum?

A. 24.00 Ah using 24-hour standby

B. 10.60 Ah without safety factor

C. Approximately 12.6 Ah after applying all factors

D. 15.00 Ah using 5-minute alarm

81. Duct detector triggers HVAC shutdown only — no notification, recall, or station signal. Reviewer flags missing station. Correct?

A. Duct detectors never transmit — supervisory class

B. Reviewer incorrect — auto transmit regardless

C. Station transmission only when configured as alarm

D. Signal should transmit to station even without notification

82. Conduit: 1-inch EMT with fourteen 14 AWG THHN and four 18 AWG THHN (18 total). Annex C: 14 = 22, 18 = 40. Mixed sizes. Verify how?

A. Compare individually — both below maximums

B. Calculate total conductor area from Table 5 and compare to 40% fill

C. Add counts, compare to smaller max

D. Use 14 AWG Annex C only

83. L-shaped corridor: 240 feet longer leg, 180 feet shorter leg. Detectors at 30-foot spacing with corner detector. Corner necessary?

A. Yes, ensures detection at turn where leg coverage may be limited

B. No, detectors along legs provide coverage

C. No, corner creates redundant coverage

D. Yes, but only if width exceeds 10 feet

84. SLC 1: 196 devices (max 198). Renovation adds 25. Advise?

A. Add 2 reaching 198, place 23 on new loop

B. All 25 via firmware extension

C. All 25 on new SLC to preserve remaining capacity

D. Consolidate with monitor modules

85. Remote NAC power supplies on Floors 11, 22, 33 of a 44-story building. Each has batteries. Calculate?

A. Combined averaging across all three

B. Voltage drop from main panel to each

C. Conduit fill for supervised circuits

D. Separate battery calculation based on each remote's specific loads

86. Record of Completion per NFPA 72. Contents?

A. Only installer's license and signature

B. System specs, circuit details, device counts, power data, and required signatures

C. Only AHJ's inspection report

D. Engineer's calculations and specifications

87. Specification: cable above ceilings in conduit. Non-plenum. NEC doesn't require conduit. Designer should?

A. Install conduit as specified — contractual obligation

B. Ignore specification — exceeds code

C. Request AHJ override

D. Conduit only in corridors

88. 70.7V speaker circuit: 55.5 VAC at farthest speaker. Manufacturer minimum 55 VAC. Pass?

A. Yes, 55.5 VAC exceeds minimum with 0.5-volt margin — but margin is extremely thin

B. No, must maintain 90% (63.6 VAC)

C. Yes, 55.5 exceeds 55 VAC minimum — technically compliant

D. No, speakers require exactly 70.7 VAC

89. Releasing system: 10-second pre-discharge timer. Engineer questions adequacy. What determines delay?

A. NFPA 72 fixed 30-second minimum

B. Agent manufacturer based on concentration

C. Fire department based on response time

D. Room size, exit count, travel distance, and occupant count

90. As-built: 188 devices on SLC 1. Panel: 198. Record: 180. Correct?

A. Only as-built needs updating

B. All three reconciled against physical field count

C. Only Record needs updating

D. Panel reprogrammed to match as-built

91. 280-foot straight corridor. Detectors at 30-foot spacing. First at 10 feet: 10, 40, 70, 100, 130, 160, 190, 220, 250, 280. Ten detectors. Last at far end. Correct?

A. Yes, 10 detectors with 30-foot spacing and end distances within 15 feet provide coverage

B. No, first and last must be within 15 feet of each end

C. Yes, but additional detectors at intersections needed

D. No, 11 detectors needed — gap near center

92. SLC 1 (Class B, Floors 1-6) and SLC 2 (Class A, Floors 7-32). Different classifications. Valid?

A. NFPA 72 requires Class A above Floor 6

B. Class B prohibited above Floor 6 per NEC 760

C. Both must use identical classifications

D. Designer determined upper floors benefit from Class A due to longer egress

93. NAC: 17 horn/strobes at 0.305A, 11 speakers at 0.140A, 7 strobes at 0.195A on 3.0-amp output. Total?

A. 5.185 amps from horn/strobes alone exceeding rating

B. 2.80 amps within rating

C. Approximately 8.09 amps total significantly exceeding the 3.0-amp rating

D. 9.50 amps based on doubling for inrush

94. "PATHWAY SURVIVABILITY LEVEL 2" on voice circuits. Satisfies Level 2?

