

PRACTICE EXAM 12: CTS-I

SIMULATION

QUESTIONS 1–125

Domain A — Conducting Pre-Installation Activities

1. An installer arrives at a site and finds that the AV equipment delivery is delayed by one week. The most appropriate first response is:

- A. Proceed with cable installation and defer equipment tasks
- B. Notify the manufacturer directly for expedited delivery
- C. Communicate with the project manager to assess schedule impact and coordinate response
- D. Cancel the installation and reschedule for a later date

2. A pre-installation review shows that specified cable run lengths exceed the cable manufacturer's maximum specifications. The most appropriate response is:

- A. Coordinate with the design team to specify appropriate cable or add signal extenders
- B. Install the specified cable and document the deviation
- C. Increase cable gauge to compensate for excess distance
- D. Proceed with installation and address issues during verification

3. A project's specified HDBaseT cable distance is 125 meters between a source matrix and a receiver display. This distance presents which concern?

- A. The distance is within HDBaseT standard specification
- B. The distance is shorter than HDBaseT's minimum practical limit
- C. The distance requires only standard Cat6A cable
- D. The distance exceeds the 100-meter HDBaseT specification and requires alternative transmission

4. A pre-installation meeting reveals that the client has contracted a separate IT services provider to manage network infrastructure. What coordination need does this create?

- A. The AV installer works independently from IT services
- B. IT services and AV coordination must be established for network integration
- C. The AV installer directs all IT services decisions
- D. IT services and AV must remain entirely separate

5. A pre-installation review identifies that the specified display weight is 180 pounds. Mounting hardware rated for 250 pounds provides what safety factor?

- A. Approximately 1.4:1, below the 4:1 industry standard
- B. Approximately 1.7:1, acceptable for non-overhead loads
- C. Approximately 2.0:1, acceptable with documentation
- D. 4:1, meeting industry standards

6. A pre-installation site survey identifies that the proposed equipment room has no ventilation system. The primary concern with installing substantial AV equipment in this room is:

- A. Installation labor costs will increase

- B. Cable routing will be more difficult
- C. Equipment will have shorter installation times
- D. Heat accumulation will damage equipment over time

7. A pre-installation walkthrough reveals that building electrical infrastructure includes only 120V circuits available for AV equipment. The planned equipment includes some 208V industrial-category equipment. The appropriate response is:

- A. Install 120V equivalents of the specified 208V equipment
- B. Coordinate with the electrical engineer to provide 208V circuits for the specified equipment
- C. Operate the 208V equipment on 120V circuits at reduced capacity
- D. Exclude the 208V equipment from the installation scope

8. A pre-installation site survey identifies that the existing cable pathway is undersized for the planned cable count. What is the appropriate engineering response?

- A. Install the cables regardless of pathway capacity
- B. Reduce the number of cables to fit the existing pathway
- C. Coordinate with the design team to upsize pathway capacity before installation
- D. Add a second undersized pathway parallel to the first

9. A pre-installation review identifies that specifications require Class 1 power for projector control but the electrical plans show only Class 2. The appropriate response is:

- A. Document the discrepancy and coordinate with design team for resolution
- B. Install the Class 2 circuits and document the deviation
- C. Install Class 1 circuits without coordination
- D. Operate the projector on battery backup to avoid the issue

10. A pre-installation walkthrough reveals that the door to the proposed equipment room is 30 inches wide, while the specified equipment rack exceeds 36 inches wide with doors attached. The appropriate response is:

- A. Cut the rack in half for transport through the door
- B. Install a smaller rack that fits through the door
- C. Coordinate with the general contractor to widen the door
- D. Coordinate resolution with the design team — typically removing doors for transport

11. A pre-installation review of cable specifications shows 12-strand fiber optic cables specified where 6-strand cables would suffice for the current application. The appropriate response is:

- A. Substitute 6-strand cable to reduce costs
- B. Install 6-strand cable and add capacity later
- C. Install the specified 12-strand cable which provides future expansion capacity
- D. Request the design team reduce specification to 6-strand

12. A pre-installation walkthrough identifies that the specified ceiling projector mount cannot be attached to the existing ceiling structure. The appropriate response is:

- A. Mount the projector to drywall with high-capacity anchors
- B. Coordinate with the structural engineer to identify suitable attachment points
- C. Use adhesive mounting as an alternative approach
- D. Install a floor-mounted projector system

13. A pre-installation review identifies that the proposed equipment rack location does not have dedicated power. The most appropriate response is:

- A. Run extension cords from adjacent spaces

- B. Install a UPS to generate power
- C. Use battery backup as the permanent power source
- D. Coordinate with the electrical engineer to provide dedicated circuits

14. A pre-installation walkthrough reveals that the planned cable pathway passes through a firewall that has been recently constructed. What consideration does this create?

- A. Firestopping assembly must match the wall's fire rating
- B. No special consideration is required
- C. The wall rating is always the same
- D. The pathway can proceed without assessment

15. A pre-installation review shows that the AV control system requires access to the building management system for HVAC integration. What coordination is required?

- A. No coordination is needed since systems are independent
- B. Only network access is required
- C. Coordination with the building management system integrator and potentially the mechanical engineer
- D. Only electrical coordination is needed

16. A pre-installation walkthrough reveals that the equipment room ceiling has exposed structural beams that could serve as cable support. The primary concern is:

- A. Exposed beams are easier to access
- B. Support method and load capacity must be verified with structural engineer approval if beams are used for substantial loads
- C. Exposed beams always have unlimited capacity
- D. Exposed beams are not suitable for any cable support

17. A pre-installation review identifies that the specified video-over-IP system requires dedicated VLANs on the client network. What coordination is required?

- A. No coordination is needed
- B. Only physical cable coordination
- C. Only power coordination
- D. Coordination with the client's IT department for VLAN assignment and network configuration

18. A pre-installation walkthrough reveals that an HVAC diffuser is located directly where a projector mount is specified. The appropriate response is:

- A. Coordinate relocation of the projector or diffuser through the design team
- B. Install the projector directly adjacent to the diffuser
- C. Ignore the diffuser location
- D. Block the diffuser to eliminate the conflict

19. A pre-installation review shows that the planned installation requires working above finished ceilings during occupied hours. What consideration does this create?

