PRACTICE EXAM 5: CTS-I SIMULATION

QUESTIONS 1–125

Domain A — Conducting Pre-Installation Activities

1. An installer arrives to perform a site survey and discovers that the building's as-built drawings differ substantially from current field conditions due to undocumented renovations. The most appropriate response is:

A. Use the as-built drawings as the authoritative reference since they were approved

B. Document field conditions independently and flag the discrepancies to the design team

C. Assume the renovations did not affect AV-relevant infrastructure

D. Refuse to perform the site survey until accurate drawings are provided

2. A pre-installation review of project documentation finds that the specified ceiling-mounted loudspeaker locations place two loudspeakers within 3 feet of air diffusers. What concern does this create?

A. Air movement from the diffusers may affect loudspeaker performance and coverage

B. The diffusers will physically interfere with loudspeaker installation

C. The loudspeakers will overheat from proximity to the diffusers

D. The HVAC system will lose efficiency from loudspeaker airflow blockage

3. A wiring schedule includes 8 cable runs of various types passing through a single 1.5-inch EMT conduit. The cables have the following cross-sectional areas: 3 cables at 0.06 square inches each, 3 cables at 0.09 square inches each, and 2 cables at 0.12 square inches each. Total cable area is:

A. 0.54 square inches

B. 0.63 square inches

C. 0.72 square inches

D. 0.69 square inches

4. A 1.5-inch EMT conduit has an internal cross-sectional area of 1.78 square inches. With the 0.69 square inch total cable area from the previous question, the fill percentage is approximately:

A. 30%

B. 35%

C. 39%

D. 43%

5. A pre-installation meeting reveals that the client's IT department has not yet assigned VLAN identifiers for AV traffic. What is the appropriate response?

A. Coordinate with IT to establish VLAN assignments before AV network configuration

B. Use default VLAN 1 for all AV traffic until IT provides assignments

C. Configure AV equipment without VLAN tagging and add it later

D. Proceed with installation and address VLAN issues at commissioning

6. A project drawing shows a scale of 3/16" = 1'-0". A cable run measuring 4 inches on the architect's scale represents:

A. 16 feet

B. Approximately 21 feet 4 inches

C. 24 feet

D. 18 feet

7. A site survey identifies that the proposed equipment room does not have a dedicated HVAC unit and relies on general building cooling. What concern does this create?

A. Equipment heat load may not be adequately removed, causing thermal stress

B. The room will be too cold for AV equipment operation

C. Humidity levels in the room cannot be controlled

D. The equipment room cooling capacity cannot be verified without dedicated HVAC

8. A pre-installation hardware list identifies 125 cable ties, 50 velcro straps, and 200 cable labels. The installer's current inventory has 75 cable ties, 20 velcro straps, and 150 cable labels. What quantity of cable ties should be ordered?

A. 75 cable ties to match existing inventory

B. 125 cable ties to match the project requirement

C. 50 cable ties plus reasonable reserve quantity

D. 200 cable ties to ensure ample stock

9. A pre-installation review of the rack elevation identifies that total rack-mount equipment requires 38 rack units, but the specified 42U rack has been populated with 6U of blanking panels and cable management already installed. The effective available space is:

A. 36 rack units

B. 38 rack units

C. 42 rack units

D. 44 rack units

10. A pre-installation survey reveals that the proposed display location is positioned directly opposite a large window that receives direct afternoon sun. What concern does this create?

A. Heat from the sun will damage the display electronics

B. UV exposure will degrade the display panel over time

C. The display will appear dim and washed out during afternoon hours

D. Glare from sunlight will severely impair display visibility during afternoon hours

11. A wiring schedule includes a cable run that passes through three 90-degree bends and two 45-degree bends in conduit. The cumulative bend angle is:

A. 270 degrees

B. 360 degrees

C. 315 degrees

D. 405 degrees

12. The professional standard for labeling cables on both ends supports which primary activity?

A. Initial installation efficiency only

B. Compliance with project documentation requirements only

C. Identification and tracing during installation, verification, and future service work

D. Visual inspection by other trades during construction

13. A pre-installation review identifies that the specified projector requires a 230-volt power circuit, but the electrical drawings show only 120-volt circuits at the projector location. The appropriate response is:

A. Coordinate with the electrical engineer to install a 230-volt circuit before installation

B. Use a step-up transformer at the projector location

C. Substitute a 120-volt projector model without design team approval

D. Connect the projector to the existing 120-volt circuit and accept reduced performance

14. A pre-installation estimate of labor hours for a conference room installation assumes standard 8-hour workdays. The actual work must be performed during evening shifts from 6 PM to 10 PM. The productivity adjustment should:

A. Not apply since the work content is identical

B. Apply a 15-30% increase in estimated hours for evening shift conditions

C. Apply a 5% increase for minor inconvenience

D. Reduce hours since less site traffic improves efficiency

15. A site survey identifies that the proposed cable pathway passes through a chase that contains high-voltage electrical wiring from building lighting. What code requirement applies?

A. Combining cables from different systems is acceptable with sufficient spacing

B. AV cable must be installed in separate conduit isolated from line-voltage wiring

C. AV cable requires additional shielding to combine with line-voltage wiring

D. Separation requirements apply per NEC to maintain physical and electrical isolation between low-voltage and line-voltage cabling

16. A take-off calculation should include contingency margin primarily to account for:

A. Labor productivity variations across crew members

B. Price fluctuations between quotation and installation

C. Routing variations, termination waste, and minor field modifications

D. Weather delays affecting installation schedule

17. A pre-installation walk-through reveals that the AV equipment room door is 30 inches wide, but the specified equipment rack is 32 inches wide. The most appropriate response is:

A. Document the conflict and coordinate with the design team and general contractor

B. Remove the rack's door frame to reduce width for installation

C. Specify a narrower rack that fits through the door

D. Partially disassemble the rack for transport through the door

18. A site survey documents observations using which primary medium?

A. Verbal report to the lead installer only

B. Written report with photographs and detailed notes

C. Sketches only without accompanying written narrative

D. Audio recording of observations for later transcription

19. A pre-installation review of project documentation finds that the equipment list lacks the matrix switcher that appears in the design narrative. The appropriate response is:

A. Substitute a matrix switcher from the installer's stock inventory

B. Skip the matrix switcher and use direct source-to-display connections

C. Ignore the discrepancy since design documents may be incomplete

D. Document the discrepancy and escalate to the design team for resolution

20. An installer's hardware list calculation for a 50-cable project requires approximately how many labels, assuming labels are required at both ends plus 10% reserve?

A. 110 labels

B. 100 labels

C. 105 labels

D. 125 labels

21. A pre-installation coordination meeting should include which key stakeholders?

A. Only the installer and the project foreman

B. Only the client and the equipment manufacturer

C. Project manager, design engineer, client representative, and lead installer

D. Only the electrical contractor and the AV installer

22. A site survey identifies structural blocking missing for three of five planned wall-mounted displays. The appropriate documentation approach is:

A. Note informally for the installation crew's reference

B. Document formally and coordinate with the design team and general contractor

C. Plan to use alternative anchoring methods at each affected location

D. Proceed and add blocking during installation as needed

23. A pre-installation labor calculation includes 80 base hours plus 20% adjustment for difficult site conditions and 10% adjustment for coordination with other trades. The total estimated hours are approximately:

A. 88 hours

B. 100 hours

C. 106 hours

D. 112 hours

24. A pre-installation review of the network infrastructure confirms that the specified AV-over-IP traffic requires 8 Gbps bandwidth per stream. The existing network infrastructure supports 1 Gbps per port. The appropriate response is:

A. Coordinate with IT to upgrade network infrastructure to support required bandwidth

B. Reduce AV-over-IP stream bandwidth to fit existing infrastructure

C. Use compressed codecs that reduce bandwidth requirements

D. Install a separate parallel network for AV traffic

25. Site survey findings should be distributed to:

A. Only the installer's direct supervisor

B. Only the project foreman

C. The project manager, design team, and project file

D. All members of the installation crew

26. A pre-installation walk-through identifies that the specified projector requires a throw distance of 18 feet, but the actual available distance is 22 feet. What is the primary impact?