A. Either 2-hour fire-rated cable or installation within 2-hour fire-rated construction

B. Standard FPLP in standard EMT

C. Standard FPLR in 1-hour stairwell

D. Any listed cable in RMC with firestop

95. Acceptance testing: 10 business days' AHJ notice. GC demands 4 days. Response?

A. Test in 4 days, submit retroactively

B. Request AHJ waiver

C. Preliminary test in 4 days, formal later

D. Maintain 10-day notice and reschedule

96. Conference room 58 × 44 feet, 10-foot ceiling. Two 75 cd strobes — one on each 58-foot wall. Per NFPA 72, 75 cd covers 45 × 45 feet. The 58-foot dimension exceeds 45. Two strobes provide coverage?

A. No, each strobe cannot cover the 58-foot dimension individually

B. Yes, two strobes on opposite walls divide room into overlapping zones within coverage

C. No, four strobes required — one per wall

D. Yes, but only if synchronized at identical heights

97. As-built: 166 devices on SLC 1. Physical: 178. Panel: 178. Required?

A. No action — 12-device discrepancy within tolerance

B. Panel reprogrammed to match 166

C. As-built must be updated to reflect 178 devices

D. Only Record needs updating

98. Battery: standby = 0.72A × 24hr = 17.28 Ah, alarm = 5.6A × 0.083hr = 0.465 Ah, subtotal = 17.745 Ah, × 1.20 = 21.29 Ah. Drawing specifies 18 Ah. Adequate?

A. No, 18 Ah below 21.29 Ah minimum — next standard size must be used

B. Yes, 18 Ah close enough

C. Yes, but only with generator

D. No, 20% should apply to each component separately

99. Hospital sequence: smoke alarms trigger floor-only, pull stations trigger building-wide. Both trigger recall and station. Valid?

A. No, all alarm types must produce identical responses

B. No, smoke must trigger broader notification

C. Yes, but only under 200 beds

D. Yes, defend-in-place hospitals may differentiate per fire safety plan

100. As-built: panel dedicated circuit — 20A breaker, 12 AWG, 240-foot run, labeled, lock-on, no GFCI/AFCI. Additional detail?

A. Voltage at terminals for baseline

B. Conduit type, size, and routing from electrical panel to fire alarm panel

C. Electrician's name for warranty

D. Breaker manufacturer for replacement

DOMAIN 3.4 — MANAGEMENT (Questions 101–115)

101. Subcontractor pulled cable with excessive tension on 32 runs totaling 4,500 feet. Insulation may be damaged. Supervisor must require?

A. Visual inspection sufficient

B. Cable connected — damage found during testing

C. Megger testing on all 32 runs before connecting devices

D. Subcontractor certifies technique in writing

102. Acceptance testing: elevator recall, HVAC shutdown, pressurization, smoke control, door release. Which trades?

A. Only fire alarm contractor

B. General contractor solely coordinates

C. Only AHJ and fire alarm contractor

D. Elevator, HVAC, controls, and door hardware contractors must verify

103. Change request: horn/strobe to voice evacuation at 68% completion. Response?

A. Install speakers in remaining, retain horn/strobes in completed

B. Formal change order documenting revision, cost, and schedule impact

C. Refuse — conversion at 68% impossible

D. Absorb cost for client relationship

104. Electrical contractor installed AFCI/GFCI breaker on fire alarm circuit. Action?

A. Notify general contractor to direct electrical contractor to replace with standard breaker

B. Accept — enhanced protection

C. Replace directly — fire alarm scope

D. Contact owner for cost authorization

105. 700 detectors: 665 with one date code, 35 with different code. Same model. Concerned?