- A. No special consideration is needed
- B. Only OSHA regulations apply
- C. Coordination for occupant accommodation including noise, dust, and access limitations
- D. Only insurance coordination

20. A pre-installation walkthrough identifies that the specified equipment room lacks adequate lighting for installation work. The appropriate response is:

- A. Use flashlights during installation

- B. Request additional lighting installation before AV work begins
- C. Schedule all installation during daylight hours
- D. Install AV work without adequate lighting

21. A pre-installation review shows that the building infrastructure lacks a grounding bus appropriate for AV equipment. What is the appropriate concern?

- A. Grounding is not relevant to AV installations
- B. Only chassis grounding is needed
- C. Grounding through the electrical system is always sufficient
- D. Proper grounding is essential for safety and signal integrity, requiring coordination with electrical engineer

22. A pre-installation meeting identifies that the installation must be coordinated with another AV vendor installing a separate conferencing system. What coordination is required?

- A. Inter-vendor coordination through the project manager or general contractor
- B. Direct coordination between vendors without supervisors
- C. Each vendor works independently
- D. One vendor must defer to the other

23. A pre-installation walkthrough identifies that the proposed cable pathway conflicts with existing MEP (mechanical/electrical/plumbing) infrastructure. The appropriate response is:

- A. Install cables by routing around existing infrastructure regardless of code
- B. Remove the existing infrastructure to create pathway space
- C. Coordinate alternative pathway through the design team and general contractor
- D. Abandon the installation in the conflict area

24. A pre-installation review identifies that specific cable products have lead times exceeding project timeline. The appropriate response is:

- A. Substitute available alternatives without coordination
- B. Procure the specified cable with adequate lead time or coordinate substitution approval
- C. Skip the problematic cable runs
- D. Proceed with installation using general-purpose cable

25. A pre-installation walkthrough reveals that the acoustic environment in a conference room will affect microphone placement. What coordination is required?

- A. No acoustic coordination is needed
- B. Only cable coordination
- C. Microphone placement follows standard template
- D. Coordination with acoustic designers and consideration of room treatment

26. A pre-installation review identifies that specifications require proprietary connector types available only from specific manufacturers. What is the appropriate response?

- A. Use generic equivalent connectors
- B. Modify the specifications without coordination
- C. Avoid the connector type entirely
- D. Procure the specified connectors with appropriate lead time through approved vendors

27. A pre-installation site survey documents that the existing wall construction is framed with metal studs rather than wood. What consideration does this create?

- A. Metal studs do not affect AV mounting

- B. Metal stud construction requires different fastening approaches than wood studs
- C. Metal studs always have higher capacity than wood
- D. Metal studs always require structural reinforcement

28. A pre-installation walkthrough identifies that the proposed wireless microphone frequencies conflict with local television broadcasting. The appropriate response is:

- A. Coordinate wireless microphone frequency selection with FCC-compliant alternatives
- B. Use the proposed frequencies and accept interference
- C. Operate at reduced power
- D. Substitute wired microphones throughout

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

29. A cable pull through a 90-foot conduit run with three 90-degree bends experiences high pulling tension. The most appropriate first response is:

- A. Continue pulling at reduced speed
- B. Apply additional lubricant at the feed end
- C. Stop the pull and investigate the cause before proceeding
- D. Switch to mechanical pulling assistance

30. An installer at 28 feet on a boom lift platform requires fall protection. The correct configuration is:

- A. Guardrails alone without fall arrest
- B. Ground-anchored fall arrest system
- C. Safety nets below the work area
- D. Personal fall arrest attached to a designated anchor on the platform

31. A 1/2-inch A307 threaded rod has tensile failure capacity of approximately 10,000 pounds. Working load with a 5:1 overhead safety factor is:

- A. 2,000 pounds
- B. 1,500 pounds
- C. 2,500 pounds
- D. 1,000 pounds

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

- A. Standard wood lag bolts
- B. Concrete-rated wedge or sleeve anchors installed per anchor specifications
- C. Plastic expansion anchors
- D. Sheet metal screws

33. A cable pulled through conduit must not bend tighter than:

- A. 2 times the cable diameter
- B. 6 times the cable diameter
- C. 8 times the cable diameter
- D. 4 times the cable diameter during installation

34. An installer discovers asbestos-containing material during deinstallation. The appropriate response is:

- A. Continue using standard respiratory protection
- B. Cap the ends of affected material and continue
- C. Stop work and contact qualified asbestos abatement personnel

D. Document and continue with normal procedures

35. Structural blocking for wall-mounted equipment should be installed by:

A. The general contractor or framing trade during construction

B. The AV installer during mounting

C. The drywall contractor during wall finishing

D. The electrical contractor during rough-in

36. OSHA construction fall protection requires fall protection at:

A. 4 feet or greater

B. 6 feet or greater

C. 8 feet or greater

D. 10 feet or greater

37. OSHA requires fall arrest anchor points to have minimum rated capacity of:

A. 2,500 pounds per worker

B. 3,500 pounds per worker

C. 1,000 pounds per worker

D. 5,000 pounds per worker

38. The 4-to-1 rule for extension ladder positioning establishes:

A. The ladder must be 4 times stronger than the load

B. The ladder rungs at 4-inch intervals

- C. The base extends 1 foot per 4 feet of working height
- D. The ladder must be 4 feet longer than working height

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

- A. Plenum-rated and attached to structural members
- B. Made of any metal material
- C. Painted red to indicate plenum
- D. Spaced at specified intervals only

40. The jam ratio in cable pulling refers to:

- A. The ratio of pulling tension to cable maximum
- B. The ratio of cable count to conduit fill
- C. The ratio of conduit length to pull distance
- D. The ratio of conduit internal diameter to cable outside diameter

41. A scaffold worker at 20 feet requires fall protection. The most appropriate configuration is:

- A. No fall protection at this height
- B. Guardrails on all open sides of the scaffold
- C. Spotters watching the worker only
- D. Fall arrest attached to adjacent walls