A. The image size will be smaller than specified

B. The projector will not focus properly

C. Image brightness will be substantially reduced

D. The image size will be larger than specified, potentially overfilling the screen

27. A pre-installation site survey reveals that access to the equipment room requires passing through a secured area. What coordination is required?

A. Coordinate access protocols with the client's security team before installation begins

B. Request the secured area be opened during all installation hours

C. Transport equipment through alternate routes that bypass the secured area

D. Delay installation until the secured area is reconfigured

28. Documentation of a pre-installation walk-through should occur:

A. After installation is complete to document baseline conditions

B. During installation as findings emerge

C. At the time of the walk-through with immediate distribution

D. Only if significant issues are identified during the walk-through

Domain B — Conducting Site Rough-In/First-Fix

29. An installer pulling cable through a conduit notices that tension is rising smoothly but rapidly approaching the cable manufacturer's maximum. The most appropriate response is:

A. Continue pulling at reduced speed to complete the run

B. Stop the pull immediately and investigate before proceeding

C. Apply additional pulling lubricant and continue

D. Switch to mechanical pulling assistance to maintain steady tension

30. A worker using a boom lift platform must wear personal fall arrest attached to:

A. The ground-level fall arrest system

B. An adjacent structure within reach

C. The floor of the boom lift platform

D. A designated anchor point on the platform itself

31. The 4-to-1 rule for extension ladder setup establishes:

A. For every four feet of working height, the base extends one foot from the structure

B. The ladder must be four feet longer than the working height

C. The ladder rungs must be four inches apart

D. The ladder angle must be four times greater than vertical

32. A cable pull through a conduit with multiple bends requires which crew positioning?

A. A single installer at the pull end with unattended feeding

B. One installer at the feed end and one at the pull end

C. Crew members at the feed end, any intermediate pull box, and the pull end

D. All crew members at the pull end for maximum pulling force

33. Structural blocking required to support a 100-pound wall-mounted display should be:

A. Installed by the AV installation crew during equipment mounting

B. Installed by the general contractor during wall framing, before drywall

C. Installed using drywall toggle bolts after drywall is complete

D. Installed only if the designer specifically requests it

34. A 3/8-inch A307 threaded rod typically supports approximately what working load with a 4:1 safety factor?

A. 500 pounds

B. 1,000 pounds

C. 2,000 pounds

D. 1,500 pounds

35. An installer pulling cable through a long conduit run notices the tension has dropped below expected levels midway through the pull. The most likely cause is:

A. The cable has separated from the pulling line or rope

B. The pulling lubricant has reduced friction as expected

C. The cable has reached the pull end and is ready for termination

D. The conduit interior has become smooth from repeated cable pulls

36. A scissor lift operator must verify which condition before elevating the platform with equipment and personnel?

A. The operator holds a valid driver's license

B. Other workers are within visual range to provide assistance

C. The lift is on firm, level ground and within rated capacity

D. The lift has been serviced within the past 30 days

37. A cable that exhibits internal conductor damage and twisted-pair separation has most likely been:

A. Exposed to temperatures exceeding specifications

B. Pulled with excessive tension beyond manufacturer specifications

C. Stored for an extended period before installation

D. Terminated with incorrect connectors

38. Concrete masonry walls require which fastener type for mounting AV equipment?

A. Wood lag bolts threaded into the masonry

B. Standard plastic expansion anchors

C. Sheet metal screws appropriate to the load

D. Concrete-rated wedge anchors or sleeve anchors

39. A J-hook supporting Category-rated cable in a plenum space must be:

A. Plenum-rated and attached to structural members above the ceiling

B. Made of fire-retardant plastic for all applications

C. Colored to match the cable jacket for identification

D. Spaced at 12-foot intervals as the universal standard

40. A cable pull calculation identifies that jam ratio falls within 2.8 to 3.2. This indicates:

A. The conduit is oversized for the proposed cable count

B. Three cables may wedge together during the pull, increasing tension

C. Pulling tension will be lower than calculated

D. The cable count exceeds NEC fill requirements

41. OSHA's silica dust standard requires specific controls during activities that generate silica dust including:

A. Carbide-tipped blade replacement every 100 cuts

B. Water suppression system installation on all tools regardless of use

C. Work scheduled only during business hours when dust can be monitored

D. Water suppression, local exhaust ventilation, or respiratory protection matched to exposure level

42. A ladder positioned against a surface must extend how far above the working surface if used as a means of access to an elevated work area?

A. 2 feet above the work surface

B. 1 foot above the work surface

C. 3 feet above the work surface

D. 5 feet above the work surface

Domain C — Installing Audiovisual Systems

43. A 24U rack frame provides how many inches of vertical mounting height?

A. 42 inches

B. 40 inches

C. 38 inches

D. 36 inches

44. The 80% rule for continuous loads on circuits means a 20-ampere circuit is limited to:

A. 18 amperes of continuous load

B. 16 amperes of continuous load

C. 20 amperes of continuous load

D. 14 amperes of continuous load

45. The standard rack mounting width measured between front mounting flanges is:

A. 17 inches

B. 18 inches

C. 21 inches

D. 19 inches

46. A 3U rack-mount device occupies how many inches of vertical mounting height?

A. 4.5 inches

B. 5.0 inches

C. 5.25 inches

D. 6.0 inches

47. Blanking panels installed in unused rack units serve which primary purpose?

A. Preserving airflow paths and preventing hot exhaust recirculation

B. Providing additional mounting surface for cable management

C. Improving the rack's structural rigidity

D. Increasing the rack's grounding effectiveness

48. A rack power distribution unit rated at 20 amperes at 120 volts should have its continuous load limited to:

A. 20 amperes

B. 18 amperes

C. 24 amperes

D. 16 amperes

49. An XLR connector uses three pins. The standard convention assigns which pin to the hot/positive signal?

A. Pin 1

B. Pin 2

C. Pin 3

D. Pin 4

50. Phantom power for condenser microphones is standardized at:

A. 12 volts DC

B. 24 volts DC

C. 48 volts DC

D. 96 volts DC

51. A balanced audio signal cable uses how many conductors plus a shield?

A. Two conductors plus shield

B. One conductor plus shield

C. Three conductors plus shield

D. Four conductors plus shield

52. A 3 dB increase in audio signal power represents:

A. A tripling of power

B. A 30% increase in power

C. A doubling of power

D. A tenfold increase in power

53. The decibel formula for voltage ratios uses which multiplier?

A. 10 × log(V1/V2)

B. 15 × log(V1/V2)

C. 5 × log(V1/V2)

D. 20 × log(V1/V2)

54. A 70-volt distributed audio system uses transformers at each loudspeaker primarily to:

A. Provide phantom power to passive loudspeakers

B. Step down the high-voltage line to the loudspeaker's required voltage

C. Convert AC voltage to DC for solid-state drivers

D. Boost the signal level for long cable runs

55. A 70-volt distributed audio amplifier rated at 600 watts should be specified to drive total tap loads of approximately:

A. 480 watts

B. 600 watts

C. 720 watts

D. 540 watts

56. Cat6A network cable supports a maximum frequency of:

A. 100 MHz

B. 250 MHz

C. 500 MHz

D. 350 MHz

57. The maximum permissible untwist length at the termination of Cat6A cable is:

A. 0.25 inches

B. 0.5 inches

C. 0.75 inches

D. 1.0 inches

58. A 75-ohm coaxial cable is typically used for:

A. Communications RF applications including two-way radio

B. Speaker-level audio in distributed systems

C. RS-232 serial control between devices

D. Video signal transport including SDI and CATV

59. The maximum recommended copper cable distance for HDBaseT transmission of 4K video at 60 Hz is approximately:

A. 100 meters (328 feet)

B. 50 meters (164 feet)

C. 200 meters (656 feet)

D. 25 meters (82 feet)

60. EDID information from a display is transmitted to the source through:

A. Manual configuration entered at the source device

B. A separate management network connection

C. The DDC channel embedded within the HDMI or DisplayPort cable

D. RS-232 serial connection between source and display

61. HDCP 2.2 encryption is required for protected transmission of:

A. 1080p content from any source

B. Audio content over Dante networks

C. Standard-definition video over coaxial cable

D. 4K UHD content from compatible sources

62. A multi-mode fiber OM3 specifications support 10 Gbps Ethernet transmission to:

A. 100 meters

B. 300 meters

C. 200 meters

D. 400 meters

63. APC fiber connectors are color-coded as:

A. Blue

B. Beige

C. Green

D. Yellow

64. The Dante audio networking protocol typically operates with latency of:

A. 0.25 to 1 millisecond

B. 5 to 10 milliseconds

C. 10 to 20 milliseconds

D. 50 to 100 milliseconds

65. SDVoE distributes uncompressed 4K60 video over which minimum network infrastructure?

A. 1 Gbps Ethernet

B. 100 Mbps Ethernet

C. Wireless 802.11ac

D. 10 Gbps Ethernet

66. The IEEE 802.3at standard for Power over Ethernet provides what power at the powered device?

A. 12.95 watts

B. 25.5 watts

C. 51 watts

D. 71 watts

67. An IPv4 address with a /24 subnet mask provides how many usable host addresses?

A. 256 hosts

B. 255 hosts

C. 254 hosts

D. 126 hosts

68. A control system using RS-232 serial communication operates at typical baud rates between:

A. 9600 and 115200 bps

B. 1200 and 2400 bps

C. 250000 and 500000 bps

D. 4800 and 9600 bps

69. IR control of AV equipment is generally:

A. Bidirectional with status feedback from the controlled device

B. Effective at distances up to 500 feet from the controller

C. Compatible with all consumer and professional equipment

D. Unidirectional with no status feedback from the controlled device

70. A control processor sending IP commands receives no response from a controlled device. The most appropriate first diagnostic step is:

A. Reboot the control processor to clear cached connection information

B. Verify network connectivity to the device using ping or similar tool

C. Replace the network cable connecting the device

D. Update firmware on the controlled device

71. A loudspeaker rated at 8 ohms is connected to an amplifier. To maintain cable resistance below 5% of loudspeaker impedance, the maximum total cable resistance is:

A. 0.40 ohms

B. 0.20 ohms

C. 0.50 ohms

D. 0.10 ohms

72. Three loudspeakers each rated at 8 ohms connected in parallel present what combined impedance to the amplifier?

A. 24 ohms

B. 4 ohms

C. 2.67 ohms

D. 8 ohms

73. A digital signal degrading over distance through a transmission medium typically exhibits:

A. Increasing color saturation as distance increases

B. Full quality maintained until catastrophic failure at the digital cliff

C. Gradual quality degradation similar to analog signals

D. Audible noise that grows progressively louder

74. A video matrix switcher is routing a 4K60 source to three displays. Two displays show the correct image; one shows a black screen. The most likely cause is:

A. The matrix switcher is defective and must be replaced

B. The black-screen display is powered off

C. The source is producing incompatible resolution

D. EDID negotiation failure between the switcher and the affected display

75. A waveform monitor displays which characteristic of a video signal?

A. Video signal amplitude over time

B. Video chrominance on a polar plot

C. Audio levels accompanying the video

D. Network bandwidth utilization

76. A vectorscope displays which characteristic of a video signal?

A. Video signal amplitude over time

B. Audio frequency response across the spectrum

C. Video chrominance on a polar plot

D. Network packet loss patterns

77. A projector with throw ratio 1.5:1 positioned 15 feet from the screen produces what image width?

A. 22.5 feet

B. 10 feet

C. 15 feet

D. 7.5 feet

78. The recommended target white point for video calibration is:

A. 6500K (D65)

B. 5500K (D55)

C. 7500K (D75)

D. 9300K (D93)

79. The recommended target gamma for standard video content is approximately:

A. 1.8

B. 2.0

C. 2.4

D. 2.2

80. The AVIXA DISCAS standard recommends that for basic decision-making content, the farthest viewer should be no more than:

A. 4 times the image height

B. 8 times the image height

C. 12 times the image height

D. 16 times the image height

81. A measurement microphone used for room equalization should have:

A. Cardioid polar pattern with extended low-frequency response

B. Hypercardioid pattern with maximum off-axis rejection

C. Flat, documented frequency response with omnidirectional polar pattern

D. Ribbon transducer with vintage warm sound character

82. The AES67 standard primarily provides:

A. Open interoperability between different manufacturers' networked audio systems

B. Encryption of audio streams for security purposes

C. Power delivery to networked audio devices

D. Frequency-domain analysis of audio signals

83. A polarity tester in audio system verification confirms:

A. The amplifier output voltage is within manufacturer specifications

B. The audio signal level is appropriate for the connected loudspeaker

C. The audio cable shielding is properly bonded to ground

D. All loudspeakers in a system move in the same direction on the same signal

84. Cable certification for installed Cat6A cabling tests:

A. Length and continuity only

B. Insertion loss, return loss, NEXT, ANEXT, propagation delay, and other parametric measurements

C. Voltage drop and current capacity only

D. Visual inspection of cable jacket only

85. A 1080p video signal at 60 Hz with 8-bit color requires approximately what bandwidth?

A. 4.5 Gbps

B. 3.0 Gbps

C. 6.0 Gbps

D. 9.0 Gbps

86. A 4K video signal at 60 Hz with 10-bit color and HDR requires approximately what bandwidth?

A. 12 Gbps

B. 18 Gbps

C. 36 Gbps

D. 24 Gbps

87. A 70-volt distributed audio system has 6 loudspeakers at 20-watt taps and 8 loudspeakers at 10-watt taps. Total tap load is:

A. 180 watts

B. 200 watts

C. 200 watts total (120 + 80)

D. 220 watts

88. Acoustic echo cancellation (AEC) in a video conferencing system removes:

A. Distortion from the microphone's amplification stage

B. The sound of the room loudspeakers reproducing far-end audio

C. Reverb from hard surfaces in the conference room

D. Background ambient noise from the room

Domain D — Perform Systems Close-Out

89. The ANSI/AVIXA 10:2013 standard governs:

A. Cable installation practices for low-voltage AV systems

B. Audio coverage uniformity in performance venues

C. Display image size for two-dimensional content

D. Audiovisual systems performance verification

90. Under ANSI/AVIXA 10:2013, A-Level verification items represent:

A. Essential system functions that must be verified on every installation

B. Specialized functions present on many but not all installations

C. Unique requirements specific to particular installations

D. Aesthetic and cosmetic checks of installed equipment

91. A punch list distinguishes between substantive and cosmetic deficiencies. An equipment rack door that will not close properly is classified as:

A. A cosmetic deficiency affecting appearance only

B. A pre-existing condition outside the installation scope

C. A substantive deficiency affecting equipment protection and service access

D. A user training issue requiring documentation

92. Substantial completion is the formal milestone at which:

A. The installer's contractual obligations begin

B. The system is ready for its intended use and the warranty period typically begins

C. All punch list items have been completed and verified

D. Final retention is fully released to the installer

93. A 12-month warranty effective date is generally tied to:

A. The original contract signing date

B. The date equipment was originally delivered to the warehouse

C. The first day of installation work on the project

D. Substantial completion when the client takes beneficial use

94. As-built documentation primarily serves which purpose?

A. To record the installed system's actual configuration for future reference

B. To provide design intent for the installation team

C. To establish contract scope between parties

D. To document change orders processed during construction

95. A typical client end-user training session in AV installations is best characterized by:

A. Extended technical sessions covering all system capabilities in detail

B. Lecture-style presentation with no hands-on participation

C. Brief focused sessions on essential operations with hands-on practice

D. Self-paced video training without instructor presence

96. A quick reference guide provided as a training material should include:

A. Detailed technical specifications for each piece of equipment

B. Essential functions with screenshots and simple instructions

C. Complete signal flow diagrams for the entire system

D. Manufacturer service contact information for each component

97. A service agreement typically provides:

A. Complete installation upgrades at no additional cost

B. Free equipment replacement throughout the agreement period

C. Manufacturer warranty extension for all installed equipment

D. Defined response times, scheduled preventive maintenance, and priority service

98. A typical preventive maintenance schedule for a commercial AV installation operating during standard business hours typically recommends:

A. Annual visits with more frequent visits for high-use environments

B. Quarterly visits as the universal standard regardless of environment

C. Visits only when system problems occur

D. Monthly visits for all installations regardless of usage

99. The signed sign-off documentation at project completion serves the primary purpose of:

A. Authorizing manufacturer warranty registration for equipment

B. Creating a formal written record of the client's acceptance of the installation

C. Documenting installation date for tax depreciation purposes

D. Triggering the next phase of the construction project

100. A walk-through performed during the substantial completion process typically involves:

A. Only the lead installer reviewing their own work

B. Only the design engineer and manufacturer representative

C. Only the client's facility staff with no installer present

D. The installer, client representative, and sometimes the general contractor

101. A certificate of substantial completion documents:

A. The original cost of equipment installed in the project

B. That the system is ready for its intended use even though minor work may remain

C. The serial numbers of all installed equipment

D. The expected service life of installed components

102. A client representative who signs project completion documents typically holds:

A. Limited authority to provide informal acknowledgment only

B. Authority to verify the installation date but not accept the work

C. Authority to modify the original contract terms

D. Formal signing authority for the client organization

Domain E — Conducting Ongoing Project Responsibilities

103. The primary purpose of daily progress reports is to:

A. Calculate weekly invoice amounts for billing purposes

B. Document equipment serial numbers as they are installed

C. Document activities, labor, materials, and issues for the project record

D. Track individual installer productivity for performance reviews

104. A request for information (RFI) is most appropriately used to:

A. Obtain clarification or direction on a field-discovered issue from the design team

B. Document materials consumed during the previous work day

C. Request additional labor resources from the project manager

D. Submit invoices for completed work to the client's accounting

105. A field engineering decision involving substituting equivalent accessories during installation is typically:

A. A major adaptation requiring formal change order and client approval

B. A code violation requiring building inspector notification

C. A breach of contract requiring immediate work stoppage

D. A minor adaptation within the installer's authority but requiring documentation

106. Trade coordination on a construction project is primarily managed through:

A. The architect who provides daily schedule updates to all trades

B. The general contractor's superintendent and structured coordination meetings

C. Direct communication between AV and electrical workers without supervisor involvement

D. The client's facilities director who coordinates all trades

107. A change order is required when:

A. Work scope expands beyond the original contract specifications

B. Materials are consumed faster than originally estimated

C. The installer must perform work during evening hours

D. Equipment fails during installation and requires replacement

108. The "clean as you go" practice in AV installation means:

A. The installation crew cleans the entire jobsite at the end of each work week

B. Specialized cleaning contractors handle all jobsite cleanup activities

C. Cable scraps, packaging, and debris are managed continuously

D. Cleanup activities are deferred until the project's final close-out phase

109. Construction debris from AV installation is typically disposed of through:

A. The AV installation firm's own dedicated dumpster brought to the site

B. The general contractor's construction waste management system

C. The client's regular building trash service

D. Personal disposal by individual installers at the end of each shift

110. A delay caused by another trade's incomplete work should be reported by the AV installer through:

A. Direct confrontation with the other trade's foreman

B. Posting on the project's social media or messaging platforms

C. Filing a formal grievance with the building owner

D. The project manager who can coordinate appropriate response

111. Silica dust controls during concrete cutting in AV installations include:

A. Standard N95 dust masks accepting normal dust generation

B. Performing all cutting outside the building during favorable weather

C. Water suppression, local exhaust ventilation, or respiratory protection per OSHA standards

D. Using only carbide-tipped blades to minimize cutting friction

112. A coordination drawing developed through Building Information Modeling (BIM) primarily supports:

A. Conflict identification and resolution between MEP, fire protection, and technology systems

B. Marketing presentations to potential clients

C. Building permit applications submitted to local authorities

D. Insurance documentation for the construction project

113. An AV installer who discovers an unexpected condition that affects the original design has the responsibility to:

A. Modify the installation to accommodate the condition without notifying others

B. Report the condition through appropriate channels for engineering review

C. Wait for the design team to discover the condition during their next site visit

D. Document the condition for the as-built drawings only

114. Reporting a delay to the project manager should occur:

A. Only after the delay has caused a missed schedule milestone

B. During the next scheduled coordination meeting regardless of timing

C. Only when the cause of the delay can be definitively documented

D. As soon as the potential delay is identified, even if impact is uncertain

115. A scope change identified during installation should:

A. Be routed through the project manager for change order processing

B. Be implemented immediately to maintain project schedule

C. Be ignored if it represents a small amount of additional work

D. Be assigned to the next available installer without documentation

116. Work performed on AV equipment beyond the original contract scope without formal change order approval typically results in:

A. Reimbursement at premium emergency rates

B. Automatic addition to the next monthly invoice

C. Labor and materials consumed without compensation to the installer

D. Default acceptance by the client at the original contract rate

117. The professional documentation captured during field engineering decisions supports:

A. Direct communication between the installer and equipment manufacturers

B. Both as-built records and traceability of decisions made under installer authority

C. Sales discussions with future potential clients

D. Performance reviews of individual installation crew members

118. The installer's responsibility regarding firestopping at fire-rated wall penetrations is to:

A. Defer all firestopping to the general contractor without coordination

B. Apply silicone caulk as a temporary measure pending professional firestop

C. Use the same firestop material regardless of the wall's fire rating

D. Either perform the firestopping correctly or coordinate with the firestop contractor

119. An installer who discovers asbestos-containing material during cable removal should:

A. Stop work immediately and contact qualified asbestos abatement personnel

B. Continue work using respiratory protection and document the finding

C. Cap both ends of the affected cable and continue with remaining work

D. Notify only the client without involving regulatory authorities

120. The professional purpose of root-cause analysis after a service incident is to:

A. Determine which crew member is responsible for the failure

B. Document the failure for future legal proceedings

C. Understand why the failure occurred so the same failure does not recur

D. Calculate the warranty coverage applicable to the failure

121. A typical AV installation's expected service life before major refresh is approximately:

A. 2 to 3 years

B. 7 to 10 years

C. 15 to 20 years

D. 25 to 30 years

122. End-of-life indicators for an AV installation typically include:

A. Increased user satisfaction with system performance

B. Decreased frequency of preventive maintenance visits

C. Reduced electricity consumption by aging equipment

D. Increasing service frequency, declining reliability, and parts unavailability

123. Decommissioned AV equipment containing configuration data should be:

A. Factory-reset or data-wiped before leaving the client's site

B. Returned to the manufacturer in original packaging for credit

C. Donated to charitable organizations without modification

D. Stored in the client's facility for potential future use

124. The Restriction of Hazardous Substances (RoHS) directive primarily addresses:

A. Workplace safety requirements for AV installation work

B. Building code requirements for AV equipment installation

C. Restricted materials in electronic equipment requiring responsible handling

D. Manufacturer warranty terms for installed AV equipment

125. The relationship between an installer and an installation typically extends:

A. Only through the initial installation phase to client handover

B. Through the entire service life of the system via maintenance and service activities

C. Through manufacturer warranty period only

D. Until the next election of building management

PRACTICE EXAM 5: ANSWER KEY WITH FULL ANSWER EXPLANATIONS

Questions 1–125

Domain A — Conducting Pre-Installation Activities

1. B — Document field conditions independently and flag the discrepancies to the design team. As-built drawings that do not reflect current conditions are unreliable for planning, and installations based on outdated drawings produce field errors. Documenting actual field conditions and escalating the drawing discrepancy enables the design team to correct records and adjust design elements that depend on building geometry.

2. A — Air movement from the diffusers may affect loudspeaker performance and coverage. Air movement near loudspeakers can affect their radiation pattern and create audible artifacts in nearby microphones, and diffuser placement typically targets occupant comfort without considering AV equipment. Documentation and coordination with the HVAC designer addresses this interaction before installation.

3. D — 0.69 square inches. Summing 3 × 0.06 + 3 × 0.09 + 2 × 0.12 equals 0.18 + 0.27 + 0.24 = 0.69 square inches. This total is compared against the conduit's allowable fill area to verify NEC compliance before pulling cable.

4. C — 39%. Dividing 0.69 square inches by 1.78 square inches equals approximately 38.8%, rounded to 39%. This percentage falls within the 40% NEC fill limit for three or more cables, confirming the proposed cable count is code-compliant.

5. A — Coordinate with IT to establish VLAN assignments before AV network configuration. VLAN assignments affect how AV equipment communicates on the network, and configuration without assignments produces installations that conflict with the broader network architecture. Coordinating before installation prevents discovery of the issue at commissioning.

6. B — Approximately 21 feet 4 inches. At 3/16" = 1'-0" scale, each 3/16 inch on paper represents one foot in reality. 4 inches divided by 3/16 inch equals approximately 21.3 feet, or 21 feet 4 inches.

7. D — The equipment room cooling capacity cannot be verified without dedicated HVAC. Shared cooling systems may or may not provide adequate heat removal for the AV equipment room, and

verification requires HVAC engineering assessment. Documentation and coordination with the mechanical engineer addresses this uncertainty before installation.

8. C — 50 cable ties plus reasonable reserve quantity. The shortage is 125 required minus 75 available equals 50 ties, and adding reasonable reserve (typically 10-15%) ensures availability without producing excess. This approach minimizes procurement while maintaining adequate stock.

9. A — 36 rack units. The 42U rack minus 6U of blanking panels and cable management leaves 36 rack units of available mounting space. This calculation is essential for verifying that proposed equipment fits within the rack's remaining capacity.

10. D — Glare from sunlight will severely impair display visibility during afternoon hours. Direct sunlight opposite a display creates glare that washes out the image and reduces contrast to unusable levels. Documentation and coordination with the design team addresses this through display technology selection, mounting repositioning, or window treatment.

11. B — 360 degrees. Three 90-degree bends total 270 degrees, plus two 45-degree bends add 90 degrees, equaling 360 degrees total. This equals the NEC limit between pull points, and any additional bends would require a pull box.

12. C — Identification and tracing during installation, verification, and future service work. Cable labels on both ends support tracing from either direction, essential for installation verification, commissioning, and future service work over the installation's service life. Single-end labeling limits tracing capability and creates service difficulties.

13. A — Coordinate with the electrical engineer to install a 230-volt circuit before installation. Equipment requiring specific voltage must have matching circuit infrastructure, and the electrical engineer must design and approve the circuit installation. Field workarounds (step-up transformers, model substitutions, underpowered operation) compromise system performance and reliability.

14. B — Apply a 15-30% increase in estimated hours for evening shift conditions. Evening shift work typically produces 15-30% productivity reduction due to fatigue, reduced coordination with daytime resources, and work-environment changes. Professional estimating applies appropriate productivity factors rather than assuming standard productivity in non-standard conditions.

15. D — Separation requirements apply per NEC to maintain physical and electrical isolation between low-voltage and line-voltage cabling. NEC and similar codes mandate separation between communications cable and electrical power conductors to prevent electrical interference and safety hazards. Documentation and coordination with the design team addresses the specific separation requirements.

16. C — Routing variations, termination waste, and minor field modifications. Contingency margin accounts for the differences between calculated requirements and actual field consumption,

including routing variations from planned paths, termination waste at cable ends, and minor modifications during installation. Typical contingency is 10-15% of calculated requirements.

17. A — Document the conflict and coordinate with the design team and general contractor. Dimensional conflicts between equipment and building access require coordinated resolution between trades. Removing rack frame components or substituting different equipment requires design team involvement to ensure the installation meets requirements.

18. B — Written report with photographs and detailed notes. Comprehensive site survey documentation uses written format with supporting photographs and detailed notes, producing a record that can be distributed, referenced, and preserved for the project duration. Verbal or sketch-only documentation is insufficient for professional practice.

19. D — Document the discrepancy and escalate to the design team for resolution. Discrepancies between design documents indicate incomplete or inconsistent design that requires design team resolution. Unilateral substitution or omission of specified equipment bypasses the design accountability that protects project integrity.

20. A — 110 labels. 50 cables × 2 ends equals 100 labels minimum, plus 10% reserve (10 labels) equals 110 labels total. Adding reserve prevents shortages during installation that would disrupt work.

21. C — Project manager, design engineer, client representative, and lead installer. A comprehensive pre-installation meeting involves all key project stakeholders to align on schedule, scope, access, safety, and communication before installation begins. Partial meetings missing key parties produce gaps that become issues during installation.

22. B — Document formally and coordinate with the design team and general contractor. Missing structural blocking is a construction deficiency requiring coordination with the design team (to verify what is actually required) and the general contractor (to execute the blocking installation). Alternative anchoring methods or field additions without coordination compromise structural integrity.

23. D — 112 hours. Base 80 hours × 1.20 (difficult conditions) equals 96 hours, then × 1.10 (trade coordination) equals approximately 106 hours, which rounds to approximately 112 hours accounting for compound effects. Productivity factors are typically applied multiplicatively.

24. A — Coordinate with IT to upgrade network infrastructure to support required bandwidth. Insufficient network infrastructure cannot support the specified AV traffic, and the proper response is infrastructure upgrade coordinated with IT. Reducing bandwidth, using compression, or installing parallel networks compromises the specified system design.

25. C — The project manager, design team, and project file. Site survey findings require distribution to stakeholders who use the information for their respective contributions, with permanent storage

in the project file for future reference. Limited distribution produces gaps that become issues during installation.

26. D — The image size will be larger than specified, potentially overfilling the screen. Throw distance and image size are inversely related through the throw ratio — greater distance produces larger image. A 22-foot distance with a 1:1 throw ratio would produce a 22-foot image instead of the 18-foot specified, potentially overfilling the screen.

27. A — Coordinate access protocols with the client's security team before installation begins. Secured area access requires advance coordination with security personnel to establish escort arrangements, credentialing, and access windows. Coordinating before installation prevents daily access disruptions during the work.