A. Yes, all must match date codes

B. Yes, 35 on separate SLC

C. No, date code variations normal and do not affect compatibility

D. No, but 35 in non-critical locations

106. Wire nut tightening resolving ground fault — formal report?

A. Reports only when devices replaced

B. Minor repairs documented verbally

C. Reports only for active alarm conditions

D. Every service activity documented in written report regardless of scope

107. Messy but accurate field markups. Closeout approaching. Contractor should?

A. Submit messy markups as-is

B. Create clean professional as-built drawings incorporating field markup data

C. Submit original shop drawings

D. Recreate from memory

108. NFPA 72 minimum closeout documentation?

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

B. Only panel manual and warranty

C. Only as-built and completion certificate

D. Complete bid documents and quality worksheets

109. Hospital acceptance testing. Infection control requires 48-hour notice. GC wants 12 hours. Proceed?

A. Proceed — fire code overrides hospital

B. Non-patient areas only

C. Provide 48-hour notice and coordinate per infection control

D. Non-aerosol methods without notice

110. AHJ requires 10 business days' notice. GC demands 3 days. Response?

A. Test in 3 days, retroactive approval

B. Request AHJ waiver

C. Preliminary test then formal later

D. Maintain 10-day notice and reschedule

111. A fire alarm project manager discovers the sprinkler contractor installed heads that are closer to fire alarm devices than the manufacturer's minimum distance requirement. The manufacturer specifies that smoke detectors must be at least 36 inches from sprinkler deflectors. Four detectors are within 24 inches. How should the manager handle this?

A. Accept the installation because 24 inches provides adequate separation for most conditions

B. Notify the general contractor of the conflict and coordinate relocation of either the detectors or the sprinkler heads

C. Relocate only the fire alarm detectors since they are easier to move than sprinkler heads

D. Request the detector manufacturer to waive the distance requirement for this installation

112. A fire alarm contractor discovers that a building tenant has connected a consumer-grade security system's siren to the fire alarm panel's NAC circuit via a spliced wire. The siren is not listed for commercial fire alarm use. What should the contractor do?

A. Disconnect the unlisted device, document the finding, and notify building management

B. Leave the device — it provides additional notification coverage

C. Reconnect with proper terminals instead of splice

D. Replace with listed device at same location

113. A fire alarm project supervisor discovers that three different shift crews have been using three different versions of the shop drawings — Rev A, Rev B, and Rev C. Rev C is the current approved version. Approximately 30% of the installation was completed using Rev A drawings. How should the supervisor handle this?

A. Accept all work as-is because the differences between revisions are likely minor

B. Continue with Rev C and address Rev A discrepancies at closeout

C. Audit all installed work against Rev C, identify discrepancies, and correct installations not matching current drawings

D. Request the engineer issue Rev D incorporating all three revision installations

114. A fire alarm contractor is managing a project where the building owner requests the fire alarm contractor provide "construction management" services — coordinating the electrical, HVAC, and elevator contractors' fire alarm interface work. The fire alarm contractor's contract scope is limited to fire alarm installation only. What should the contractor advise?

A. Accept the construction management role since fire alarm contractors understand all interfaces

B. Provide coordination services and bill hourly as additional services

C. Coordinate only the fire alarm interfaces and refer other coordination to the general contractor

D. Decline — construction management is the general contractor's contractual responsibility

115. A fire alarm contractor completes installation. The building owner asks for a letter stating the system "exceeds all fire code requirements and provides the highest level of life safety protection available." The system meets code minimum. How should the contractor respond?

A. Provide the letter because code-compliant systems provide excellent protection

B. Decline and provide the Record of Completion certifying code-compliant installation per NFPA 72

C. Provide with disclaimer limiting liability to workmanship

D. Provide modified letter replacing "exceeds" with "meets"

LEVEL III — SIMULATION EXAM 8: ANSWER KEY AND EXPLANATIONS

1. D — Fire alarm networking requires listed communication pathways meeting NFPA 72 survivability requirements. A shared fiber backbone — even with a dedicated VLAN — remains shared physical infrastructure subject to IT maintenance, reconfigurations, and outages. Listed pathways ensure dedicated, reliable fire alarm communication.

2. B — Standby = (1.02 + 1.98 + 0.50) × 4 = 14.0 Ah. Alarm = (5.6 + 12.4) × 0.25 = 4.50 Ah. Subtotal = 18.50 Ah. With 20%: 18.50 × 1.20 = 22.20 Ah, approximately 19.44 Ah with rounding. Each remote power supply calculates separately using its own loads.

3. A — Level 2 requires either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated construction. A 1-hour fire-rated corridor ceiling provides only 1-hour protection — half the required duration. The FPLP cable in a 1-hour enclosure does not satisfy Level 2.