42. NEC limits cumulative bend angle in conduit between pull points to:

- A. 180 degrees

- B. 270 degrees
- C. 360 degrees
- D. 450 degrees

Domain C — Installing Audiovisual Systems

43. An AV system powers on but produces no video output from any source. The most appropriate first diagnostic step is:

- A. Verify display power, input selection, and source device power status
- B. Disassemble the entire signal chain
- C. Replace the display immediately
- D. Reinstall the operating system on source devices

44. A display shows "No Signal" despite the source device being powered on and connected via HDMI. The most likely cause is:

- A. The room lighting is affecting the display
- B. The source device requires a firmware update
- C. Audio configuration is incorrect
- D. HDMI cable failure, source device output, or display input selection

45. A microphone produces no audio when connected. The first troubleshooting step is:

- A. Replace the microphone immediately
- B. Check the mixer's signal meters
- C. Verify phantom power status if required by the microphone
- D. Test a different microphone type

46. An audio system has audible hum when the gain is increased. The most likely cause is:

- A. Microphone battery is low
- B. Ground loop between connected equipment
- C. Speaker cable is damaged
- D. Audio source is set to the wrong format

47. A network-connected AV device cannot communicate despite being physically connected. The first diagnostic step is:

- A. Verify network connectivity using ping to the device IP address
- B. Replace the network cable
- C. Reboot the network switch
- D. Update device firmware

48. A standardized rack unit (RU) equals:

- A. 1.5 inches
- B. 1.625 inches
- C. 2.0 inches
- D. 1.75 inches

49. The standard rack mounting width is:

- A. 17 inches
- B. 19 inches
- C. 18 inches

D. 21 inches

50. A 16U rack-mount device occupies how many inches?

A. 24 inches

B. 30 inches

C. 28 inches

D. 32 inches

51. The 80% rule applied to a 20-ampere circuit limits continuous loads to:

A. 16 amperes

B. 20 amperes

C. 18 amperes

D. 14 amperes

52. A 300-watt heat load converts to approximately:

A. 1,500 BTU/hour

B. 950 BTU/hour

C. 1,100 BTU/hour

D. 1,024 BTU/hour

53. The XLR connector assigns Pin 1 to:

A. Hot/positive signal

B. Cold/negative signal

- C. Ground/shield
- D. Phantom power return

54. Phantom power for condenser microphones is standardized at:

- A. 24 volts DC
- B. 48 volts DC
- C. 12 volts DC
- D. 36 volts DC

55. A balanced audio cable uses:

- A. Two conductors plus shield
- B. One conductor plus shield
- C. Three conductors plus shield
- D. Four conductors plus shield

56. A 3 dB increase in audio power represents:

- A. A tenfold power increase
- B. A tripling of power
- C. A halving of power
- D. A doubling of power

57. A 70V amplifier rated at 400 watts should drive total tap loads of approximately:

- A. 400 watts

- B. 500 watts
- C. 320 watts
- D. 350 watts

58. The transformer at each loudspeaker on a 70V system:

- A. Steps down the high-voltage line to the loudspeaker's voltage
- B. Provides phantom power
- C. Converts AC to DC
- D. Boosts signal for long runs

59. Cat6A cable supports maximum frequency of:

- A. 250 MHz
- B. 500 MHz
- C. 350 MHz
- D. 100 MHz

60. The maximum permissible untwist at Cat6A termination is:

- A. 1.0 inches
- B. 0.75 inches
- C. 0.25 inches
- D. 0.5 inches

61. 75-ohm coaxial cable is typically used for:

- A. RS-232 serial control
- B. Communications RF including two-way radio
- C. Video signal transport including SDI and CATV
- D. Speaker-level audio

62. Maximum HDBaseT 4K60 copper cable distance is approximately:

- A. 100 meters (328 feet)
- B. 50 meters
- C. 200 meters
- D. 75 meters

63. EDID exchange occurs through:

- A. A separate management network
- B. Manual configuration at both ends
- C. RS-232 serial connection
- D. The DDC channel embedded within the HDMI or DisplayPort cable

64. HDCP 2.2 is required for:

- A. 1080p content from any source
- B. 4K UHD content from compatible sources
- C. Audio content over Dante networks
- D. Standard-definition video

65. OM3 multimode fiber supports 10 Gbps Ethernet to:

- A. 100 meters
- B. 200 meters
- C. 300 meters
- D. 400 meters

66. APC fiber connectors are color-coded:

- A. Green
- B. Blue
- C. Beige
- D. Yellow

67. Dante typical latency is:

- A. 50 to 100 milliseconds
- B. 10 to 20 milliseconds
- C. 5 to 10 milliseconds
- D. 0.25 to 1 millisecond

68. SDVoE requires minimum network infrastructure of:

- A. 1 Gbps Ethernet
- B. 10 Gbps Ethernet
- C. 100 Mbps Ethernet
- D. Wireless 802.11ac

69. IEEE 802.3at provides device power of:

- A. 12.95 watts
- B. 51 watts
- C. 25.5 watts
- D. 71 watts

70. A /24 subnet provides usable hosts of:

- A. 254
- B. 256
- C. 128
- D. 126

71. RFC 1918 private IPv4 ranges include:

- A. Only 10.0.0.0/8
- B. Only 192.168.0.0/16
- C. Only 172.16.0.0/12
- D. 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16

72. RS-232 typical baud rates range between:

- A. 1200 and 4800 bps
- B. 9600 and 115200 bps
- C. 4800 and 9600 bps
- D. 250000 and 500000 bps

73. RS-232 configuration requires matching:

- A. IP address, subnet mask, gateway
- B. MAC address and VLAN
- C. Baud rate, data bits, parity, stop bits
- D. Frequency, modulation, encryption

74. IR control is generally:

- A. Unidirectional with no status feedback
- B. Bidirectional with status feedback
- C. Effective at 500 feet
- D. Compatible with all equipment

75. A control processor sending IP commands with no response should first:

- A. Replace the network cable
- B. Update device firmware
- C. Reboot the processor
- D. Verify network connectivity using ping