28. C — At the time of the walk-through with immediate distribution. Documentation at the time of the walk-through captures observations while they are fresh and accurate, and immediate distribution enables stakeholders to act on findings before conditions change. Delayed documentation loses accuracy and timely action.

Domain B — Conducting Site Rough-In/First-Fix

29. B — Stop the pull immediately and investigate before proceeding. Tension approaching manufacturer maximum indicates that the cable is near its damage threshold. Continuing the pull risks invisible internal damage that degrades cable performance permanently; professional practice stops to identify and address the cause of high tension.

30. D — A designated anchor point on the platform itself. Boom lifts can experience whipping motion that ejects workers from the platform, and OSHA requires personal fall arrest attached to designated anchor points on the platform. Anchoring to ground systems or adjacent structures defeats the protection and is not permitted.

31. A — For every four feet of working height, the base extends one foot from the structure. The 4-to-1 rule establishes the ladder angle for safe climbing and stability. A 16-foot working height requires the ladder base positioned 4 feet from the supporting surface.

32. C — Crew members at the feed end, any intermediate pull box, and the pull end. Multi-bend conduit pulls require crew members at critical positions to manage cable through the pull path, coordinate via communications, and stop immediately if problems develop. Single-position pulls cannot manage multi-bend pulls safely.

33. B — Installed by the general contractor during wall framing, before drywall. Structural blocking is a construction activity that must be installed during framing, before walls are closed. Coordination with the general contractor ensures blocking is in place at the correct locations when AV mounting begins.

34. D — 1,500 pounds. A 3/8-inch A307 threaded rod has a tensile failure capacity of approximately 6,000 pounds (varies slightly by specific grade), and applying a 4:1 safety factor yields approximately 1,500 pounds working load. Professional installation uses published working loads rather than failure loads.

35. A — The cable has separated from the pulling line or rope. Unexpected tension drops during a pull typically indicate that the cable has separated from the pulling apparatus, leaving the rope being pulled without attached cable. Stopping to verify cable attachment prevents damage and wasted effort.

36. C — The lift is on firm, level ground and within rated capacity. Scissor lift stability depends on firm, level supporting ground within the manufacturer's rated capacity. Verification of these conditions is a pre-operation requirement before elevating with load.

37. B — Pulled with excessive tension beyond manufacturer specifications. Excessive pulling tension stretches and damages cable internally, including breaking individual conductors and separating twisted pairs. This damage may not be visible externally but degrades electrical performance significantly.

38. D — Concrete-rated wedge anchors or sleeve anchors. Concrete masonry walls require fasteners specifically designed for concrete materials with installation per anchor specifications. Wood screws and lag bolts cannot effectively engage masonry, and plastic expansion anchors lack adequate capacity for substantial AV mounts.

39. A — Plenum-rated and attached to structural members above the ceiling. Plenum installations require materials with appropriate fire ratings including cable supports, and attachment must be to structural members rather than to ceiling grid or ductwork that are not designed for cable loads.

40. B — Three cables may wedge together during the pull, increasing tension. Jam ratio in the 2.8 to 3.2 range causes three cables to geometrically wedge together during pulling, dramatically increasing pulling tension and damaging cables. Professional practice avoids this geometry through cable count adjustment, conduit resizing, or split pulls.

41. D — Water suppression, local exhaust ventilation, or respiratory protection matched to exposure level. OSHA's silica standard (29 CFR 1926.1153) requires specific controls matched to the specific activity and exposure level, including engineering controls and respiratory protection. Standard dust masks are insufficient for silica exposure.

42. C — 3 feet above the work surface. OSHA requires ladders used for access to an elevated surface to extend at least 3 feet above the landing surface, providing stable handholds as the worker transitions from ladder to surface. Ladders not extending 3 feet above create unsafe access conditions.

Domain C — Installing Audiovisual Systems

43. A — 42 inches. A 24U rack frame provides 24 × 1.75 inches of vertical mounting height, which equals 42 inches. The rack unit measure is calculated by multiplying RU count by 1.75 to determine vertical space requirements.

44. B — 16 amperes of continuous load. The 80% rule limits continuous loads to 80% of circuit rating, so a 20-ampere circuit is limited to 20 × 0.80 = 16 amperes for continuous loads. This rule prevents breaker tripping and equipment damage from sustained near-rated current draw.

45. D — 19 inches. The 19-inch width measured between front mounting flanges is the global standard for professional AV, broadcast, data, and telecommunications equipment racks. This standardization allows compatible equipment from any manufacturer to mount into any compatible rack.

46. C — 5.25 inches. A 3U device occupies 3 × 1.75 inches, which equals 5.25 inches of vertical mounting height. Multiplying RU count by 1.75 gives the precise vertical space requirement for any equipment.

47. A — Preserving airflow paths and preventing hot exhaust recirculation. Blanking panels close unused rack units and maintain the rack's pressurized front-to-back airflow path. Without them, hot exhaust can recirculate back through gaps to be re-ingested by equipment intakes, causing thermal degradation.

48. D — 16 amperes. The 80% rule applied to 20 amperes equals 20 × 0.80 = 16 amperes of continuous load. This rule provides headroom against breaker tripping and equipment damage from sustained near-rated current draw.

49. B — Pin 2. The XLR connector convention assigns Pin 1 to ground/shield, Pin 2 to the hot/positive signal, and Pin 3 to the cold/negative signal. This AES standard ensures XLR cables function consistently across professional audio equipment.

50. C — 48 volts DC. Phantom power for condenser microphones is standardized at 48 volts DC, delivered through balanced audio cables in a configuration that does not affect the audio signal. Lower voltages exist for specific microphones, but 48V is the dominant standard.

51. A — Two conductors plus shield. Balanced audio uses two signal conductors (hot and cold) carrying the signal as a voltage difference, plus a shield/ground conductor. This three-wire configuration enables common-mode rejection that distinguishes balanced from unbalanced audio.

52. C — A doubling of power. A 3 dB increase represents a power ratio of 2:1, meaning power has doubled. This reference value is one of the three key decibel facts to memorize, along with 6 dB doubling voltage and 10 dB representing a tenfold power change.

53. D — 20 × log(V1/V2). The decibel formula for voltage ratios uses the multiplier 20, while the formula for power ratios uses 10. The voltage formula uses 20 because power scales with voltage squared, doubling the multiplier to account for this relationship.

54. B — Step down the high-voltage line to the loudspeaker's required voltage. The transformer at each loudspeaker on a 70V distributed audio system steps down the 70-volt line to the lower voltage that the loudspeaker driver requires, with a tap selector determining the power the loudspeaker draws.

55. A — 480 watts. Professional practice sizes amplifiers at approximately 125% of total tap load, meaning a 600-watt amplifier should drive no more than approximately 480 watts of total tap load (600 ÷ 1.25 = 480). This headroom ensures reliable operation.

56. C — 500 MHz. Cat6A cable supports a maximum frequency of 500 MHz, twice the 250 MHz of Cat6 cable. This higher bandwidth supports 10GBase-T data rates and modern HDBaseT 4K60 video applications.

57. B — 0.5 inches. Cat6A cable specifications permit only half an inch of untwist at termination because excess untwist degrades high-frequency performance and crosstalk rejection. Maintaining this minimum is essential for certified performance.

58. D — Video signal transport including SDI and CATV. 75-ohm coaxial cable is the standard for video applications including composite video, SDI broadcast video, CATV, and other baseband and broadband video signals. The 50-ohm version is used for communications RF applications.

59. A — 100 meters (328 feet). The HDBaseT specification supports 4K60 video transmission over Cat6A cable up to 100 meters (328 feet), matching general Ethernet limits. This long-distance capability is one of HDBaseT's key advantages for commercial AV.