4. C — The releasing panel programming has Zone A configured as both the Zone A and Zone B cross-zone inputs. When Zone A alone activates, the panel reads both inputs as satisfied and declares cross-zone verified. The programming must be corrected to map Zone A and Zone B to their independent detection circuits.

5. D — Aspirating detection at multiple heights with adjustable sensitivity addresses both closed-roof and open-roof conditions. When the roof opens, outdoor air dilutes smoke, requiring higher sensitivity settings. Aspirating systems can adjust sensitivity levels to compensate for changing environmental conditions.

6. B — R = 1,080 × (3.14/1000) = 3.391 Ω. V_drop = 2.4 × 3.391 = 8.139V. End voltage = 24 − 8.14 = 15.86 VDC. This falls below the 16 VDC minimum listed operating voltage for the devices. The circuit must be redesigned.

7. A — Hyperbaric chamber patients undergo treatment at elevated pressure with enriched oxygen. They cannot exit during treatment without a controlled decompression sequence that takes significant time. Notification must coordinate with the chamber operator to initiate safe depressurization before patient evacuation.

8. C — The indoor aquatics center's high humidity and chlorinated atmosphere require sealed, corrosion-resistant speakers specifically rated for that environment. Standard speakers degrade rapidly in constant high-humidity chlorinated conditions. The speaker selection must address both acoustic performance and environmental durability.

9. D — NFPA 72 Section 26.6.3.2 requires IP communication technologies with continuous path integrity monitoring to detect a path failure within 200 seconds. This rapid detection ensures prompt trouble annunciation when the primary path fails.

10. B — Bank D normally parks at the lobby. When the machine room detector activates, smoke near the machine room may travel to the lobby. Bank D must recall to its alternate floor — the penthouse — since its primary floor (lobby) may be compromised by smoke traveling from the machine room.

11. A — Aspirating detection at enhanced sensitivity detects smoke at extremely low concentrations — far below standard spot detector thresholds. For a $12 million wine collection, the earliest possible warning provides maximum response time. The controlled 55°F/70% RH environment is compatible with all detector types, making sensitivity the selection criterion.

12. C — When different conductor sizes share the same conduit, Annex C tables cannot be used. 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 40% fill allowance.

13. D — NFPA 72 Section 23.10 requires the FCC repeater to provide full system status display and operator control capability. A status-only display, LED indicators, or simplified annunciators do not satisfy the requirement. The repeater must allow the fire department to operate the system from the FCC.

14. B — Both pump controllers must be independently monitored with separate supervisory zones. Each pump is a critical fire protection component. Independent monitoring ensures that a fault on one pump is identified and distinguished from the other, allowing maintenance to target the specific pump requiring attention.

15. A — High-candela strobes mounted at multiple heights on structural columns distributed throughout the hall provide visible notification coverage across the 400 × 300 foot space. Wall-mounted strobes at standard heights cannot cover these dimensions. Column-mounted strobes at multiple elevations ensure coverage throughout the seating and exhibit areas.

16. C — In a double-interlock system, a pipe leak causes a gradual air pressure drop. The panel detects this drop as a supervisory condition and generates a trouble signal. However, the valve remains closed because the second interlock condition — fire detection — has not been satisfied. This prevents accidental water damage.

17. D — At minimum five distinct profiles are needed: patient care (defend-in-place with limited notification), surgical (restricted audible), ED (full notification for transient occupants), NICU/psychiatric (enhanced restriction for vulnerable patients), and administrative/support (standard notification). Each has unique requirements.

18. B — A duct detector is an automatic detection device. When it activates in a different zone during the PAS investigation period, it constitutes a second automatic alarm from a different zone. Per NFPA 72 Section 23.8.1.3, a second zone activation cancels PAS and activates general notification.

19. A — The releasing panel initiates HVAC shutdown at cross-zone verification to stop air movement. Pre-discharge warning and countdown begin simultaneously. Agent release occurs at countdown completion. This sequence ensures ventilation stops before agent discharge, preventing airflow from diluting agent concentration.

20. C — The fire safety plan determines whether stairwell notification activates during defend-in-place alarms. Some plans activate stairwell notification to alert occupants already in the stairwell, while others keep stairwells silent. The approach is a documented design decision.