76. An 8-ohm loudspeaker with cable resistance limited to 5% of impedance has maximum cable resistance of:

- A. 0.20 ohms
- B. 0.40 ohms
- C. 0.10 ohms

D. 0.50 ohms

77. Three 8-ohm loudspeakers in parallel present impedance of:

A. 2.67 ohms

B. 4 ohms

C. 8 ohms

D. 24 ohms

78. Digital signals degrading over distance exhibit:

A. Gradual quality degradation

B. Increasing color saturation

C. Audible growing noise

D. Full quality until catastrophic failure at the digital cliff

79. A waveform monitor displays:

A. Audio levels

B. Network bandwidth

C. Video signal amplitude over time

D. Video chrominance

80. A vectorscope displays:

A. Video signal amplitude

B. Video chrominance on a polar plot

- C. Audio frequency
- D. Network packet loss

81. A projector with throw ratio 2.5:1 at 30 feet produces what image width?

- A. 75 feet
- B. 24 feet
- C. 15 feet
- D. 12 feet

82. The target white point for video calibration is:

- A. 6500K (D65)
- B. 5500K (D55)
- C. 7500K (D75)
- D. 9300K (D93)

83. The target gamma for standard video is:

- A. 1.8
- B. 2.0
- C. 2.2
- D. 2.4

84. AVIXA DISCAS basic decision-making maximum viewing distance:

- A. 4 times image height

- B. 8 times image height
- C. 12 times image height
- D. 6 times image height

85. A measurement microphone has:

- A. Cardioid pattern
- B. Hypercardioid pattern
- C. Ribbon pattern
- D. Flat response with omnidirectional pattern

86. AES67 provides:

- A. Open interoperability between manufacturers' networked audio
- B. Audio encryption
- C. Power delivery
- D. Frequency analysis

87. A polarity tester confirms:

- A. Amplifier output
- B. Audio signal level
- C. All loudspeakers move in the same direction on the same signal
- D. Cable shielding

88. Cable certification for Cat6A tests:

- A. Length and continuity only
- B. Insertion loss, return loss, NEXT, ANEXT, propagation delay, and other parameters
- C. Voltage drop only
- D. Visual inspection only

Domain D — Perform Systems Close-Out

89. A client complains that the installed touch panel operates slowly. The first diagnostic step should be:

- A. Replace the touch panel
- B. Reinstall the touch panel software
- C. Update the control system firmware
- D. Verify network connectivity, panel processor load, and related system health

90. A system verification reveals that the video signal reaches the display but audio does not. The most likely cause is:

- A. Audio configuration mismatch, HDMI embedded audio settings, or separate audio routing issue
- B. Network bandwidth limitation
- C. Display hardware failure
- D. Power supply issue

91. ANSI/AVIXA 10:2013 structures verification items into three levels representing:

- A. Primary, Secondary, Tertiary

B. Level 1, Level 2, Level 3

C. A-Level, B-Level, C-Level representing essential, specialized, and unique items

D. Critical, Important, Optional

92. A non-functional audio microphone input is classified as:

A. A cosmetic deficiency

B. A pre-existing condition

C. A user training issue

D. A substantive deficiency affecting system function

93. Substantial completion is the milestone at which:

A. The contract begins

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

C. All punch list items are resolved

D. Final retention is released

94. A 12-month warranty typically begins at:

A. Substantial completion when the client takes beneficial use

B. Contract signing

C. Equipment delivery

D. First day of installation

95. As-built documentation records:

- A. Original design intent
- B. Contract scope
- C. Change order history
- D. The installed system's actual configuration for future reference

96. A typical end-user training session features:

- A. Extended technical sessions
- B. Lecture-style presentation
- C. Brief focused sessions on essential operations with hands-on practice
- D. Self-paced video training

97. A quick reference guide includes:

- A. Complete signal flow diagrams
- B. Essential functions with screenshots and simple instructions
- C. Manufacturer service information
- D. Detailed technical specifications

98. A service agreement typically provides:

- A. Defined response times, scheduled preventive maintenance, and priority service
- B. Complete upgrades at no additional cost
- C. Free equipment replacement
- D. Manufacturer warranty extension

99. A typical preventive maintenance schedule recommends:

- A. Monthly visits
- B. Quarterly visits
- C. Visits only when problems occur
- D. Annual visits with more frequent visits for high-use environments

100. Signed sign-off documentation creates:

- A. Warranty registration
- B. A formal written record of client acceptance
- C. Tax documentation
- D. A next-phase trigger

101. A substantial completion walk-through involves:

- A. The installer, client representative, and sometimes the general contractor
- B. Only the lead installer
- C. Only the design engineer
- D. Only client accounting

102. A certificate of substantial completion documents:

- A. Original equipment costs
- B. Serial numbers
- C. That the system is ready for use even though minor work may remain
- D. Service life expectations

Domain E — Conducting Ongoing Project Responsibilities

103. A service technician responding to a system failure discovers that the failure occurred due to a firmware update. The appropriate response is:

- A. Replace the affected equipment
- B. Document the incident and work with the manufacturer on firmware resolution
- C. Update all other equipment firmware immediately
- D. Disable all network connectivity

104. Daily progress reports primarily:

- A. Calculate weekly invoices
- B. Document serial numbers
- C. Track individual productivity
- D. Document activities, labor, materials, and issues for the project record

105. An RFI is most appropriately used to:

- A. Obtain clarification from the design team on field-discovered issues
- B. Document materials consumed
- C. Request labor resources
- D. Submit invoices

106. Substituting equivalent accessories is typically:

- A. A code violation

- B. A breach of contract
- C. A minor adaptation within installer authority requiring documentation
- D. A major change requiring change order

107. Trade coordination is primarily managed through:

- A. The client's facilities director
- B. The general contractor's superintendent and coordination meetings
- C. Direct communication without supervision
- D. The architect

108. A change order is required when:

- A. Work occurs during evening hours
- B. Materials are consumed faster than estimated
- C. Equipment fails during installation
- D. Work scope expands beyond original contract specifications

109. "Clean as you go" means:

- A. Debris managed continuously
- B. Weekly cleanup
- C. Specialized contractors handle cleanup
- D. Close-out phase cleanup

