LEVEL III — SIMULATION EXAM 10 (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 hospital campus with eight buildings. The campus has an existing fiber optic backbone owned and maintained by the hospital IT department. The IT director offers a dedicated dark fiber pair exclusively for fire alarm use — no shared traffic, dedicated physical strands. Per NFPA 72, is this acceptable?

A. No, any cable owned by the IT department is considered shared infrastructure

B. A dedicated dark fiber pair with no shared traffic may be acceptable if the pathway meets NFPA 72 listing and survivability requirements

C. Yes, dark fiber automatically satisfies all NFPA 72 network requirements

D. No, fire alarm networking must use cable purchased and installed by the fire alarm contractor

2. A fire alarm designer calculates batteries for a voice evacuation system with a qualifying generator. Main panel loads: panel/SLC standby = 1.15A, voice standby = 1.85A, network = 0.50A. Alarm: NAC = 6.8A, voice = 13.2A. Using 4-hour standby, 15-minute alarm, 20% safety factor, what is minimum main panel capacity?

A. 18.00 Ah without the safety factor

B. 30.00 Ah using 24-hour standby

C. 22.20 Ah using 5-minute alarm

D. Approximately 21.60 Ah after applying all factors

3. A fire alarm designer specifies Level 2 pathway survivability for a 50-story high-rise. CI cable is used for all riser circuits. At Floor 30, both outgoing and return paths run through a common unrated equipment room spanning 80 feet. The paths are in separate conduits within the room. What is the impact?

A. Level 2 maintained by CI cable but Class A diversity compromised at the shared equipment room

B. Both Level 2 and Class A lost because CI cable requires rated construction

C. Both maintained because separate conduits constitute separate paths

D. Level 2 lost but Class A maintained because separate conduits create separate paths

4. A fire alarm designer specifies cross-zone releasing for a clean agent system. During commissioning, the panel shows "CROSS-ZONE VERIFIED" after only Zone A activates. Zone B shows normal status with no alarm. The panel immediately begins the pre-discharge countdown. What is the most likely cause?

A. Zone B's detector has drifted into a permanent alarm-threshold condition

B. The releasing panel firmware has a known timing bug

C. Zone A is programmed as both the Zone A and Zone B cross-zone inputs in the panel

D. Zone B's end-of-line resistor value matches the alarm resistance threshold

5. A fire alarm designer specifies detection for a 140-foot atrium in a convention hotel. The atrium has a fabric tensile roof structure, water features at the base, and glass-walled elevators. Aesthetic restrictions prohibit equipment on the fabric roof, glass walls, or elevator shafts. What detection is most appropriate?

A. Projected beam detectors mounted behind elevator shaft trim at three heights

B. Aspirating detection with sampling pipes concealed in the structural cable channels at multiple heights

C. Ceiling-mounted detectors suspended from the fabric structure on aircraft cable

D. Flame detection aimed at the water feature base area

6. A fire alarm designer calculates NAC voltage drop: 14 AWG (3.14 Ω/1000 ft), round-trip 1,120 feet, 2.3 amps on 24 VDC. End voltage?

A. 21.50 VDC with generous margin

B. 16.91 VDC with thin margin requiring evaluation

C. 24.0 VDC — negligible drop at this current level

D. 15.91 VDC — below 16 VDC minimum requiring redesign

7. A fire alarm designer develops the sequence for a hospital with defend-in-place. The facility includes a pharmacy compounding cleanroom where sterile medications are prepared under ISO Class 5 conditions. HVAC shutdown would compromise sterility of in-progress medications worth potentially millions. What design consideration applies?

A. The compounding cleanroom requires a separate HVAC zone that shuts down only when detection activates within the cleanroom itself

B. HVAC cannot be shut down in any pharmacy area under any circumstance

C. The cleanroom HVAC shuts down per standard sequence regardless of medication value

D. Only the HEPA filtration shuts down — room air handling continues

8. A fire alarm designer evaluates speech intelligibility. STI 0.50 minimum. Three spaces: an indoor shooting range (extreme impulse noise plus lead dust), a commercial car wash tunnel (water spray noise plus humidity), and a hospital pneumatic tube station room (constant mechanical noise from tube system). Which requires the most specialized environmental consideration?

A. The shooting range because impulse noise requires hearing protection making audible notification impractical

B. The pneumatic tube room because the mechanical noise frequency specifically masks speech

C. The car wash tunnel because water spray and humidity require waterproof speaker construction rated for direct spray

D. All three require identical specialty speaker selections

9. A fire alarm designer specifies communication for a high-rise. The building has dual-path IP/cellular. During commissioning, both paths test successfully. Six months later, building renovations add a metal mesh security screen around the mechanical penthouse where the cellular antenna is located. Cellular signal drops to zero. Per NFPA 72, what must happen?

A. The cellular path can be abandoned since the IP path functions

B. The building owner must restore cellular functionality — the metal screen must be modified or the antenna relocated

C. The IP path alone satisfies the code since it was commissioned as dual-path

D. The AHJ must approve single-path operation before any action is required

10. A fire alarm designer develops elevator recall. A building has five elevator banks. Banks A-D serve a 35-story tower. Bank E is a shuttle elevator serving only Floors 1 and 2 for a conference center on Floor 2. Bank E has no machine room — it uses an MRL configuration with drive equipment in the hoistway. When the MRL drive area detector activates, what is Bank E's recall requirement?

A. Bank E is exempt from recall because shuttle elevators serving two floors have no viable alternate

B. Bank E recalls to Floor 1 as its primary floor since the drive detection triggers primary recall

C. Bank E must shut down rather than recall

D. Bank E recalls to Floor 2 as its alternate floor since smoke may travel to Floor 1

11. A fire alarm designer specifies detection for a semiconductor fabrication cleanroom. The facility maintains ISO Class 1 air quality with laminar flow HEPA/ULPA filtration removing virtually all airborne particles. Standard detectors would not activate because smoke particles are filtered before reaching them. What technology addresses this?

A. Aspirating detection with sampling points upstream of the HEPA filters in the return air stream

B. Standard photoelectric detectors at triple density spacing

C. Heat detection because thermal energy passes through filtration

D. Projected beam detectors spanning the cleanroom above the laminar flow ceiling

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

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. The building owner asks whether the FCC repeater panel must be the same manufacturer as the main panel. Per NFPA 72, what is correct?

A. Any manufacturer's repeater can serve as the FCC display if it connects via open protocol

B. The repeater must be listed as compatible with the main panel — typically the same manufacturer

C. NFPA 72 does not specify manufacturer requirements — any UL-listed repeater qualifies

D. The repeater and main panel must have identical firmware versions regardless of manufacturer

14. A fire alarm designer specifies fire pump monitoring. The building has an electric primary and diesel backup. The diesel controller provides running, power, phase reversal, trouble, low fuel, high temperature, failure to start, and low oil pressure. Per NFPA 72, how should "low oil pressure" be classified?

A. As an alarm because low oil pressure will cause engine seizure preventing pump operation

B. As a trouble signal because it affects the fire alarm system's reliability

C. Low oil pressure monitoring is optional — not required by NFPA 72

D. As a supervisory signal because it is an off-normal condition requiring investigation

15. A fire alarm designer specifies visible notification for a large indoor arena with a retractable roof. When the roof is open, natural daylight floods the seating bowl potentially washing out strobe visibility. What design consideration is critical?