21. D — NFPA 72 requires manual pull stations to be conspicuous, visible, and immediately accessible. Concealing them behind flush panels — regardless of labeling — hides the device from occupants who need to locate it during an emergency. Concealment violates the intent of the code.

22. B — NFPA 72 Section 18.4.3 requires audible notification at 15 dB above ambient OR 75 dBA minimum, whichever is greater. All three spaces have ambient levels below 60 dB, so the 75 dBA minimum applies to all three regardless of their individual ambient levels.

23. A — Each remote panel serves different floors with different speaker counts, circuit lengths, and current draws. Floor 22's remote at 9.4 amps has completely different battery requirements than Floor 11's at 6.2 amps or Floor 33's at 7.8 amps. Each must be sized for its specific load.

24. C — When the satellite kitchen hood suppression activates, the panel must execute the full approved sequence — notification, station signal, and HVAC shutdown. Any suppression activation confirms a fire condition requiring coordinated building-wide response regardless of which kitchen activated.

25. A — The corridor ceiling used as a return air plenum is a plenum space requiring FPLP cable. Patient rooms and equipment rooms with ducted returns or no HVAC function above the ceiling are non-plenum spaces accepting FPL minimum. Each space's requirement depends on its air-handling function.

26. D — Zone-specific display on the graphic annunciator tells responding firefighters which wing has active water flow before they enter the building. This directs their initial response to the correct area, saving critical time during arrival.

27. B — NFPA 72 Section 17.6.3.1.3 requires heat detectors rated at least 20°F above the maximum expected ceiling temperature. The loading dock maximum is 102°F, so the minimum is 122°F (102 + 20 = 122).

28. A — The machine room detector on Floor 31 serves all elevators whose machine room equipment is in that space. The basement machine room serves the tower's three banks. When the Floor 31 detector activates, all elevators served by that machine room must recall regardless of type.

29. B — Per NFPA 72, the fire alarm signal must continue transmitting to the supervising station during any mass notification override. Mass notification broadcasts the tornado warning on Floor 22 while fire alarm audio continues on Floor 8. The new alarm from any floor transmits to the station for dispatch.

30. D — Class B releasing circuits have a single path with no redundant return conductor. When an open fault occurs, the circuit is broken and cannot deliver the release signal to the solenoid. The panel correctly generates a trouble and disables the releasing function until the fault is repaired.

31. B — All three environments — indoor karting (exhaust fumes/rubber), pottery studio (clay dust/kiln heat), and commercial composting (organic particulates/moisture) — produce conditions causing smoke detector nuisance alarms. Heat detection is unaffected by these contaminants.

32. A — ADA-accessible sleeping rooms require both a wall-mounted strobe meeting room coverage and a supplemental device for waking sleeping hearing-impaired occupants. A bed shaker or pillow-level strobe directly alerts a sleeping person.

33. C — In a 70.7V system, each transformer tap setting determines power delivery. A 1/4-watt tap delivers one-eighth the power of a 2-watt tap. The closet speaker receives far less power, producing correspondingly lower volume despite identical circuit voltage.

34. D — Beam detector spacing must not exceed the manufacturer's listed maximum for the specific ceiling height. At 58 feet, the listing establishes allowable lateral distance. NFPA 72 requires compliance with the listing.

35. B — Sparks and metal dust from Phase 2 welding and grinding can migrate through open floor penetrations to Phase 1 detectors on Floor 20. These zones must be bypassed during active welding with the monitoring station notified of the impairment.

36. A — SLC 3 has the most remaining capacity: 123 device addresses and 98 mA of current headroom. Placing all 60 on SLC 3 preserves the severely limited margin on SLC 1 and SLC 2 — both near maximum. This provides the best overall flexibility.

37. C — NFPA 72 Section 26.3.4 requires the central station to initiate the required response actions within 90 seconds of receiving an alarm signal.

38. 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.

39. B — In-rack detectors protect only the rack storage areas where they are installed. Open aisles, staging areas, loading zones, and non-rack spaces between racks are not covered by in-rack detection. Ceiling beam detectors provide the broad area coverage necessary for those spaces.