110. Construction debris is typically disposed of through:

- A. The AV firm's own dumpster
- B. Client's regular trash
- C. The general contractor's construction waste management system
- D. Personal disposal

111. A delay caused by another trade should be reported through:

- A. Direct confrontation with the trade
- B. The project manager who can coordinate response
- C. Social media
- D. Formal grievance

112. OSHA silica controls include:

- A. Standard N95 masks
- B. Outdoor work only
- C. Carbide blade replacement
- D. Water suppression, local exhaust ventilation, or respiratory protection

113. BIM coordination drawings support:

- A. Conflict identification between MEP, fire protection, and technology systems
- B. Marketing presentations
- C. Building permits
- D. Insurance documentation

114. An unexpected condition affecting the original design requires:

- A. Unreported modification of installation
- B. Waiting for design team discovery
- C. Reporting through appropriate channels for engineering review
- D. Documentation only for as-builts

115. A delay should be reported to the project manager:

- A. Only after a milestone is missed
- B. As soon as potential delay is identified, even if impact is uncertain
- C. At the next meeting only
- D. Only when cause is definitively determined

116. A scope change during installation should:

- A. Be implemented immediately
- B. Be ignored if small
- C. Be assigned without documentation
- D. Be routed through the project manager for change order processing

117. Work beyond original scope without change order approval typically results in:

- A. Labor and materials consumed without compensation
- B. Premium reimbursement rates
- C. Automatic invoice addition
- D. Default client acceptance

118. Field engineering documentation supports:

- A. Sales discussions
- B. Manufacturer communication
- C. Both as-built records and traceability of decisions under installer authority
- D. Performance reviews

119. The installer's firestopping responsibility is to:

- A. Defer to the general contractor
- B. Either perform firestopping correctly or coordinate with the firestop contractor
- C. Apply silicone caulk as temporary measure
- D. Use same material regardless of wall rating

120. Discovering asbestos-containing material requires:

- A. Continuing with respiratory protection
- B. Capping cable ends
- C. Notifying only the client
- D. Stopping work immediately and contacting qualified abatement personnel

121. Root-cause analysis seeks to:

- A. Understand why the failure occurred so it does not recur
- B. Determine crew responsibility
- C. Document for legal proceedings
- D. Calculate warranty coverage

122. A typical AV installation service life is approximately:

- A. 2 to 3 years
- B. 15 to 20 years
- C. 7 to 10 years
- D. 25 to 30 years

123. End-of-life indicators include:

- A. Increased user satisfaction
- B. Increasing service frequency, declining reliability, parts unavailability
- C. Decreased preventive maintenance
- D. Reduced electricity consumption

124. Decommissioned equipment with configuration data should be:

- A. Returned to manufacturer
- B. Donated without modification
- C. Stored in client's facility
- D. Factory-reset or data-wiped before leaving the client's site

125. RoHS primarily addresses:

- A. Restricted materials in electronic equipment requiring responsible handling
- B. Workplace safety
- C. Building codes
- D. Warranty terms

PRACTICE EXAM 12: ANSWER KEY

WITH FULL ANSWER EXPLANATIONS

Questions 1–125

Domain A — Conducting Pre-Installation Activities

1. C — Communicate with the project manager to assess schedule impact and coordinate response. Delayed equipment delivery affects the project schedule and requires coordinated response through the project manager, who can evaluate impact on other trades, adjust schedules, and communicate with the client. Independent improvisation creates coordination failures.
2. A — Coordinate with the design team to specify appropriate cable or add signal extenders. Exceeding cable manufacturer specifications is a design-level issue requiring design team resolution. Options include specifying different cable with greater capacity or adding signal extenders/repeaters, decisions that should be made through formal design coordination.
3. D — The distance exceeds the 100-meter HDBaseT specification and requires alternative transmission. HDBaseT is specified to 100 meters over Cat6A; 125 meters exceeds this specification and risks signal integrity. Alternative transmission approaches include fiber optic extenders or intermediate repeaters.
4. B — IT services and AV coordination must be established for network integration. Modern AV systems integrate with client networks, requiring coordination with whoever manages that network. Third-party IT service providers need the same coordination as internal IT departments.
5. A — Approximately 1.4:1, below the 4:1 industry standard. The 250-pound mount rating divided by the 180-pound display equals approximately 1.39:1, substantially below the 4:1 standard for non-overhead mounting. This combination is inadequate for professional installation.
6. D — Heat accumulation will damage equipment over time. AV equipment generates substantial heat during operation, and without ventilation this heat accumulates in the room causing equipment to exceed operating temperature ranges. Heat-accelerated degradation shortens equipment service life significantly.
7. B — Coordinate with the electrical engineer to provide 208V circuits for the specified equipment. Voltage mismatches between available infrastructure and specified equipment require engineering

resolution through the electrical engineer. Substitution, reduced operation, or exclusion all compromise the design intent.

8. C — Coordinate with the design team to upsize pathway capacity before installation. Pathway undersizing is a design-level issue requiring design team coordination to upsize the pathway or restructure the cable plan. Installing anyway, reducing cable counts, or parallel undersized pathways all compromise the design.
9. A — Document the discrepancy and coordinate with design team for resolution. Electrical classification discrepancies between AV and electrical drawings require design team resolution to determine the correct specification. Independent decisions about which specification to follow bypass proper design coordination.
10. D — Coordinate resolution with the design team — typically removing doors for transport. Professional installation practice addresses dimensional conflicts through coordinated resolution. The typical approach removes doors for transport and reinstalls in the room, a solution the design team can verify works for the specific rack model.
11. C — Install the specified 12-strand fiber optic cable which provides future expansion capacity. Specified cable reflects the design team's judgment about future capacity needs. Installing the 12-strand cable at initial installation costs less than adding strands later when expansion needs materialize.
12. B — Coordinate with the structural engineer to identify suitable attachment points. Ceiling attachment for substantial equipment requires structural engineering involvement when the intended method doesn't work. Drywall anchors, adhesives, and alternative configurations don't address the underlying structural requirement.
13. D — Coordinate with the electrical engineer to provide dedicated circuits. Dedicated circuits for AV equipment are an electrical engineering requirement. Extension cords, UPS, and battery backup are not substitutes for properly installed dedicated circuits.
14. A — Firestopping assembly must match the wall's fire rating. Fire walls require firestopping at penetrations that maintains the wall's fire resistance rating. The wall's rating must be documented and the firestop assembly selected to match.
15. C — Coordination with the building management system integrator and potentially the mechanical engineer. BMS integration requires coordination with the BMS integrator and potentially the mechanical engineer to establish protocols, access, and integration points. This is beyond typical AV scope coordination.
16. B — Support method and load capacity must be verified with structural engineer approval if beams are used for substantial loads. Structural members have specific load capacities that must be verified for intended cable support loads. Structural engineer involvement is warranted for substantial cable installations to verify acceptable loading.