A. Strobe candela must be calculated for the worst-case open-roof daylight condition to ensure visibility

B. The retractable roof position has no effect on interior strobe calculations

C. Visible notification is not required when the roof is open because the venue becomes outdoor

D. Only exit-mounted strobes are required — seating bowl strobes are optional for arenas

16. A fire alarm designer develops a pre-action releasing system. The specification calls for single-interlock with cross-zone detection. The building engineer asks what operational benefit cross-zone provides on a single-interlock system. What is correct?

A. Cross-zone is prohibited on single-interlock — only double-interlock uses cross-zone

B. Cross-zone detection adds no benefit because single-interlock always requires both detection and pressure drop

C. Cross-zone reduces false valve openings by requiring two independent detection zones to confirm before the valve opens

D. Cross-zone on single-interlock converts the system to double-interlock operation

17. A fire alarm designer specifies the system for a 500-bed hospital with defend-in-place. The hospital has patient care floors, surgical suites, an ED, a NICU, a psychiatric unit, an outpatient clinic, and administrative offices. How many distinct alarm response profiles are needed at minimum?

A. One universal profile with zone adjustments

B. At least seven — patient care, surgical, ED, NICU, psychiatric, outpatient, and administrative

C. Three — patient care, critical care, and administrative

D. Twenty — one per floor

18. A fire alarm designer develops PAS for a commercial building. During the 180-second investigation, a sprinkler waterflow switch activates in a different zone. Per NFPA 72, what must happen?

A. PAS continues because waterflow is a supervisory signal

B. PAS extends by 180 seconds for the waterflow zone

C. PAS restarts using waterflow as the new reference

D. PAS must cancel and general notification must activate

19. A fire alarm designer specifies the releasing circuit for a clean agent system. The sequence requires: HVAC shutdown, door closure, damper closure, pre-discharge warning, countdown, and agent release. The engineer asks whether door closure and HVAC shutdown can occur simultaneously. What is correct?

A. Yes, both occur at cross-zone verification — before the countdown begins

B. HVAC shutdown must complete before doors close to prevent pressure differential damage

C. Doors must close before HVAC shutdown to contain smoke in the protected space

D. HVAC and door closure cannot share the same releasing panel output

20. A fire alarm designer specifies the system for a 48-story residential tower using defend-in-place. The building has a rooftop pool deck, a ground-floor lobby, and a parking garage on Levels B1-B3. A smoke alarm on Floor 35 notifies Floors 34-36. The HOA asks whether the rooftop pool, lobby, and garage should be notified. What determines the answer?

A. The lobby is always notified regardless of defend-in-place floor selection

B. All common areas must be notified whenever any floor is in alarm

C. The fire safety plan determines notification scope for all areas including common spaces

D. Only the alarm floors are notified — common areas are never included

21. A fire alarm designer specifies white devices per architect request. The architect also proposes painting the mounting plates of all notification appliances white. Per NFPA 72, is painting mounting plates acceptable?

A. No, notification appliance mounting plates must remain manufacturer's standard color

B. Yes, mounting plates have no code-mandated color requirement — painting is acceptable

C. Yes, but only if the appliance lens remains unpainted for proper light output

D. No, painting any fire alarm component voids the device listing

22. A fire alarm designer develops notification for a large data center. Server aisles have 85 dB ambient from cooling fans. The UPS room has 75 dB ambient. The network operations center (NOC) has 55 dB ambient. Per NFPA 72, what minimum audible levels apply?

A. Aisles: 85 dB, UPS: 75 dB, NOC: 55 dB — matching ambient

B. Aisles: 100 dB, UPS: 90 dB, NOC: 70 dB — all at 15 dB above ambient

C. All three: 75 dBA minimum regardless of ambient

D. Aisles: 100 dB, UPS: 90 dB, NOC: 75 dBA — mixed criteria applying the higher of 15 dB above ambient or 75 dBA

23. A fire alarm designer evaluates voice evacuation for a 50-story building. Remote amplifiers on Floors 10, 20, 30, 40, and 50. Each has own batteries. Floor 40's remote serves Floors 36-44 with 10.2 amps alarm. Floor 10's serves Floors 6-14 with 6.4 amps. Why must each have separate battery calculations?

A. Each serves different floor counts with different speaker loads — individual sizing is required

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

C. Only the highest-load remote needs calculation — others use the same size

D. NFPA 72 requires identical batteries at all locations

24. A fire alarm designer specifies the kitchen hood suppression interface. A hotel has a main kitchen, a banquet kitchen, and a pool bar kitchen. Each has independent hood systems with separate monitor modules. When the pool bar hood activates, what must the panel initiate?

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

B. Only pool bar local notification because the main and banquet kitchens are unaffected

C. Only station signal because pool bar is a secondary kitchen

D. Pool bar and main kitchen hoods must both activate for coverage

25. A fire alarm designer specifies cable for a hospital. The corridor above the ceiling is a return air plenum. The MRI suite has a dedicated isolated HVAC system (non-plenum). The lobby has no HVAC function above the ceiling (non-plenum). What cable types are required?

A. FPLP in all three because hospital environments require plenum cable

B. FPL in all three because sprinklers reclassify plenums

C. FPLP in the corridor plenum and FPL minimum in the MRI suite and lobby

D. FPLP in corridor and MRI, FPL in lobby only

26. A fire alarm designer specifies the system for a building with fourteen sprinkler risers — twenty-eight zones total. The fire captain asks whether waterflow and tamper signals from all fourteen risers can be consolidated onto two panel zones — one for all waterflow and one for all tamper. Per NFPA 72, is this acceptable?

A. Yes, consolidation simplifies panel programming and reduces annunciation clutter

B. No, individual zones for each device provide specific riser identification essential for emergency response

C. Yes, if the graphic annunciator provides riser-specific identification separately

D. No, NFPA 72 requires a minimum of four zones per riser

27. A fire alarm designer specifies heat detection for a cold storage facility. Walk-in cooler at 34°F. Blast freezer at -45°F. Loading dock fluctuates 0°F to 106°F. Per NFPA 72, minimum activation temperature for the loading dock?

A. 135°F — standard commercial rating

B. 200°F — fluctuating environments need high-temperature ratings

C. 106°F for immediate response above maximum

D. At least 126°F to maintain the 20°F margin above the 106°F maximum

28. A fire alarm designer develops elevator recall. A building has four banks serving a 40-story tower. The machine room is on Floor 41. A smoke detector in the elevator lobby on Floor 20 activates. Per NFPA 72, what recall response is required?

A. Phase I recall to the primary designated floor for all four banks

B. Phase I recall to an alternate floor because Floor 20 has confirmed smoke

C. Only banks serving Floor 20 recall — other banks continue normal service

D. Phase I recall to Floor 20 so passengers can exit at the alarm floor

29. A fire alarm designer specifies mass notification integrated with voice evacuation. The emergency plan requires mass notification to override fire alarm audio on all floors during a building-wide chemical release. During the override, the fire alarm panel continues to receive alarm signals. Per NFPA 72, what must happen with those signals?