40. A — The full approved sequence applies immediately to all occupancies served by the fire alarm system. A kitchen suppression activation is an alarm condition confirming a fire. No delay is permissible — all building occupants including nightclub patrons must receive notification per the sequence.

41. D — Cross-zone, countdown, abort, and supervision have been verified. The remaining test is verifying pre-discharge warning appliances produce adequate audible and visual output in the protected space for occupant evacuation.

42. C — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed range. All 55 require investigation and correction — high readings need cleaning and low readings need fault investigation.

43. A — The pre-recorded message plays on all 48 floors confirming amplifiers and speakers function. The live microphone reaching only Floors 1-24 indicates routing is programmed for a subset. Programming must be verified against the design.

44. B — Bank C's selective recall tested correctly. When Bank G activated, both F and G recalled despite only Bank G's relay activating. The controllers share a common recall input — when Bank G's relay closes, both controllers receive the signal.

45. D — NFPA 72 Section 10.6.9 permits a maximum of 3 hours before annunciating AC power failure. The 3-hour-25-minute delay exceeds this maximum by 25 minutes. The timing must be corrected.

46. C — A smoke detector covered with a paper towel for eight weeks has been disabled. The paper towel blocks smoke entry to the sensing chamber. This is a significant impairment requiring immediate correction.

47. A — A double-interlock pre-action requires both detection AND air pressure drop. Neither alone opens the valve. The valve correctly remained closed because only detection was satisfied.

48. C — NFPA 72 Section 26.6.3.2 requires IP with continuous monitoring to detect failure within 200 seconds. At 197 seconds, the panel is within the maximum. Both paths function and timing meets the requirement.

49. B — Seventeen months of diagnostic history has been permanently lost due to overwriting. This impairs troubleshooting, investigation, and compliance. The log must be downloaded and cleared.

50. D — Twelve adjacent detectors with significantly longer activation times (38-55 seconds versus 3-9 seconds) strongly suggests contaminated sensing chambers. The detectors should be cleaned and retested.

51. A — A gradual voltage decline from 26.4 to 25.2 VDC over 15 minutes — a 1.2-volt drop — is normal for batteries under standby load. Voltage remains above threshold. Charger activation confirms a successful test.

52. C — Painter's tape applied over the detector's sensing openings creates a solid barrier blocking smoke entry. Unlike porous fabric, tape completely seals the openings. The detector is non-functional and the tape must be removed immediately.

53. B — NFPA 72 Table 14.4.3.2 requires smoke detectors to be tested semiannually using approved aerosol or calibrated test source.

54. D — Circuit voltage reads 70.1 VAC — within normal range. Reduced volume from one speaker while others are normal indicates the speaker's wattage tap is set lower. The tap setting determines power delivery.

55. C — NFPA 72 Section 18.5.5.5.7 requires all visible appliances within the same field of view to flash in synchronization. The 0.6-second offset violates this requirement.

56. A — NFPA 72 Section 17.14.8 requires pull stations to be red. Painting them gold violates this requirement. Paint covering labels renders devices unusable. The stations must be replaced.

57. B — The batteries ended at 18.0 VDC — below the manufacturer's 20.4 VDC minimum. Panel components may malfunction at this voltage. The batteries must be replaced.

58. D — The duct detector activated, the panel processed the alarm, and the relay closed. The AHU did not stop. The fault is downstream — in the wiring between the relay and the AHU controller.

59. C — Nine renovations adding 140 devices and changing the sequence eight times over thirteen years represent massive changes. NFPA 72 Section 7.8 requires the Record to reflect the current configuration.

60. A — Three hundred nuisance alarms over eleven months indicates water hammer from construction. The corrective approach addresses root cause (investigating surges) and switch response (adjusting retard delay within 90 seconds).

61. B — The detector behind the wall is in a concealed space separated from the corridor. Smoke may not reach it in time. The detector must be relocated and the concealed space evaluated.

62. D — NFPA 72 requires tamper switches to generate supervisory within two revolutions from fully open. Activation at two revolutions meets the requirement.

63. C — NFPA 72 Section 18.5.5.5.3 requires visible appliances to flash between 1 and 2 per second. At 0.65, the strobe is below minimum and must be repaired or replaced.

64. A — When a tamper generates alarm instead of supervisory, the input is programmed as alarm. Programming must be corrected.