60. C — The DDC channel embedded within the HDMI or DisplayPort cable. EDID information is exchanged via the Display Data Channel (DDC), which runs within the HDMI or DisplayPort cable on dedicated pins. This embedded channel allows automatic EDID exchange without separate connections.

61. D — 4K UHD content from compatible sources. HDCP 2.2 (and later versions) is required for 4K content because the original HDCP 1.x standard was not designed for 4K bandwidth. Every device in the signal path must support the required HDCP version, or protected content will not display.

62. B — 300 meters. OM3 multimode fiber specifications support 10 Gbps Ethernet transmission to 300 meters, substantially exceeding the 100-meter limit for copper. OM4 extends this to 400 meters, and OM5 to even greater distances.

63. C — Green. APC (Angled Physical Contact) fiber connectors are color-coded green to distinguish them from PC and UPC connectors which are blue or beige. This distinct color coding prevents accidental mating of incompatible connector types.

64. A — 0.25 to 1 millisecond. Dante audio networking operates with extremely low latency at standard settings, typically 0.25 to 1 millisecond depending on the specific configuration. This low latency is essential for professional audio applications where noticeable delay would degrade the user experience.

65. D — 10 Gbps Ethernet. SDVoE distributes uncompressed 4K60 video over 10 Gbps Ethernet, which provides the bandwidth required for the uncompressed stream plus headroom for protocol overhead. This requirement is substantially greater than the 1 Gbps of typical office networks.

66. B — 25.5 watts. The IEEE 802.3at standard (PoE+) provides 25.5 watts at the powered device, with 30 watts at the power source equipment. The difference between source output and PD input accounts for cable losses during transmission.

67. C — 254 hosts. A /24 subnet provides 256 total addresses, minus 2 reserved for network and broadcast, leaving 254 usable host addresses. This is the standard subnet size for many local network deployments.

68. A — 9600 and 115200 bps. RS-232 serial communication operates at typical baud rates between 9600 and 115200 bits per second, with 9600 being the most common default. Higher rates support greater throughput but require shorter cable lengths.

69. D — Unidirectional with no status feedback from the controlled device. IR control transmits commands from controller to device but receives no feedback, making it limited compared to bidirectional protocols. IR also requires line of sight, further limiting its application.

70. B — Verify network connectivity to the device using ping or similar tool. Ping testing is the most efficient first diagnostic step because it quickly identifies whether the device is reachable on the network. This eliminates the most common cause of communication failures before pursuing more complex diagnostics.

71. A — 0.40 ohms. The 5% of 8 ohms equals 0.40 ohms maximum cable resistance. Maintaining this limit preserves power transfer efficiency and prevents the amplifier from seeing reduced effective impedance that could trigger protection circuits.

72. C — 2.67 ohms. Three 8-ohm loudspeakers in parallel combine as 8 ÷ 3, which equals approximately 2.67 ohms. Parallel impedance is always lower than any individual element, and dropping below amplifier minimum specification can cause damage.

73. B — Full quality maintained until catastrophic failure at the digital cliff. Digital signals tolerate degradation without quality loss up to the point where binary ones and zeros become indistinguishable, then fail completely rather than degrading gradually. This binary success/failure characteristic distinguishes digital from analog signal behavior.

74. D — EDID negotiation failure between the switcher and the affected display. When one display shows a black screen while others display correctly from the same source routed through the same

switcher, EDID negotiation is the typical cause. The switcher may not be providing EDID information that matches what the display expects.

75. A — Video signal amplitude over time. A waveform monitor displays video signal voltage as a waveform on a time-axis display, useful for verifying signal levels, sync timing, and amplitude-based characteristics. Modern software waveform monitors integrate with capture hardware in many verification workflows.

76. C — Video chrominance on a polar plot. A vectorscope displays video chrominance (color information) as a polar plot showing color hue (angle) and saturation (radius from center). This display format is essential for color verification across multiple video sources.

77. B — 10 feet. The throw ratio formula is image distance divided by image width, so image width = 15 ÷ 1.5 = 10 feet. Throw ratio calculations determine projector positioning to achieve specific image sizes.

78. A — 6500K (D65). The D65 white point references 6500 Kelvin and is the standard white point for video content calibration. Calibrating to D65 ensures that white content appears correctly without warm or cool tints.

79. D — 2.2. Standard video content is encoded for gamma 2.2, establishing the nonlinear relationship between input signal and displayed brightness that matches human visual perception. Display calibration adjusts gamma to match this standard so midtones appear correctly bright.

80. B — 8 times the image height. The AVIXA DISCAS standard recommends maximum viewing distance of 8 times image height for basic decision-making content (where text must be readable from the back of the room). Analytical decision-making content requires shorter distances of 4 times image height.

81. C — Flat, documented frequency response with omnidirectional polar pattern. Measurement microphones are designed for analytical accuracy rather than performance coloration, with flat frequency response and omnidirectional sensitivity producing measurements that reflect the room's actual sound rather than the microphone's character.

82. A — Open interoperability between different manufacturers' networked audio systems. AES67 is an open standard from the Audio Engineering Society that enables networked audio systems from different manufacturers to exchange audio. Modern Dante implementations include AES67 compatibility as the common interoperability layer.

83. D — All loudspeakers in a system move in the same direction on the same signal. A polarity tester verifies that every loudspeaker responds with correct polarity to a reference signal. Polarity errors cause destructive interference and substantial loss of low-frequency output that the test identifies.

84. B — Insertion loss, return loss, NEXT, ANEXT, propagation delay, and other parametric measurements. Category-rated cable certification tests multiple parameters that together

demonstrate the cable's high-frequency performance meets the specified category. Simple continuity tests are insufficient for verified performance.

85. A — 4.5 Gbps. 1080p60 at 8-bit color depth requires approximately 4.5 Gbps of bandwidth. Cable infrastructure must support this bandwidth because inadequate cable produces signal failure rather than gradual degradation.

86. D — 24 Gbps. 4K60 with 10-bit color and HDR requires approximately 24 Gbps of bandwidth, exceeding the 18 Gbps capacity of Premium High Speed HDMI. Ultra High Speed HDMI or equivalent infrastructure is required for this signal specification.

87. C — 200 watts total (120 + 80). 6 loudspeakers × 20 W = 120 W, plus 8 loudspeakers × 10 W = 80 W, totaling 200 watts. Tap load calculations determine the total power demand on the amplifier.

88. B — The sound of the room loudspeakers reproducing far-end audio. Acoustic echo cancellation removes the room loudspeaker audio from the microphone signal so that far-end participants hear only the near-end voices rather than echoes of their own speech. This processing is essential for effective hands-free conferencing.

Domain D — Perform Systems Close-Out

89. D — Audiovisual systems performance verification. ANSI/AVIXA 10:2013 is the industry standard governing how AV systems are verified against design specifications during commissioning. The standard defines the verification framework including A-Level, B-Level, and C-Level verification items.

90. A — Essential system functions that must be verified on every installation. A-Level verification items are the fundamental capabilities that every AV installation must demonstrate, including system power-on, source selection, content display, audio reinforcement, and control system function.

91. C — A substantive deficiency affecting equipment protection and service access. A rack door that will not close affects equipment protection and service access, making it substantive rather than cosmetic. Substantive deficiencies typically receive higher priority than items affecting only appearance.

92. B — The system is ready for its intended use and the warranty period typically begins. Substantial completion is the milestone where the installation is usable for its intended purpose, even though minor work may remain. This triggers warranty effective dates, beneficial use, and final payment becoming due.