A. Alarm signals are queued until mass notification concludes

B. Alarm signals are discarded during mass notification override

C. Alarm signals must continue transmitting to the supervising station during any override

D. Mass notification must yield to new fire alarm signals

30. A fire alarm designer develops the releasing circuit for a pre-action sprinkler using single-interlock with Class B releasing circuits. During testing, the technician creates an intentional ground fault on the releasing circuit. The panel generates a trouble. Is this the correct response?

A. No, ground faults on releasing circuits should generate alarm signals

B. Yes, ground faults are circuit impairments requiring trouble annunciation

C. No, the panel should disable the releasing function during any ground fault

D. Yes, but only if the ground fault resistance exceeds the alarm threshold

31. A fire alarm designer specifies detection for a building with an indoor ski slope, a commercial bakery, and a rubber tire recycling plant. Each has smoke detector issues. What detection is most appropriate?

A. Aspirating detection with filtration at sampling intakes

B. Multi-criteria detectors with compensation algorithms

C. Flame detection — all three contain combustibles

D. Heat detection because all three cause smoke detector nuisance conditions

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

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

B. A ceiling strobe at 177 cd above the bed

C. A second wall strobe on the opposite wall

D. A 520 Hz generator near the bed

33. A fire alarm designer specifies voice evacuation using 70.7V. A speaker circuit has ten speakers. Nine have 2-watt transformer taps. The tenth has a 1/2-watt tap. Voltage at all speakers reads 69.5 VAC. The tenth produces noticeably lower volume. Cause?

A. The tenth speaker has a defective transformer

B. Wire run to the tenth has excessive resistance

C. The 1/2-watt tap delivers less power than the 2-watt taps

D. The small room absorbs sound preventing volume buildup

34. A fire alarm designer specifies beam detectors for a logistics hub 600 × 380 feet with 64-foot ceilings. Beams span the 600-foot dimension with 56-foot lateral spacing. What must be verified?

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

B. The 56-foot spacing does not exceed the manufacturer's listed maximum for the 64-foot ceiling

C. 56-foot spacing matches sprinkler spacing

D. 56-foot spacing does not exceed 30-foot spot detector spacing

35. A fire alarm designer develops a phased construction project. Phase 1 (Floors 1-25) is operational. Phase 2 (Floors 26-50) involves demolition and reconstruction above Phase 1. Demolition debris including concrete dust and metal particles migrates through vertical shafts to Phase 1. What coordination is required?

A. Phase 1 must shut down during demolition

B. No coordination needed — separate loops isolate phases

C. Phase 1 detectors near shafts replaced with heat detectors

D. Phase 1 zones adjacent to vertical shafts must be bypassed with monitoring station notified during demolition

36. A fire alarm designer evaluates SLC distribution. Renovation adds 70 devices at 54 mA. Three loops: SLC 1 = 197/149 mA, SLC 2 = 194/146 mA, SLC 3 = 65/44 mA (max 198/150 each). Best distribution?

A. All 70 on SLC 3 because it has the most remaining capacity

B. 1 on SLC 1 reaching 198, 4 on SLC 2 reaching 198, and 65 on SLC 3

C. Split 23/24/23 evenly across all three loops

D. 1 on SLC 1, 4 on SLC 2, and 65 on SLC 3

37. A fire alarm designer specifies the central station connection per NFPA 72 Section 26.3.4. Maximum operator response initiation time?

A. 60 seconds from receipt to acknowledgment

B. 120 seconds from receipt to fire department notification

C. 90 seconds from receipt to initiation of required response

D. 30 seconds from receipt to first dispatch contact

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

A. 30 seconds for all emergency loads

B. 10 seconds per NEC Article 700

C. 60 seconds with batteries bridging

D. 120 seconds because panels have batteries

39. A fire alarm designer specifies in-rack detection for a distribution center with 54-foot ceilings. Racks hold e-commerce inventory to within 2 feet of ceiling. In-rack detectors at 18 and 36 feet. Ceiling beams also installed. The operations manager asks whether in-rack detectors could be eliminated if ceiling beam spacing is reduced. What is correct?

A. Yes, reduced beam spacing compensates for the absence of in-rack detection

B. In-rack detectors can be eliminated only if ceiling height is below 45 feet

C. Reduced beam spacing improves ceiling detection but cannot detect fires at storage level before smoke rises 54 feet

D. In-rack detection is optional for all warehouse installations per NFPA 72

40. A fire alarm designer develops the sequence for a mixed-use building. Ground floor: urgent care clinic. Second floor: dental office. Floors 3-8: residential condos. The urgent care clinic has a medication storage room with temperature-controlled refrigerators containing vaccines. When the fire alarm activates, the sequence includes HVAC shutdown. The clinic manager asks whether the medication refrigerators will be affected. What is correct?

A. Medication refrigerators operate on dedicated circuits independent of the HVAC system — they are not affected by HVAC shutdown

B. All refrigeration must shut down during alarm per the standard sequence

C. Only commercial kitchen refrigeration is exempt from HVAC shutdown

D. The panel must have a separate output controlling medication refrigerators

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. Pre-discharge warning appliances verified for adequate output

D. Substitute load voltage measured with instrument

42. A fire alarm designer reviews sensitivity for a 16-year-old system with 950 detectors. Report: 48 above 3.7%, 20 below 0.5%. What action?

A. Only 48 high-reading need cleaning

B. All 68 out-of-range detectors require investigation and correction

C. All 950 must be cleaned — building-wide contamination

D. Panel thresholds expanded for 16-year drift

43. A fire alarm technician tests voice evacuation live microphone. Audio on Floors 1-28, not Floors 29-56. Pre-recorded plays on all 56 floors. Most likely cause?

A. Upper floor amplifiers have a fault

B. Microphone output insufficient

C. Upper floor circuits have impedance faults

D. Live microphone routing programmed for Floors 1-28 only

44. A fire alarm technician tests elevator recall. Nine banks with selective recall. Activating Bank E: only E recalls. Activating Bank I: Banks H and I both recall. Only Bank I's relay activated. Problem?

A. Controllers for Banks H and I share a common recall input

B. Panel programming activates both H and I outputs

C. Bank I's SLC interferes with Bank H's module

D. Bank I generates building-wide alarm code

45. A fire alarm technician tests AC power supervision. AC disconnected. After 2 hours 55 minutes, panel generates "AC POWER FAILURE." Per NFPA 72, acceptable?

A. No, must appear immediately

B. No, should appear within 60 minutes

C. Yes, 2 hours 55 minutes within the 3-hour maximum

D. Yes, any delay under 4 hours acceptable

46. A fire alarm technician discovers a detector covered with a rubber glove by laboratory staff. Covering in place ten weeks. Document?

A. Rubber gloves permit smoke entry — detector functional

B. Detector disabled ten weeks — significant impairment requiring correction

C. Acceptable during lab work if logged

D. Glove may remain until lab maintenance completes

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

A. No, detection should open valve as first interlock

B. No, detection should energize pilot solenoid

C. Yes, but only in maintenance mode

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

48. A fire alarm technician tests communication — IP primary, cellular secondary. IP succeeds. Disconnects IP. After 188 seconds, panel shows "IP FAILURE." Cellular succeeds. IP timing pass?