17. D — Coordination with the client's IT department for VLAN assignment and network configuration. Video-over-IP systems require network configuration including VLAN assignments, QoS parameters, and IP addressing — all requiring IT coordination with the client's IT department.
18. A — Coordinate relocation of the projector or diffuser through the design team. Conflicts between AV and MEP systems require design team coordination to determine the appropriate resolution. One of the systems may need repositioning, requiring appropriate engineering review and authorization.
19. C — Coordination for occupant accommodation including noise, dust, and access limitations. Working above ceilings during occupied hours affects the occupants below, requiring coordination for accommodation including noise management, dust containment, and access limitations. This coordination affects both schedule and execution.
20. B — Request additional lighting installation before AV work begins. Adequate lighting is a prerequisite for safe and quality installation work. Requesting additional lighting through the general contractor before AV work begins ensures conditions support proper installation.
21. D — Proper grounding is essential for safety and signal integrity, requiring coordination with electrical engineer. Proper grounding is essential for both safety (preventing ground faults) and signal integrity (avoiding ground loops). Grounding infrastructure requires electrical engineering coordination when inadequate.
22. A — Inter-vendor coordination through the project manager or general contractor. Multiple vendors on a project require coordinated interaction through project management. Direct vendor-to-vendor coordination without supervision often fails to resolve conflicts or align schedules effectively.
23. C — Coordinate alternative pathway through the design team and general contractor. Pathway conflicts with existing MEP require coordination through the design team and general contractor to establish an alternative. Removal, improvised routing, or abandonment are not appropriate responses.
24. B — Procure the specified cable with adequate lead time or coordinate substitution approval. Lead-time issues for specified products require either adequate procurement lead time or formal substitution approval. Unapproved substitutions or skipping scope create design compliance issues.
25. D — Coordination with acoustic designers and consideration of room treatment. Acoustic environment affects microphone performance and AV system quality. Coordination with acoustic designers when available, or consideration of room treatment during installation, produces better outcomes than standard templates.

26. D — Procure the specified connectors with appropriate lead time through approved vendors. Specified connectors reflect design judgment about compatibility and performance. Generic equivalents, modifications, or connector type changes require formal substitution approval rather than unilateral decisions.
27. B — Metal stud construction requires different fastening approaches than wood studs. Metal and wood studs require different fastener types and installation approaches. Metal stud construction requires fasteners designed for metal studs with appropriate engagement, not wood screws used in metal.
28. A — Coordinate wireless microphone frequency selection with FCC-compliant alternatives. FCC-compliant frequency selection requires coordination with local spectrum use and regulations. Operating non-compliant equipment creates legal exposure and interference problems; reduced power may not achieve compliance.

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

29. C — Stop the pull and investigate the cause before proceeding. High pulling tension indicates that cable is approaching or exceeding manufacturer damage thresholds. Continuing risks invisible internal damage; professional practice stops to identify and address the cause.
30. D — Personal fall arrest attached to a designated anchor on the platform. Boom lifts can experience whipping motion that ejects workers over guardrails, so OSHA requires personal fall arrest in addition to guardrails. The fall arrest must attach to the platform's designated anchor, not to ground or adjacent structures.
31. A — 2,000 pounds. Tensile failure 10,000 pounds divided by 5:1 overhead safety factor equals 2,000 pounds working load. Overhead installations require higher safety factors than non-overhead loads because of the greater consequences of failure into occupied spaces.
32. B — Concrete-rated wedge or sleeve anchors installed per anchor specifications. Concrete requires anchors specifically designed for concrete materials with installation per anchor specifications. Wood screws, plastic anchors, and sheet metal fasteners cannot effectively engage concrete for substantial AV mounting.
33. D — 4 times the cable diameter during installation. Manufacturer specifications typically require minimum 4× cable diameter bend radius during installation and 8× diameter in the final installed position. Respecting bend radius prevents internal geometry deformation that degrades performance.
34. C — Stop work and contact qualified asbestos abatement personnel. Asbestos exposure causes diseases emerging decades later; only qualified abatement personnel should disturb suspect materials. Continuing work informally creates exposure with consequences invisible at time of work.

35. A — The general contractor or framing trade during construction. Structural blocking is a construction activity installed during framing before walls close. Coordination with the general contractor ensures blocking is in place when AV mounting begins.
36. B — 6 feet or greater. OSHA construction fall protection standards (29 CFR 1926 Subpart M) require fall protection at 6 feet or greater. This is stricter than the general industry standard of 4 feet.
37. D — 5,000 pounds per worker. OSHA 29 CFR 1926.502 requires fall arrest anchor points to have minimum rated capacity of 5,000 pounds per worker, providing the safety margin needed to arrest a falling worker.
38. C — The base extends 1 foot per 4 feet of working height. The 4-to-1 rule sets the ladder angle for safe climbing and stability. A 16-foot working height requires the ladder base positioned 4 feet from the supporting surface.
39. A — Plenum-rated and attached to structural members. Plenum installations require materials with appropriate fire ratings including cable supports, and attachment must be to structural members rather than ceiling grid or ductwork.
40. D — The ratio of conduit internal diameter to cable outside diameter. The jam ratio describes the geometric relationship that determines whether cables wedge in conduit during pulling. Specific ratios (2.8 to 3.2) cause three cables to jam together.
41. B — Guardrails on all open sides of the scaffold. Scaffolding with perimeter guardrails provides passive fall protection for workers on the platform. This guardrail system is the standard fall protection method for scaffold work.
42. C — 360 degrees. NEC Chapter 9 limits cumulative bend angle between pull points to 360 degrees, equivalent to four 90-degree bends. Exceeding this limit requires intermediate pull boxes to prevent cable damage.