93. D — Substantial completion when the client takes beneficial use. Warranty periods typically begin at substantial completion because that is when the system is placed in service and wear begins to accumulate. Tying warranties to original installation dates would unfairly disadvantage clients.

94. A — To record the installed system's actual configuration for future reference. As-built documentation captures the system as it actually exists, supporting future service work, modifications, and expansions throughout the installation's service life. The documentation is the authoritative reference for what is installed.

95. C — Brief focused sessions on essential operations with hands-on practice. End-user training is most effective when concise, focused on essential operational tasks rather than detailed technical knowledge, and includes hands-on practice. Users who actually operate the system during training retain knowledge better than passive observers.

96. B — Essential functions with screenshots and simple instructions. Quick reference guides are typically one or two pages providing brief, accessible instruction on essential functions with screenshots and simple language. They serve as the most-used training material long after training sessions conclude.

97. D — Defined response times, scheduled preventive maintenance, and priority service. Service agreements typically combine response time commitments, preventive maintenance visits at scheduled intervals, remote support, priority over ad-hoc service requests, and discounted rates for work outside the agreement scope.

98. A — Annual visits with more frequent visits for high-use environments. Professional preventive maintenance schedules typically recommend annual visits for most installations, with more frequent visits for high-use, demanding, or mission-critical environments. The annual baseline captures most preventive needs cost-effectively.

99. B — Creating a formal written record of the client's acceptance of the installation. Signed sign-off documents create the contractual record that the client has inspected, observed, received training on, and accepted the installation as meeting requirements. This record protects both parties from later disputes.

100. D — The installer, client representative, and sometimes the general contractor. The substantial completion walk-through is a formal event where the installer, client representative, and on larger projects the general contractor or commissioning authority walk through together to verify the installation and document any remaining items.

101. B — That the system is ready for its intended use even though minor work may remain. The certificate of substantial completion formally documents that the installation has reached the milestone where the client takes beneficial use, with any remaining punch list items scheduled for resolution before final completion.

102. D — Formal signing authority for the client organization. Project completion documents must be signed by an authorized client representative who has signing authority for the organization (typically a facilities director, project owner, or equivalent role). This formal authority makes the signed acknowledgment binding on the client.

Domain E — Conducting Ongoing Project Responsibilities

103. C — Document activities, labor, materials, and issues for the project record. Daily progress reports create the ongoing record of installation work that supports schedule tracking, change management, billing, and historical reference. The reports become particularly valuable when disputes arise about what was accomplished when.

104. A — Obtain clarification or direction on a field-discovered issue from the design team. RFIs are formal questions submitted to the design team requesting clarification or direction on issues encountered during installation. The RFI documents both the question and the response, becoming part of the project record.

105. D — A minor adaptation within the installer's authority but requiring documentation. Substituting equivalent accessories is typically a minor adaptation within installer authority that does not require formal change orders. However, even minor changes should be documented in daily reports and as-built drawings to maintain accurate project records.

106. B — The general contractor's superintendent and structured coordination meetings. The general contractor's superintendent coordinates across all trades on construction projects and is the primary point of contact for schedule coordination, site access, and conflict resolution. Coordination meetings provide the structured forum for trade interactions.

107. A — Work scope expands beyond the original contract specifications. Change orders are required when work scope expands beyond the original contract, whether through client requests, field discoveries, design modifications, or coordination requirements. The change order documents the addition, impact, and obtains client approval.

108. C — Cable scraps, packaging, and debris are managed continuously. Clean-as-you-go integrates debris management into installation work, placing cable scraps and packaging into appropriate containers as they are produced. This continuous practice prevents the accumulation that would require time-consuming end-of-day cleanup.

109. B — The general contractor's construction waste management system. Construction debris from AV installation is typically disposed of through the general contractor's waste management infrastructure, which provides general construction waste containers, recyclable material containers, and appropriate disposal routes.

110. D — The project manager who can coordinate appropriate response. Issues with other trades should be routed through the project manager who has the authority and relationship with the general contractor to coordinate resolution. Direct conflict between trades typically damages working relationships and rarely produces effective solutions.

111. C — Water suppression, local exhaust ventilation, or respiratory protection per OSHA standards. OSHA's silica standard (29 CFR 1926.1153) requires specific dust controls during silica-

generating activities including water suppression at the point of cutting, local exhaust ventilation with HEPA filtration, or respiratory protection appropriate for the exposure level.

112. A — Conflict identification and resolution between MEP, fire protection, and technology systems. BIM coordination drawings show how all building systems fit into ceiling and wall spaces without conflicts. Coordination drawings are developed collaboratively during design, but coordination issues continue to emerge in the field and require real-time resolution.

113. B — Report the condition through appropriate channels for engineering review. Field-discovered conditions affecting design must be reported for engineering review rather than being silently absorbed into the installation. Professional escalation enables design modifications to be properly authorized rather than becoming undocumented improvisations.

114. D — As soon as the potential delay is identified, even if impact is uncertain. Delays reported early permit the project manager to develop mitigation strategies and communicate with the client before commitments are missed. Late reporting deprives the project manager of options and produces surprise schedule slips.

115. A — Be routed through the project manager for change order processing. Scope changes must flow through formal change order processes with project manager coordination, cost and schedule impact assessment, and client approval. Performing scope-change work without authorization consumes labor and materials that may not be recovered through payment.

116. C — Labor and materials consumed without compensation to the installer. Unauthorized scope expansion typically results in labor and materials consumed without recovery, because the work was not part of the original contract and was not authorized through change order. Professional installation firms refuse to perform unauthorized scope expansion.

117. B — Both as-built records and traceability of decisions made under installer authority. Field engineering documentation supports both the as-built record of what was actually installed and the professional record of decisions made during installation. This dual function makes documentation valuable for service support and demonstrating professional judgment.

118. D — Either perform the firestopping correctly or coordinate with the firestop contractor. Firestopping is life-safety work requiring proper materials and installation methods matched to the specific wall assembly rating. The installer must either perform the work correctly with appropriate training and materials or coordinate with qualified firestop contractors.

119. A — Stop work immediately and contact qualified asbestos abatement personnel. Asbestos exposure causes diseases that may emerge decades after exposure, and only qualified asbestos abatement contractors should disturb suspect materials. Continuing work informally creates exposure for workers and others with consequences that may not be apparent for years.

120. C — Understand why the failure occurred so the same failure does not recur. Root-cause analysis seeks the fundamental cause of failures so that addressing the cause prevents recurrence rather

than just restoring function. Repairs that address symptoms without root causes typically produce repeat failures that consume support resources over time.

121. B — 7 to 10 years. Professional AV installations typically have a service life of 7 to 10 years before substantial refresh is required, with individual components having varying lives within that range. Planning for refresh helps clients budget for system updates and installation firms plan service capacity.

122. D — Increasing service frequency, declining reliability, and parts unavailability. End-of-life indicators include increasing service calls, failures occurring during use rather than being caught by preventive maintenance, inability to support current needs, and unavailability of replacement parts.

123. A — Factory-reset or data-wiped before leaving the client's site. Decommissioned equipment containing configuration data, credentials, network information, or proprietary client information must be reset before disposal to protect that information from exposure. Professional decommissioning includes data removal as a standard step.

124. C — Restricted materials in electronic equipment requiring responsible handling. RoHS (Restriction of Hazardous Substances) restricts the use of certain hazardous materials in electronic equipment and requires responsible handling at end of life. Combined with WEEE directives, RoHS shapes how decommissioned AV equipment must be processed.

125. B — Through the entire service life of the system via maintenance and service activities. The professional installer's relationship with an installation extends through maintenance, service, upgrades, and eventually decommissioning across the system's full service life. This long-term relationship is the foundation of recurring revenue and client loyalty.