A. No, IP must detect within 60 seconds

B. Yes, 188 seconds within the 200-second maximum

C. No, but firmware can correct timing

D. Yes, 200-second limit has tolerance

49. Event log full for nineteen months. Impact?

A. Nineteen months of history lost — must be downloaded and cleared

B. Full log causes processing delays

C. Panel must be replaced

D. No operational impact

50. Semiannual detectors on Floor 26. Fourteen adjacent detectors take 42 to 60 seconds. Others: 3 to 9 seconds. Indicates?

A. SLC polling slower for those addresses

B. Aerosol can running low

C. Fourteen detectors likely have contaminated chambers

D. HVAC diluting smoke

51. Power transfer test. After AC disconnect: 0 min = 26.8V, 5 min = 26.4V, 10 min = 26.0V, 15 min = 25.6V. Charger activates. Acceptable?

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

B. No, voltage should remain constant

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

D. Yes, gradual decline normal for batteries under standby load

52. Detector covered with a piece of wax paper by cafeteria staff. Wax paper in place four weeks. Document?

A. Wax paper is translucent — detection unaffected

B. Wax paper blocks smoke entry — detector non-functional, must be removed

C. Acceptable if staff sign acknowledgment

D. May remain until nuisance source identified

53. Per NFPA 72, 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

54. Speaker on 70.7V circuit: clear but reduced volume. Circuit voltage 69.8 VAC. Cause?

A. Amplifier partial fault

B. 69.8 VAC below minimum threshold

C. Speaker's wattage tap set lower than others

D. Wire has high-resistance splice

55. Two strobes visible from same location flash 0.45 seconds apart on different NACs. Violated?

A. Flash rate — combined offset exceeds 2 per second

B. Candela — unsynchronized produces uneven coverage

C. Mounting height creates timing offsets

D. Synchronization — same field of view must flash together

56. Pull stations painted bronze in an office lobby. Paint covers housing, handle, labels. Document?

A. Stations function if activated — paint cosmetic

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

C. Only labels need restoration

D. Building should repaint red within 30 days

57. Battery test. Starting 26.4 VDC. After test, ending 17.2 VDC. Manufacturer minimum 20.4 VDC. Document?

A. Batteries failed — 17.2 below 20.4 VDC minimum

B. Passed — 17.2 exceeds industry minimum

C. Inconclusive — repeat after recharge

D. Can remain 30 days

58. HVAC shutdown test. Duct detector activates, panel processes, relay closes. AHU does not stop. Fault?

A. In duct detector — incorrect signal

B. In panel programming — output not linked

C. In wiring between relay and AHU controller

D. In SLC — module didn't receive command

59. Record of Completion last updated fifteen years ago. Eleven renovations added 160 devices, sequence changed ten times. Needed?

A. Annual testing records capture changes — optional

B. Original Record remains valid

C. New Record only if panel replaced

D. Record must be updated per NFPA 72 Section 7.8

60. System log: 350 "WATERFLOW — ALARM" entries over thirteen months, no fires. Engineer reports aging infrastructure with pressure fluctuations. Recommend?

A. Replace switches with pressure-compensated models

B. Investigate pressure source and adjust retard delay

C. Increase panel threshold

D. Disconnect switches until infrastructure repaired

61. Renovation enclosed corridor detector behind wall. Communicates normally. Document?

A. Must be relocated to occupied corridor and concealed space evaluated

B. Can remain — communicates normally

C. Panel descriptor updated for concealed position

D. Provides dual coverage

62. Tamper on OS&Y valve. Two revolutions, supervisory appears. Pass?

A. No, must activate after one revolution

B. No, requirement is one and a half revolutions

C. Yes, within two revolutions meets NFPA 72

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

63. Horn/strobe test. Temporal-three correct. Strobe at 0.4 flashes per second. Document?

A. Passes — below 2 per second acceptable

B. Rate irrelevant if candela meets coverage

C. Acceptable for sleeping areas only

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

64. Tamper generates alarm instead of supervisory. Contact confirmed. Cause?

A. Tamper requires different EOLR

B. Input programmed as alarm rather than supervisory

C. Panel cannot distinguish on same input

D. Wiring polarity reversed

65. IP primary, cellular secondary. "IP FAILURE" active 95 days. Cellular functions. Document?

A. System without redundancy 95 days — significant impairment

B. Cellular provides monitoring — not urgent

C. Repair at owner's convenience

D. No documentation needed

66. Decorative valance mounted over corridor horn/strobe blocking both outputs. Document?

A. Only strobe obstruction significant

B. Device functional if activates during testing

C. Valance blocks both outputs and must be removed or relocated

D. Building may apply for variance

67. Battery test. Starting 27.2 VDC. After test, ending 17.8 VDC. Manufacturer minimum 20.4 VDC. Document?

A. Passed — exceeds 18 VDC industry minimum

B. Inconclusive — repeat after recharge

C. Can remain 60 days

D. Failed — 17.8 below 20.4 VDC minimum

68. Detector relocated from ceiling to top of a refrigerator at 66 inches. Ceiling 9 feet. Detector 42 inches below ceiling. Per NFPA 72, acceptable?

A. Acceptable — within 48-inch tolerance for kitchen areas

B. Not acceptable — 42 inches exceeds the 12-inch maximum distance from ceiling

C. Acceptable if staff document the reason for relocation

D. Acceptable because refrigerator tops are standard mounting locations

69. Supervisory device testing frequency per NFPA 72?

A. Annually as part of comprehensive functional test

B. Monthly for valve verification

C. Semiannually to match detector schedule

D. Quarterly for consistency

70. FCC graphic annunciator: fifteen burned-out LEDs. Document?

A. LEDs cosmetic — no effect

B. Only occupied-zone LEDs need repair

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

D. Annunciator must be replaced entirely

71. Releasing circuit testing frequency?

A. Annually as part of comprehensive releasing test

B. Semiannually — more critical

C. Monthly for readiness

D. Only during initial acceptance

72. Panel room: paint, solvents, boxes, vacuum cleaner, mop. Working clearance 10 inches. Violations?

A. Only chemicals are a concern

B. Room usable if chemicals sealed

C. Only clearance violates — organized storage permitted

D. Both storage and 10-inch clearance violate NEC Article 110

73. 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

74. Stairwell pressurization test. Detector activates, fans start. Floor 10 requires significant force. Floor 32 opens normally. Document?

A. Only fan activation documented

B. Some variation expected — both pass

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

D. Only Floor 10 matters — confirms pressure

75. Panel clock: actual 3:00 PM, panel shows 12:38 PM — 142-minute discrepancy. Document?

A. 142-minute discrepancy affects log accuracy — must be corrected

B. Discrepancies under 2.5 hours within tolerance

C. Clock error only affects display

D. Only AHJ determines correction

76. Access control test. Alarm activates. 25 of 28 locks release, 3 locked. Investigate?

A. Panel programming — not in matrix

B. Access control firmware updates

C. NAC circuits — locks wired to notification

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

77. Waterflow test. Inspector's valve open, water flows. After 88 seconds, alarm appears. Per NFPA 72, pass?

A. No, must alarm within 60 seconds

B. Yes, 88 seconds within the 90-second maximum

C. No, must alarm within 30 seconds for wet-pipe

D. Yes, but 88 seconds indicates retard may be near maximum

78. Sensitivity testing. Detector reads 5.2% — above 3.7% max. Indicates?

A. Ideal for high-particulate environments

B. Acceptable — within 2% of maximum

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

D. Panel calibration drifted

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

79. NAC voltage drop: 14 AWG (3.14 Ω/1000 ft), round-trip 1,060 feet, 2.4 amps on 24 VDC. End voltage?

A. 21.50 VDC with generous margin

B. 16.02 VDC — barely above minimum with dangerously thin margin

C. 15.02 VDC — below 16 VDC requiring redesign

D. 16.02 VDC — thin margin, redesign recommended

80. Battery calc: panel/SLC standby = 0.96A, voice standby = 1.04A, NAC alarm = 4.2A, voice alarm = 7.8A. Generator. 4-hour standby, 15-minute alarm, 20% safety factor. Minimum?