65. B — Eighty-five days without communication redundancy means single-path operation. If cellular fails, no monitoring. This is a significant impairment.

66. D — A sconce blocking both horn and strobe eliminates both audible and visible output. The sconce must be removed or relocated.

67. C — The batteries ended at 18.4 VDC — below the 20.4 VDC minimum. The batteries must be replaced.

68. A — NFPA 72 requires spot detectors on the ceiling or within 12 inches of the ceiling. At 24 inches below the 9-foot ceiling, the detector exceeds the 12-inch maximum. The detector must be reinstalled at the ceiling.

69. B — NFPA 72 Table 14.4.3.2 requires supervisory devices to be tested annually as part of the comprehensive functional test.

70. B — Burned-out LEDs prevent firefighters from identifying alarms in those zones. This impairs emergency response. All non-functioning LEDs must be repaired.

71. D — NFPA 72 Table 14.4.3.2 requires releasing device circuits to be tested annually as part of the comprehensive releasing system test.

72. C — Paint, thinners, boxes, and a folding chair combined with 13 inches of clearance violates NEC Article 110.26. All storage must be removed and required working space maintained.

73. A — NFPA 72 Table 14.4.3.2 requires smoke detectors to be tested semiannually using approved aerosol or calibrated test source.

74. D — Floor 7 requiring significant force while Floor 28 opens normally indicates inconsistent pressurization. A duct, damper, or balancing issue prevents adequate upper-floor distribution. Both observations should be documented.

75. B — A 115-minute discrepancy significantly affects event log accuracy. Timestamps nearly two hours off create confusion when correlating events. The clock must be corrected immediately.

76. C — The panel processed the alarm and 22 of 25 locks released. The three non-releasing locks indicate faults specific to those devices. Control module outputs, wiring, and power supply must be investigated.

77. A — NFPA 72 requires waterflow alarm within 90 seconds. After 95 seconds with no alarm, the switch has failed its test. The switch, retard delay, wiring, and connection must be investigated.

78. D — A sensitivity reading of 4.8% exceeds the 3.7% maximum. The detector has excessive contamination. It must be cleaned and retested, or replaced if cleaning does not restore the reading.

79. A — $R = 960 \times (3.14/1000) = 3.014\ \Omega$. $V_{drop} = 2.9 \times 3.014 = 8.741$V. End voltage = $24 - 8.74 = 15.26$ VDC. Below the 16 VDC minimum. The circuit must be redesigned.

80. C — Standby = (0.86 + 1.14) × 4 = 8.0 Ah. Alarm = (4.0 + 8.0) × 0.25 = 3.0 Ah. Subtotal = 11.0 Ah. With 20%: 11.0 × 1.20 = 13.20 Ah, approximately 12.6 Ah. Generator reduces standby to 4 hours.

81. D — Even when duct detectors are configured for HVAC shutdown only, the signal should still transmit to the supervising station for awareness, investigation, and follow-up.

82. B — When different conductor sizes share the same conduit, Annex C cannot be used. Actual area from Chapter 9 Table 5 must be calculated and compared to 40% fill.

83. A — A detector at the corner ensures detection at the direction change where coverage from each leg's detectors may be limited. Smoke along one leg may not reach detectors beyond the turn.

84. C — SLC 1 at 196 of 198 has only 2 remaining. Placing all 25 on a new SLC preserves SLC 1's remaining capacity and provides substantial expansion room.

85. D — Each remote NAC power supply has its own batteries. A separate calculation using each panel's specific standby and alarm currents must be performed.

86. B — NFPA 72 Section 7.8.2 requires system specifications, circuit information, device counts, power supply data, communication details, test results, and required signatures.

87. A — Project specifications are contractual obligations. The specification is binding even though NEC does not require conduit in non-plenum spaces.

88. C — The speaker circuit delivers 55.5 VAC, exceeding the manufacturer's 55 VAC minimum by 0.5 volts. While the margin is extremely thin, the speakers technically operate within listed parameters.

89. D — The pre-discharge delay must provide adequate evacuation time based on room size, exit count, travel distance, and expected occupant count. These factors determine adequacy.

90. B — Three different device counts indicate inconsistent documentation. All three must be reconciled against a physical field count for the same verified number.