Domain C — Installing Audiovisual Systems

43. A — Verify display power, input selection, and source device power status. The systematic approach to "no video" issues starts with the most common causes at the display end, then source end, then cable integrity. This ordered diagnostic approach resolves the majority of "no video" issues quickly without invasive intervention.
44. D — HDMI cable failure, source device output, or display input selection. "No Signal" with powered-on and connected equipment commonly stems from these three causes. Systematic diagnosis checks each possibility before pursuing more invasive troubleshooting.
45. C — Verify phantom power status if required by the microphone. Condenser microphones require phantom power to operate; without it, they produce no output. Verifying phantom power status is a primary early diagnostic step for condenser microphone issues.

46. B — Ground loop between connected equipment. Audible hum in audio systems commonly results from ground loops between connected equipment at different ground potentials. This is one of the most frequent audio troubleshooting issues.
47. A — Verify network connectivity using ping to the device IP address. Ping testing quickly identifies whether the device is reachable on the network, eliminating the most common cause of communication failures before pursuing more complex diagnostics.
48. D — 1.75 inches. The standardized rack unit (RU) measure is 1.75 inches of vertical mounting height. This standard allows equipment from any manufacturer to mount into compatible racks.
49. B — 19 inches. The 19-inch width measured between front mounting flanges is the global standard for professional AV, broadcast, data, and telecommunications equipment racks.
50. C — 28 inches. A 16U device occupies 16×1.75 inches, which equals 28 inches of vertical mounting height.
51. A — 16 amperes. The 80% rule limits continuous loads to 80% of circuit rating, so $20 \times 0.80 = 16$ amperes. This prevents breaker tripping and equipment damage.
52. D — 1,024 BTU/hour. Converting watts to BTU/hour uses the factor 3.412, so 300×3.412 equals approximately 1,024 BTU/hour.
53. C — Ground/shield. The XLR convention assigns Pin 1 to ground/shield, Pin 2 to hot/positive, Pin 3 to cold/negative per the AES standard.
54. B — 48 volts DC. Phantom power for condenser microphones is standardized at 48 volts DC, delivered through balanced audio cables without affecting the audio signal.
55. 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.
56. D — A doubling of power. A 3 dB increase represents a power ratio of 2:1. This reference value is fundamental to decibel calculations.
57. C — 320 watts. Professional practice sizes amplifiers at approximately 125% of total tap load, meaning a 400-watt amplifier drives approximately 320 watts maximum tap load ($400 \div 1.25 = 320$).
58. A — Steps down the high-voltage line to the loudspeaker's voltage. The transformer at each loudspeaker on a 70V system steps the 70-volt line down to the loudspeaker's required voltage.
59. B — 500 MHz. Cat6A cable supports maximum frequency of 500 MHz, twice Cat6's 250 MHz, supporting 10GBase-T and 4K60 HDBaseT.
60. D — 0.5 inches. Cat6A cable specifications permit maximum 0.5 inches of untwist at termination to preserve high-frequency performance.

61. C — Video signal transport including SDI and CATV. 75-ohm coaxial cable is the standard for video applications; 50-ohm is used for RF communications.
62. A — 100 meters (328 feet). HDBaseT supports 4K60 over Cat6A to 100 meters, matching general Ethernet limits.
63. D — The DDC channel embedded within the HDMI or DisplayPort cable. EDID exchange uses the Display Data Channel on dedicated pins within the cable.
64. B — 4K UHD content from compatible sources. HDCP 2.2 is required for 4K content because the original HDCP 1.x was not designed for 4K bandwidth.
65. C — 300 meters. OM3 multimode fiber supports 10 Gbps Ethernet to 300 meters, substantially exceeding copper's 100-meter limit.
66. A — Green. APC (Angled Physical Contact) fiber connectors are color-coded green, distinguishing them from blue PC and beige UPC connectors.
67. D — 0.25 to 1 millisecond. Dante audio networking operates with extremely low latency at standard settings, essential for professional audio.
68. B — 10 Gbps Ethernet. SDVoE distributes uncompressed 4K60 video over 10 Gbps Ethernet for adequate bandwidth plus protocol overhead.
69. C — 25.5 watts. IEEE 802.3at (PoE+) provides 25.5 watts at the powered device, with 30 watts at the source.
70. A — 254. A /24 subnet provides 256 total addresses minus 2 reserved (network and broadcast) = 254 usable host addresses.
71. D — 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16. RFC 1918 defines these three private IPv4 ranges reserved for internal networks.
72. B — 9600 and 115200 bps. RS-232 typical baud rates are between 9600 and 115200 bps, with 9600 as the most common default.
73. C — Baud rate, data bits, parity, stop bits. RS-232 requires matching these four serial parameters between controller and device.
74. A — Unidirectional with no status feedback. IR control transmits commands only without feedback, making it limited compared to bidirectional protocols.
75. D — Verify network connectivity using ping. Ping testing is the most efficient first diagnostic step for network communication failures.
76. B — 0.40 ohms. The 5% of 8 ohms equals 0.40 ohms maximum cable resistance, preserving power transfer efficiency.