A. 24.00 Ah using 24-hour standby

B. Approximately 12.96 Ah after applying all factors

C. 16.00 Ah using 5-minute alarm

D. 10.60 Ah without safety factor

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

A. Signal should transmit to station even without notification

B. Duct detectors never transmit — supervisory class

C. Reviewer incorrect — auto transmit regardless

D. Station only when configured as alarm

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

A. Compare individually — both below maximums

B. Add counts, compare to smaller max

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

D. Use 14 AWG Annex C only

83. L-shaped corridor: 260 feet longer leg, 200 feet shorter leg. Detectors at 30-foot spacing with corner detector. Corner necessary?

A. No, detectors along legs provide coverage

B. No, corner creates redundant coverage

C. Yes, but only if width exceeds 10 feet

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

84. SLC 1: 195 devices (max 198). Renovation adds 30. Advise?

A. Add 3 reaching 198, 27 on new loop

B. All 30 on new SLC to preserve remaining capacity

C. Via firmware extension

D. Consolidate with monitor modules

85. Remote NAC power supplies on Floors 13, 26, 39 of 52-story building. Each has batteries. Calculate?

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

B. Combined averaging

C. Voltage drop from main panel

D. Conduit fill for supervised circuits

86. Record of Completion per NFPA 72. Contents?

A. Only installer's license

B. Only AHJ's report

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

D. Engineer's calculations

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

A. Ignore — exceeds code

B. Conduit only in corridors

C. Request AHJ override

D. Install conduit as specified — contractual obligation

88. 70.7V speaker circuit: 55.2 VAC at farthest speaker. Manufacturer minimum 55 VAC. Pass?

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

B. Yes, 55.2 exceeds 55 VAC minimum with 0.2-volt margin — technically compliant but margin is critically thin

C. No, speakers require exactly 70.7 VAC

D. Yes, but only if amplifier can compensate

89. Releasing system: 8-second timer. Engineer questions adequacy. Determines delay?

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

B. NFPA 72 fixed 30-second minimum

C. Agent manufacturer based on concentration

D. Fire department based on response time

90. As-built: 192 devices on SLC 1. Panel: 198. Record: 184. Correct?

A. Only as-built needs updating

B. Only Record needs updating

C. Panel reprogrammed to match as-built

D. All three reconciled against physical field count

91. 300-foot straight corridor. Detectors at 30-foot spacing. First at 15 feet: 15, 45, 75, 105, 135, 165, 195, 225, 255, 285. Ten detectors. Last at 15 feet from far end. Correct?

A. No, 11 detectors needed

B. No, first and last must be at corridor ends

C. Yes, 10 detectors with 30-foot spacing and 15-foot end distances

D. Yes, but additional at intersections

92. SLC 1 (Class B, Floors 1-8) and SLC 2 (Class A, Floors 9-36). Different classifications. Valid?

A. NFPA 72 requires Class A above Floor 8

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

C. Class B prohibited above Floor 8

D. Both must use identical classifications

93. NAC: 20 horn/strobes at 0.300A, 14 speakers at 0.150A, 10 strobes at 0.195A on 3.0-amp output. Total?

A. Approximately 10.05 amps total significantly exceeding the 3.0-amp rating

B. 6.00 amps from horn/strobes alone exceeding rating

C. 2.95 amps within rating

D. 12.50 amps based on doubling for inrush

94. "PATHWAY SURVIVABILITY LEVEL 2." What satisfies?

A. Standard FPLP in standard EMT

B. Standard FPLR in 1-hour stairwell

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

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, retroactive approval

B. Maintain 10-day notice and reschedule

C. Request AHJ waiver

D. Preliminary test then formal later

96. Conference room 62 × 46 feet, 10-foot ceiling. Two 75 cd strobes — one on each 62-foot wall. 75 cd covers 45 × 45. The 62-foot dimension exceeds 45. Two strobes provide coverage?

A. No, each strobe cannot cover 62-foot dimension individually

B. No, four strobes required

C. Yes, but only if synchronized

D. Yes, two on opposite walls divide room into zones within 45-foot coverage per strobe

97. As-built: 170 devices on SLC 1. Physical: 182. Panel: 182. Required?

A. As-built must be updated to reflect 182 devices

B. No action — within tolerance

C. Panel reprogrammed to match 170

D. Only Record needs updating

98. Battery: standby = 0.78A × 24hr = 18.72 Ah, alarm = 6.4A × 0.083hr = 0.531 Ah, subtotal = 19.251 Ah, × 1.20 = 23.10 Ah. Drawing specifies 18 Ah. Adequate?

A. Yes, close enough

B. Yes, but only with generator

C. No, 18 Ah below 23.10 Ah minimum — next standard size must be used

D. No, 20% should apply to each component

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

C. No, smoke must trigger broader notification

D. Yes, but only under 200 beds

100. As-built: panel dedicated circuit — 20A breaker, 12 AWG, 260-foot run, labeled, lock-on, no GFCI/AFCI. Additional detail?

A. Voltage at terminals for baseline

B. Electrician's name for warranty

C. Breaker manufacturer for replacement

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

DOMAIN 3.4 — MANAGEMENT (Questions 101–115)

101. Subcontractor pulled cable with excessive tension on 38 runs totaling 5,500 feet. Insulation may be damaged. Supervisor must require?

A. Megger testing on all 38 runs before connecting devices

B. Visual inspection sufficient

C. Cable connected — damage found during testing

D. Subcontractor certifies technique in writing

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

A. Only fire alarm contractor

B. General contractor solely coordinates

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

D. Only AHJ and fire alarm contractor

103. Change request: horn/strobe to voice evacuation at 62% completion. Response?

A. Refuse — conversion at 62% impossible

B. A formal change order documenting revision, cost, and schedule impact

C. Absorb cost for relationship

D. Speakers in remaining areas, retain horn/strobes in completed

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

A. Accept — enhanced protection

B. Replace directly — fire alarm scope

C. Contact owner for authorization

D. Notify general contractor to direct electrical contractor to replace

105. 800 detectors: 760 with one date code, 40 with different code. Same model. Concerned?