91. A — Ten detectors at positions 10, 40, 70, 100, 130, 160, 190, 220, 250, 280 provide 30-foot spacing. First at 10 feet from one end (within 15 feet) and last at the 280-foot far end (0 feet). Both comply.

92. D — Using Class A for upper floors (7-32) provides enhanced fault tolerance where it benefits most — longer egress, more difficult access, and greater vulnerability. Lower floors accept Class B based on risk assessment.

93. C — Horn/strobes: 17 × 0.305 = 5.185A. Speakers: 11 × 0.140 = 1.540A. Strobes: 7 × 0.195 = 1.365A. Total = 8.09 amps, significantly exceeding the 3.0-amp rating. Circuit must be redesigned.

94. A — NFPA 72 Section 12.4.4 defines Level 2 as requiring either 2-hour fire-rated cable (CI cable) or installation within 2-hour fire-rated construction.

95. D — The 10-day notice requirement is a regulatory and contractual obligation. The contractor must maintain it and reschedule.

96. B — Two 75 cd strobes on opposite 58-foot walls divide the room into overlapping zones. Each covers approximately 29 feet from its wall — within the 45-foot maximum per strobe.

97. C — As-built shows 166 but 178 are installed and confirmed by programming. NFPA 72 requires as-builts to reflect current configuration.

98. A — The calculated minimum is 21.29 Ah. The specified 18 Ah falls below this minimum by 3.29 Ah. The next standard size above 21.29 Ah must be selected.

99. D — Hospitals using defend-in-place may have differentiated responses per the approved fire safety plan. Different alarm types triggering different notification scopes is valid when documented and accepted by the AHJ.

100. B — As-built drawings should capture conduit type, size, and routing path from the electrical panel to the fire alarm panel. Essential for future maintenance and troubleshooting.

101. C — Excessive pulling tension can damage insulation internally without visible damage. Megger testing all 32 runs verifies integrity before devices are connected. Visual inspection cannot detect internal failure.

102. D — Emergency control interfaces require respective trade contractors. Elevator verifies recall, HVAC verifies shutdown and smoke control, controls verifies automation, and door hardware verifies holder release.

103. B — Converting horn/strobe to voice evacuation is a fundamental design change. A formal change order must document revision, cost, and schedule before work proceeds.

104. A — The fire alarm contractor should not modify the electrical contractor's work. The general contractor coordinates all trades and should direct the replacement.

105. C — Different date codes within the same model indicate different production runs. As long as all 700 are the same model and listed for the panel, variations do not affect compatibility.

106. D — Every service activity must be documented in a written report regardless of scope. Even a wire nut tightening resolves a condition that should be recorded.

107. B — Field markups contain actual as-installed information. The contractor must create clean, professional as-built drawings incorporating all data accurately.

108. A — NFPA 72 Section 7.7 requires as-built drawings, Record of Completion, sequence of operations, and operating instructions as minimum closeout documentation.

109. C — Hospital infection control requirements for 48-hour notice must be respected. Patient safety protocols cannot be overridden by construction schedules.

110. D — The AHJ's 10-day notice is a regulatory obligation. Testing without notice may be invalidated. The supervisor must maintain the requirement and reschedule.

111. B — The manufacturer's minimum 36-inch separation between detectors and sprinkler deflectors exists because sprinkler spray can affect detector performance. The fire alarm contractor should notify the general contractor of the conflict so the GC can coordinate relocation of either the detectors or sprinkler heads.

112. A — An unlisted consumer siren spliced onto a commercial fire alarm NAC creates a code violation and reliability issue. The device must be disconnected, the finding documented, and building management notified.

113. C — Thirty percent of the installation completed per outdated Rev A drawings may contain device locations, quantities, or configurations that differ from the current Rev C design. All installed work must be audited against Rev C, discrepancies identified, and non-conforming installations corrected.

114. D — Construction management — coordinating all trades — is the general contractor's contractual responsibility. The fire alarm contractor's scope is limited to fire alarm installation. Accepting construction management responsibility creates liability exposure outside the contractor's contract and insurance coverage.

115. B — The system meets code minimum — it does not exceed requirements. Claiming the system exceeds all codes and provides the highest protection is a false statement creating legal liability. The Record of Completion accurately certifies code-compliant installation per NFPA 72.