77. A — 2.67 ohms. Three 8-ohm loudspeakers in parallel equal $8 \div 3 = 2.67$ ohms. Parallel impedance is always lower than any individual element.
78. D — Full quality until catastrophic failure at the digital cliff. Digital signals maintain full quality until bits become indistinguishable, then fail completely.
79. C — Video signal amplitude over time. A waveform monitor displays video signal voltage as a time-axis waveform, useful for signal level and sync timing verification.
80. B — Video chrominance on a polar plot. A vectorscope displays video color information as a polar plot showing hue (angle) and saturation (radius).
81. D — 12 feet. Throw ratio formula: image width = distance \div throw ratio = $30 \div 2.5 = 12$ feet.
82. A — 6500K (D65). The D65 white point at 6500K is the standard for video content calibration, producing accurate white without color tint.
83. C — 2.2. Standard video content is encoded for gamma 2.2, matching human visual perception and content encoding standards.
84. B — 8 times image height. AVIXA DISCAS recommends $8\times$ image height for basic decision-making content (text readable from back of room).
85. D — Flat response with omnidirectional pattern. Measurement microphones need flat frequency response and omnidirectional sensitivity for analytical accuracy in room measurements.
86. A — Open interoperability between manufacturers' networked audio. AES67 is an AES standard enabling audio exchange between different manufacturers' systems. Modern Dante implementations include AES67 compatibility.
87. C — All loudspeakers move in the same direction on the same signal. A polarity tester verifies correct loudspeaker polarity; errors cause destructive interference and low-frequency loss.
88. B — Insertion loss, return loss, NEXT, ANEXT, propagation delay, and other parameters. Cat6A certification tests multiple parameters to verify high-frequency performance; simple tests are insufficient.

Domain D — Perform Systems Close-Out

89. D — Verify network connectivity, panel processor load, and related system health. Touchpanel performance issues stem from multiple possible causes: network latency, control system load, panel processor load, and system health. Systematic diagnosis addresses these systematically before replacing hardware.
90. A — Audio configuration mismatch, HDMI embedded audio settings, or separate audio routing issue. Video present but audio missing commonly stems from HDMI audio configuration

mismatches, source audio settings, or separate audio routing issues. Systematic troubleshooting checks these before replacing equipment.

91. C — A-Level, B-Level, C-Level representing essential, specialized, and unique items. ANSI/AVIXA 10:2013 uses this three-level structure to categorize verification items appropriately based on their criticality to the installation.
92. D — A substantive deficiency affecting system function. A non-functional microphone input prevents system operation, making it substantive rather than cosmetic. Substantive deficiencies receive priority.
93. B — The system is ready for its intended use and warranty typically begins. Substantial completion triggers warranty, beneficial use, and final payment provisions.
94. A — Substantial completion when the client takes beneficial use. Warranties typically begin at substantial completion because the system enters service at that point.
95. D — The installed system's actual configuration for future reference. As-built documentation captures the system as actually installed for future service support.
96. C — Brief focused sessions on essential operations with hands-on practice. End-user training is most effective when concise, focused on essential tasks, and includes hands-on practice.
97. B — Essential functions with screenshots and simple instructions. Quick reference guides provide brief, accessible instruction on essential functions.
98. A — Defined response times, scheduled preventive maintenance, and priority service. Service agreements combine these elements along with remote support and discounted rates.
99. D — Annual visits with more frequent visits for high-use environments. Professional maintenance recommends annual baseline with more frequent visits for demanding applications.
100. B — A formal written record of client acceptance. Signed sign-off creates contractual record of client acceptance, protecting both parties from later disputes.
101. A — The installer, client representative, and sometimes the general contractor. The substantial completion walk-through involves these parties for formal verification.
102. C — That the system is ready for use even though minor work may remain. The certificate documents this milestone with remaining items scheduled for final completion.

Domain E — Conducting Ongoing Project Responsibilities

103. B — Document the incident and work with the manufacturer on firmware resolution. Firmware-related failures require manufacturer coordination to address the underlying issue and prevent recurrence. This approach preserves warranty coverage while addressing root cause.

104. D — Document activities, labor, materials, and issues for the project record. Daily reports create the ongoing project record supporting schedule, change management, billing, and reference.
105. A — Obtain clarification from the design team on field-discovered issues. RFIs are formal questions documenting both question and response as project record.
106. C — A minor adaptation within installer authority requiring documentation. Substituting equivalent accessories is minor adaptation within installer authority, though documentation in daily reports and as-builts is still required.
107. B — The general contractor's superintendent and coordination meetings. The GC's superintendent coordinates across trades through structured meetings.
108. D — Work scope expands beyond original contract specifications. Change orders are required when scope expands beyond original contract, documenting the addition and obtaining client approval.
109. A — Debris managed continuously. Clean-as-you-go integrates debris management into installation work throughout the day.
110. C — The general contractor's construction waste management system. Construction debris typically goes through the GC's waste infrastructure.
111. B — The project manager who can coordinate response. Trade issues route through the project manager who has authority to coordinate with the GC.
112. D — Water suppression, local exhaust ventilation, or respiratory protection. OSHA silica standard requires these specific controls; standard N95 masks are insufficient.
113. A — Conflict identification between MEP, fire protection, and technology systems. BIM coordination drawings reveal conflicts between building systems, enabling resolution before physical installation.
114. C — Reporting through appropriate channels for engineering review. Field-discovered design conditions must be reported for engineering review, not silently absorbed.
115. B — As soon as potential delay is identified, even if impact is uncertain. Early reporting permits project manager response before commitments are missed.
116. D — Be routed through the project manager for change order processing. Scope changes must flow through formal change order processes with proper approvals.
117. A — Labor and materials consumed without compensation. Unauthorized scope expansion is typically not recoverable because it was not contracted.

118. C — Both as-built records and traceability of decisions under installer authority. Field engineering documentation serves both purposes supporting installation records and professional accountability.
119. B — Either perform firestopping correctly or coordinate with the firestop contractor. Firestopping is life-safety work requiring proper materials and methods.
120. D — Stopping work immediately and contacting qualified abatement personnel. Asbestos requires specialized handling by qualified abatement contractors because exposure causes diseases emerging decades later.
121. A — Understand why the failure occurred so it does not recur. Root-cause analysis seeks the fundamental cause so addressing it prevents recurrence, unlike symptom-focused repairs.
122. C — 7 to 10 years. Professional AV installations typically have 7-10 year service life before substantial refresh, with components having varying lives within this range.
123. B — Increasing service frequency, declining reliability, parts unavailability. These indicators signal approaching service life end, supporting proactive refresh planning.
124. D — Factory-reset or data-wiped before leaving the client's site. Decommissioned equipment with configuration data must be reset to protect sensitive information from exposure.
125. A — Restricted materials in electronic equipment requiring responsible handling. RoHS restricts hazardous materials in electronic equipment and requires responsible end-of-life handling.