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

B. Yes, all must match codes

C. Yes, 40 on separate SLC

D. No, but 40 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. Every service activity documented in written report regardless of scope

D. Reports only for active alarm conditions

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 data

C. Submit original shop drawings

D. Recreate from memory

108. NFPA 72 minimum closeout documentation?

A. Only panel manual and warranty

B. Only as-built and completion certificate

C. Complete bid documents and quality worksheets

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

109. Hospital acceptance testing. Infection control requires 72-hour notice. GC wants 36 hours. Proceed?

A. Provide 72-hour notice and coordinate per infection control

B. Proceed — fire code overrides hospital

C. Non-patient areas only

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. Maintain 10-day notice and reschedule

D. Preliminary test then formal later

111. A fire alarm project manager discovers that the plumbing contractor routed a 4-inch drain line directly through the fire alarm panel backbox location. The drain line was installed before the fire alarm contractor mobilized to the floor. How should the project manager handle this?

A. Install the panel in a different location without notifying other trades

B. Route fire alarm conduit around the drain line and install the panel offset from the original location

C. Request the plumbing contractor relocate the drain line

D. Notify the general contractor of the conflict and request coordination to resolve the panel location

112. A fire alarm contractor discovers that a previous system installer left junction boxes in the ceiling with live fire alarm conductors that are no longer connected to any panel or device. The wires are energized from an unknown source. What should the contractor do?

A. Leave the junction boxes — they are the previous contractor's responsibility

B. Trace the energized conductors to their source, de-energize, disconnect, and remove the abandoned wiring and boxes

C. Cap the wires with wire nuts and leave the boxes in place

D. Label the boxes "ABANDONED" and notify building management

113. A fire alarm project supervisor is managing a project where the specification requires conduit for all fire alarm wiring. A subcontractor installed MC cable on two floors instead of conduit because MC cable was available on site. The MC cable is listed for fire alarm use. How should the supervisor handle this?

A. Accept the MC cable because it is listed for fire alarm use and exceeds minimum NEC requirements

B. The MC cable must be removed and replaced with conduit per the project specification

C. Request the engineer approve the MC cable as a substitution

D. Accept on the two floors already installed but require conduit on remaining floors

114. A fire alarm contractor is managing a project where the building owner's insurance carrier requires a fire alarm system inspection report before issuing the building's certificate of occupancy. The fire alarm contractor's acceptance test is complete and the AHJ has approved the system. The insurance carrier wants an independent third-party inspection. Who is responsible for arranging the third-party inspection?

A. The fire alarm contractor must arrange the inspection as part of the project scope

B. The AHJ must arrange the inspection because they have jurisdiction

C. The building owner is responsible for meeting their insurance carrier's requirements

D. The insurance carrier must arrange their own inspection directly

115. A fire alarm contractor completes a large hospital installation. The hospital administrator asks for a letter stating the system "provides complete and total fire protection for all patients, visitors, and staff under all fire scenarios." The system was designed and installed to meet NFPA 72 and building code requirements. How should the contractor respond?

A. Provide the letter because a code-compliant hospital system provides comprehensive protection

B. Provide the letter with disclaimer language limiting liability

C. Provide a modified letter with accurate performance language

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

LEVEL III — SIMULATION EXAM 10: ANSWER KEY AND EXPLANATIONS

1. B — A dedicated dark fiber pair with no shared traffic provides physical isolation from other network traffic. However, the pathway must still meet NFPA 72 listing and survivability requirements — dedicated physical strands alone do not automatically satisfy all code requirements for fire alarm networking.

2. D — Standby = (1.15 + 1.85 + 0.50) × 4 = 14.0 Ah. Alarm = (6.8 + 13.2) × 0.25 = 5.0 Ah. Subtotal = 19.0 Ah. With 20%: 19.0 × 1.20 = 22.80 Ah, approximately 21.60 Ah with rounding. Generator reduces standby to 4 hours. Voice requires 15-minute alarm.

3. A — CI cable maintains its 2-hour fire rating independently, so Level 2 is preserved. However, both outgoing and return paths sharing the same 80-foot equipment room creates a single point of failure where one fire could damage both paths simultaneously. Class A pathway diversity is compromised at the shared crossing.

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 each zone to its independent circuit.

5. B — Aspirating detection with sampling pipes concealed in the structural cable channels at multiple heights addresses stratification by sampling air at different elevations. The fabric roof, glass walls, and elevator shafts prohibit visible equipment. Cable channels provide existing concealment pathways throughout the structure.

6. D — R = 1,120 × (3.14/1000) = 3.517 Ω. V_drop = 2.3 × 3.517 = 8.089V. End voltage = 24 − 8.09 = 15.91 VDC. This falls below the 16 VDC minimum listed operating voltage. The circuit must be redesigned with larger conductors or shorter runs.

7. A — The pharmacy compounding cleanroom requires a separate HVAC zone that operates independently from other building zones. HVAC shutdown for the cleanroom should occur only when detection activates within the cleanroom itself — not from alarms in other building areas. This protects in-progress sterile compounding from unnecessary contamination.

8. C — The commercial car wash tunnel requires waterproof speakers specifically rated for direct water spray exposure. Standard speakers would fail rapidly in continuous high-humidity conditions with direct water contact. The speaker selection must address both acoustic performance and environmental IP rating for sustained water exposure.

9. B — Both communication paths must remain functional throughout the system's service life. The building renovation created a condition that disabled the cellular path. The building owner must restore cellular functionality by modifying the metal screen or relocating the antenna to maintain dual-path monitoring.

10. D — When the MRL drive area detector activates, smoke near the drive equipment at the top of the hoistway may travel down to Floor 1 (the lobby). Bank E must recall to Floor 2 as its alternate floor because its primary floor (lobby) may be compromised by smoke traveling from the drive area.

11. A — In an ISO Class 1 cleanroom, HEPA/ULPA filtration removes virtually all airborne particles including smoke before they reach ceiling-mounted detectors. Aspirating detection with sampling points upstream of the filters — in the return air stream before filtration — captures smoke particles before they are removed.

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

13. B — The FCC repeater must be listed as compatible with the main fire alarm panel to ensure proper communication, signal processing, and operator control functionality. This typically means the repeater is from the same manufacturer as the main panel, using the same communication protocol and software.

14. D — Low oil pressure on a diesel fire pump is a supervisory condition — an off-normal equipment status requiring investigation. Low oil pressure may lead to engine seizure if not addressed, rendering the backup pump unavailable. NFPA 72 Section 10.18 requires this reported as a supervisory signal.

15. A — When the retractable roof opens, natural daylight floods the seating bowl and can wash out strobe visibility. Strobe candela calculations must account for the worst-case open-roof daylight condition to ensure visible notification remains effective regardless of roof position.

16. C — Cross-zone detection on a single-interlock system requires two independent detection zones to both activate before the valve opens. This reduces false valve openings from single detector malfunctions, nuisance alarms, or accidental activations. The valve only opens when two separate zones confirm the alarm condition.

17. B — At minimum seven distinct profiles are needed: patient care (defend-in-place), surgical (restricted audible), ED (full notification for transient occupants), NICU (enhanced restriction for neonates), psychiatric (controlled notification for behavioral safety), outpatient clinic (standard with ambulatory patients), and administrative (standard notification).

18. D — A waterflow signal indicates actual water flow in the sprinkler system — a non-detector alarm condition. Per NFPA 72 Section 23.8, PAS applies only to automatic detection signals. Waterflow

must cancel PAS and activate general notification because it represents a confirmed system activation.

19. A — Both HVAC shutdown and door/damper closure occur at cross-zone verification — when both detection zones confirm the alarm. These actions seal and stop air movement in the protected space before the pre-discharge countdown begins. Agent release occurs at countdown completion after the space is sealed.

20. C — The fire safety plan determines notification scope for all building areas including common spaces such as the rooftop pool, lobby, and parking garage. The plan documents which areas receive notification for alarms on specific floors and is approved by the AHJ.

21. B — NFPA 72 has no code-mandated color requirement for notification appliance mounting plates. The code color requirement applies specifically to manual fire alarm stations (red per Section 17.14.8). Mounting plates may be painted to match the architectural finish without violating the code.

22. D — NFPA 72 requires the higher of 15 dB above ambient or 75 dBA minimum. Server aisles: 85 + 15 = 100 dB. UPS room: 75 + 15 = 90 dB. NOC: 55 + 15 = 70 dB, but 75 dBA minimum governs. The mixed criteria apply — 15 dB above ambient when ambient exceeds 60 dB, and 75 dBA minimum when ambient is below 60 dB.

23. A — Each remote panel serves different floor counts with different speaker quantities, circuit lengths, and current draws. Floor 40's remote at 10.2 amps has completely different battery requirements than Floor 10's at 6.4 amps. Using the same calculation for all would result in incorrect sizing.

24. A — When the pool bar 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. C — The corridor ceiling used as a return air plenum is a plenum requiring FPLP cable. The MRI suite and lobby with dedicated or no HVAC function above the ceiling are non-plenum spaces accepting FPL minimum. Each space's cable requirement depends on its air-handling function.

26. B — Individual zones for each waterflow and tamper device provide specific riser identification essential for emergency response. Consolidating all fourteen waterflow switches onto one zone eliminates the ability to identify which wing or floor has active water flow, severely impairing response efficiency.

27. D — 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 106°F, so minimum activation is 126°F (106 + 20 = 126).

28. A — When a lobby smoke detector activates, all elevator banks serving the building must recall to the primary designated floor per NFPA 72 Phase I recall requirements. The lobby detector triggers primary floor recall — elevators travel to the designated recall floor (typically the lobby itself unless the lobby is the smoke-detected floor, in which case alternate recall applies).

29. C — When mass notification overrides fire alarm audio, the fire alarm signal must continue transmitting to the supervising station for fire department dispatch. The override affects only in-building audio. All alarm signals received during the override must transmit to the station regardless of the audio override status.

30. B — A ground fault on a releasing circuit is a circuit impairment that could affect proper releasing function. The panel correctly generates a trouble signal to alert building management. Ground faults may cause unintended current paths that could either prevent release or cause inadvertent release under certain conditions.

31. D — All three environments — indoor ski slope (extreme cold/artificial snow), commercial bakery (flour dust/heat), and rubber tire recycling (rubber particulates/outgassing) — create conditions causing smoke detector nuisance alarms. Heat detection responds only to abnormal temperature increases unaffected by 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 1/2-watt tap delivers one-quarter the power of a 2-watt tap. The tenth speaker receives less power, producing correspondingly lower volume despite identical circuit voltage at all speakers.

34. B — Beam detector spacing must not exceed the manufacturer's listed maximum for the specific ceiling height. At 64 feet, the listing establishes allowable lateral distance based on tested performance. NFPA 72 requires compliance with the listing.

35. D — Demolition debris including concrete dust and metal particles can migrate through vertical shafts to Phase 1 detectors. Affected zones must be bypassed with the monitoring station notified of the impairment during active demolition to prevent nuisance alarms while maintaining awareness.

36. A — SLC 3 has the most remaining capacity: 133 device addresses and 106 mA of current headroom. Placing all 70 on SLC 3 (reaching 135 devices/98 mA) preserves the severely limited margin on SLC 1 and SLC 2 — both near maximum. This provides best overall flexibility.

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

38. B — 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.

39. C — Reduced ceiling beam spacing improves detection density at the ceiling level but cannot detect fires at storage level before smoke rises the full 54 feet. In-rack detectors at intermediate heights catch fires where they originate — at the storage level — providing significantly earlier detection than any ceiling-only approach.

40. A — Medication refrigerators in an urgent care clinic operate on dedicated electrical circuits separate from the building's HVAC system. HVAC shutdown affects the air handling units, ductwork, and fans — not standalone plug-in appliances. The refrigerators continue operating during HVAC shutdown.

41. C — 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. B — Both high-reading detectors (above 3.7%) and low-reading detectors (below 0.5%) are outside the manufacturer's listed range. All 68 out-of-range detectors require investigation and correction — high readings need cleaning and low readings need fault investigation.

43. D — The pre-recorded message plays on all 56 floors confirming amplifiers and speakers function throughout. The live microphone reaching only Floors 1-28 indicates audio routing is programmed for a subset. Programming must be verified against the approved design.

44. A — Bank E's selective recall tested correctly. When Bank I activated, both H and I recalled despite only Bank I's relay activating. The elevator controllers for Banks H and I share a common recall input wired in parallel — when Bank I's relay closes, both controllers receive the signal.

45. C — NFPA 72 Section 10.6.9 permits a maximum delay of 3 hours before annunciating AC power failure trouble. At 2 hours 55 minutes, the panel generated the trouble within the 3-hour window. The timing meets the code requirement.

46. B — A smoke detector covered with a rubber glove for ten weeks has been effectively disabled. The glove prevents smoke entry to the sensing chamber, leaving the corridor without detection coverage. This is a significant impairment requiring immediate correction.

47. D — 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.

48. B — NFPA 72 Section 26.6.3.2 requires IP technology with continuous monitoring to detect path failure within 200 seconds. At 188 seconds, the panel is well within the maximum. Both paths function and supervision timing meets the requirement.

49. A — Nineteen months of diagnostic history has been permanently lost due to overwriting. This impairs troubleshooting, incident investigation, and compliance documentation. The log must be downloaded and cleared to restore full capacity.

50. C — Fourteen adjacent detectors with significantly longer activation times (42-60 seconds versus 3-9 seconds) strongly suggests contaminated sensing chambers. An environmental factor specific to that area accelerated contamination. The detectors should be cleaned and retested.

51. D — A gradual voltage decline from 26.8 to 25.6 VDC over 15 minutes — a 1.2-volt drop — is normal for batteries under standby load. Voltage remains above the minimum threshold. Charger activation after reconnection confirms a successful test.

52. B — Wax paper taped over a detector's sensing openings creates a barrier blocking smoke entry regardless of translucency. The wax coating makes the paper less porous than standard paper. The detector is non-functional and the covering must be removed immediately.

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

54. C — Circuit voltage reads 69.8 VAC — within normal range. Reduced volume from one speaker while others are normal indicates the speaker's wattage tap is set lower on its impedance-matching transformer, delivering less power to that speaker.

55. D — NFPA 72 Section 18.5.5.5.7 requires all visible appliances within the same field of view to flash in synchronization. Two strobes visible from the same location must be synchronized regardless of circuit assignment. The 0.45-second offset violates this requirement.

56. B — NFPA 72 Section 17.14.8 requires manual fire alarm stations to be red. Painting pull stations bronze violates this requirement. Paint covering labels renders devices unusable. The stations must be replaced.

57. A — The batteries ended at 17.2 VDC — well below the manufacturer's 20.4 VDC minimum. Panel components may malfunction or shut down at this voltage. The batteries must be replaced.

58. C — The duct detector activated, the panel processed the alarm, and the control module relay closed. The AHU did not shut down despite relay closure. The fault is downstream in the wiring between the relay contacts and the AHU controller.

59. D — Eleven renovations adding 160 devices and changing the sequence ten times over fifteen years represent massive changes. NFPA 72 Section 7.8 requires the Record to reflect current configuration.

60. B — Three hundred fifty nuisance alarms over thirteen months indicates aging infrastructure causing pressure fluctuations. The corrective approach addresses root cause (investigating pressure source) and switch response (adjusting retard delay within 90 seconds).

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

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

63. D — NFPA 72 Section 18.5.5.5.3 requires visible appliances to flash between 1 and 2 flashes per second. At 0.4 flashes per second, the strobe is well below minimum and must be replaced.

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

65. A — Ninety-five days without communication redundancy means the system operates with a single path. If cellular fails, the building has no monitoring. This is a significant impairment requiring prompt correction.

66. C — A decorative valance blocking both horn and strobe eliminates both audible and visible notification output. The valance must be removed or relocated and building management informed.

67. D — The batteries ended at 17.8 VDC — below the manufacturer's 20.4 VDC minimum. The batteries must be replaced.

68. B — NFPA 72 requires spot detectors on the ceiling or within 12 inches of the ceiling. At 42 inches below the 9-foot ceiling, the detector far exceeds the 12-inch maximum distance. The detector must be reinstalled at the ceiling.

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

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

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

72. D — Paint, solvents, boxes, vacuum cleaner, and mop combined with 10 inches of clearance violates NEC Article 110.26. All storage must be removed and required working space maintained.

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

74. C — Floor 10 requiring significant force while Floor 32 opens normally indicates inconsistent pressurization. A duct, damper, or balancing issue prevents adequate upper-floor distribution. Both observations should be documented for mechanical investigation.

75. A — A 142-minute discrepancy significantly affects event log accuracy. Timestamps over two hours off create serious confusion when correlating events with security footage, dispatch records, and other logs. The clock must be corrected immediately.

76. D — The panel processed the alarm and 25 of 28 locks released. The three non-releasing locks indicate faults specific to those devices. Control module outputs, wiring, and power supply must be investigated.

77. B — NFPA 72 requires waterflow alarm signals at the panel within 90 seconds of sustained flow. The alarm appeared at 88 seconds, within the maximum. The waterflow switch passes.

78. C — A sensitivity reading of 5.2% 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 to within range.

79. D — R = 1,060 × (3.14/1000) = 3.328 Ω. V_drop = 2.4 × 3.328 = 7.988V. End voltage = 24 − 7.99 = 16.01 VDC. While technically above 16 VDC, the 0.01-volt margin is negligible. Any aging, temperature, or addition would push below minimum.

80. B — Standby = (0.96 + 1.04) × 4 = 8.0 Ah. Alarm = (4.2 + 7.8) × 0.25 = 3.0 Ah. Subtotal = 11.0 Ah. With 20%: 11.0 × 1.20 = 13.20 Ah, approximately 12.96 Ah. Generator reduces standby to 4 hours.

81. A — Even when duct detectors are configured for HVAC shutdown only without notification, the signal should still transmit to the supervising station for awareness, investigation, and follow-up.

82. C — 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. D — A detector at the 90-degree turn 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. B — SLC 1 at 195 of 198 has only 3 remaining addresses. Placing all 30 on a new SLC preserves SLC 1's capacity and provides substantial expansion room on the new loop.

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

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

88. B — The speaker circuit delivers 55.2 VAC, exceeding the 55 VAC minimum by 0.2 volts. While technically compliant, the margin is critically thin and any aging or addition could push voltage below the minimum threshold.

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

91. C — Ten detectors at positions 15, 45, 75, 105, 135, 165, 195, 225, 255, 285 provide 30-foot spacing. First at 15 feet from one end and last at 15 feet from the 300-foot far end (300 − 285 = 15). Both end distances comply.

92. B — Using Class A for upper floors (9-36) provides enhanced fault tolerance where it benefits most — longer egress, more difficult access, and greater vulnerability during extended evacuation. Lower floors accept Class B based on risk assessment.

93. A — Horn/strobes: 20 × 0.300 = 6.00A. Speakers: 14 × 0.150 = 2.10A. Strobes: 10 × 0.195 = 1.95A. Total = 10.05 amps, significantly exceeding the 3.0-amp rating. Circuit must be redesigned.

94. C — 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. B — The 10-day notice requirement is a regulatory and contractual obligation. The contractor must maintain the requirement and reschedule.

96. D — Two 75 cd strobes on opposite 62-foot walls divide the room into two zones. Each strobe covers approximately 31 feet from its wall — within the 45-foot maximum per strobe. Overlapping zones provide complete coverage.

97. A — As-built shows 170 but 182 are installed and confirmed by programming. NFPA 72 requires as-builts to reflect current configuration. Drawings must be updated.

98. C — The calculated minimum is 23.10 Ah. The specified 18 Ah batteries fall below this minimum by 5.10 Ah. The next standard battery size above 23.10 Ah must be selected.

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

100. D — 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. A — Excessive pulling tension can damage conductor insulation internally without visible jacket damage. Megger testing all 38 runs verifies insulation integrity before devices are connected. Visual inspection cannot detect internal failure.

102. C — Emergency control function 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 the engineering revision, cost, and schedule extension before work proceeds.

104. D — The fire alarm contractor should not modify the electrical contractor's work. The general contractor coordinates all trades and should direct the electrical contractor to replace the non-compliant breaker.

105. A — Different date codes within the same detector model indicate different production runs. As long as all 800 are the same model and listed for the panel, date code variations do not affect compatibility or performance.

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

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

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

109. A — Hospital infection control requirements for 72-hour notice must be respected. Patient safety protocols cannot be overridden by construction schedules.

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

111. D — The plumbing contractor's drain line conflicts with the fire alarm panel location. The fire alarm contractor should notify the general contractor of the conflict so the GC can coordinate between trades to determine whether the drain line is rerouted or the panel location is moved.

112. B — Live energized conductors in abandoned junction boxes create a safety hazard and code violation. NEC Article 760.25 requires removal of accessible abandoned fire alarm cable. The conductors must be traced to their source, de-energized, disconnected, and removed along with the boxes.

113. B — The project specification requires conduit for all fire alarm wiring. MC cable — even though listed for fire alarm use — does not satisfy a conduit specification. Project specifications are contractual obligations. The MC cable must be removed and replaced with conduit per the approved specification.

114. C — The insurance carrier's inspection requirement is a condition of the building owner's insurance policy — not a fire alarm contract obligation or AHJ requirement. The building owner is

responsible for meeting their insurance carrier's requirements, including arranging any third-party inspections.

115. D — No fire alarm system provides "complete and total fire protection under all fire scenarios." The system detects fire, notifies occupants, and transmits signals — it does not extinguish fires or physically protect people. Providing such a letter creates significant legal liability. The Record of Completion accurately certifies code-compliant installation.