

# PRACTICE EXAM 11: CTS-D

## SIMULATION (110 QUESTIONS)

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**Time Limit: 180 minutes | Passing Score: 70%**

1. During the needs assessment for a corporate headquarters, the designer discovers the client has no formal AV standards document. The first recommendation is:

- A. Proceed with equipment selection
- B. Copy another client's standards
- C. Skip the standards discussion
- D. Develop baseline AV standards collaboratively with the client

2. A client requests "the best video wall money can buy" without defining use case. The designer's first action is:

- A. Specify the highest-resolution product
- B. Clarify the viewing task, content type, and audience to define requirements
- C. Present three budget tiers
- D. Recommend the most popular product

3. During schematic design, the architect asks the AV designer what ceiling height is needed for a boardroom projector. The response depends on:

- A. Throw ratio, screen position, and clearance above occupied zone
- B. Projector weight only

- C. Ceiling tile type
- D. Room aesthetics only

4. A specification writer must decide between prescriptive and performance specifications for DSP equipment. Performance specification is preferred when:

- A. Only one product is acceptable
- B. The budget is fixed
- C. Multiple products may satisfy the functional requirement
- D. The client names a specific brand

5. During design development, the electrical engineer asks for AV power requirements. The deliverable is:

- A. Equipment list only
- B. Rough estimate
- C. Verbal confirmation
- D. AV power schedule with circuit count, voltage, amperage, and receptacle types per location

6. A needs assessment reveals the client's primary concern is "ease of use" for non-technical staff. This drives design toward:

- A. Simple control interface with preset scenarios and minimal user decisions
- B. Feature-rich touch panels
- C. Maximum equipment flexibility
- D. Advanced programming options

7. The AV designer must indicate conduit pathways on construction drawings. The coordination deliverable is:

- A. Equipment list
- B. Verbal description
- C. AV infrastructure drawings showing pathway locations coordinated with electrical and architectural plans
- D. Manufacturer data sheets

8. During programming phase, a client adds a requirement for assistive listening. The specification impact is:

- A. No impact to design
- B. Addition of hearing loop or IR/RF assistive listening system per ADA requirements
- C. Minor acoustic change
- D. Display modification only

9. A needs assessment identifies that a conference room will host both local and remote participants daily. The design implication is:

- A. Standard conference room design
- B. Audio-only system
- C. Display-only system
- D. Hybrid meeting design with camera, microphone, display, and codec as core infrastructure

10. The architect requests AV equipment weights for structural coordination. The deliverable is:

- A. AV equipment weight schedule with point loads and distribution loads per mounting location

- B. Manufacturer brochures
- C. Verbal estimate
- D. General category weights

11. A specification section must define display mounting height. The determining factor is:

- A. Architect preference
- B. Installer convenience
- C. DISCAS viewing geometry and ergonomic sight lines for seated viewers
- D. Manufacturer recommendation

12. During design development, the mechanical engineer requests AV heat load data. The deliverable is:

- A. Equipment list
- B. BTU/hr schedule per room derived from equipment wattage  $\times 3.412$
- C. Verbal estimate
- D. General category estimate

13. A client requests AV for a room that doesn't exist yet on architectural plans. The designer should:

- A. Design to assumed dimensions
- B. Request confirmation from architect
- C. Proceed with available information
- D. Defer AV design until architectural plans confirm room geometry and finishes

14. During the needs assessment, a healthcare client mentions HIPAA but doesn't specify AV security requirements. The designer should:

- A. Proactively identify AV-specific HIPAA implications and incorporate security requirements
- B. Ignore unless specifically asked
- C. Defer to IT department
- D. Add generic security language

15. A specification must define cable types for a mixed analog/digital audio system. The specification structure should:

- A. List all cables generically
- B. Combine analog and digital in one section
- C. Separate analog and digital cable specifications with distinct requirements for each
- D. Reference manufacturer catalogs only

16. The AV designer needs to coordinate ceiling speaker locations with the lighting designer. The coordination method is:

- A. Verbal agreement
- B. Reflected ceiling plan (RCP) overlay showing both AV and lighting elements
- C. Separate drawings
- D. Email description

17. A client's needs assessment reveals they host quarterly all-hands meetings for 200 people. The room currently seats 50. The design implication is:

- A. Design for 50 seats

- B. Ignore the quarterly use
- C. Design for 200 seats
- D. Design primary room for 50 with overflow/streaming capability for quarterly events

18. During schematic design, the AV designer identifies that the specified display location conflicts with a structural column. The coordination is:

- A. Relocate display to alternative position coordinated with architect and structural engineer
- B. Remove the display
- C. Ignore the conflict
- D. Reduce display size

19. A specification must address AV system warranty. The specification should define:

- A. Manufacturer warranty only
- B. Labor warranty only
- C. Both parts and labor warranty duration with clear start date and coverage scope
- D. No warranty language needed

20. During the needs assessment, the client states they want "future-proof" technology. The designer's interpretation should be:

- A. Specify the most expensive equipment
- B. Design infrastructure with capacity for growth and technology refresh capability
- C. Specify equipment not yet released
- D. Oversize all equipment

21. The AV designer must specify rack locations in a mechanical room. The coordination with MEP includes:

- A. Verbal communication
- B. Equipment list only
- C. Manufacturer data sheets
- D. Floor plan showing rack positions with clearance requirements coordinated with HVAC and electrical

22. A needs assessment reveals the client has no IT staff and relies on a managed service provider. The design implication is:

- A. System design emphasizing remote management, monitoring, and simplified maintenance
- B. Complex network architecture
- C. Advanced programming
- D. Enterprise-grade IT integration

23. During design development, a conflict arises between AV conduit routing and fire sprinkler piping. The resolution process is:

- A. Coordination meeting with MEP and fire protection to identify alternative routing
- B. AV takes precedence
- C. Fire protection takes precedence without discussion
- D. Defer to general contractor

24. A specification must address AV system labeling requirements. The standard to reference is:

- A. NEC Article 300
- B. TIA-568

C. AVIXA RP-38-17

D. NFPA 72

25. The client requests a system that can be operated by any employee without training. The design priority is:

A. Maximum features

B. Complex automation

C. Feature density

D. Intuitive one-touch operation with occupancy-sensing activation

26. During programming, a university client identifies that classrooms will use a learning management system. The AV integration implication is:

A. LMS integration for automated recording, content delivery, and session scheduling

B. No AV impact

C. Display change only

D. Audio change only

27. A specification must define acceptable substitution procedures during bidding. The specification should state:

A. No substitutions permitted

B. Substitution requests with performance documentation due 14 days before bid

C. Any equivalent accepted

D. Integrator decides

28. The AV designer must coordinate floor box locations with the electrical engineer. The coordination deliverable is:

- A. Verbal description
- B. Equipment list
- C. Manufacturer data
- D. Floor plan showing floor box locations, service types, and quantities per location

29. A needs assessment identifies that a courtroom requires ADA-compliant evidence display. The design implication is:

- A. Accessible display positioning, assistive listening, and closed captioning capability
- B. Standard display only
- C. Audio-only accommodation
- D. No special requirement

30. During schematic design, the AV designer identifies that the specified projection screen location receives direct afternoon sunlight. The coordination is:

- A. Ignore sunlight
- B. Specify brighter projector
- C. Coordinate with architect for window treatment or screen relocation to eliminate ambient light impact
- D. Accept reduced image quality

31. A specification must define AV system testing and commissioning requirements. The reference standard is:

- A. NEC

B. ANSI/AVIXA 10:2013 AVSPV

C. TIA-568

D. NFPA 72

32. The client requests AV for an outdoor amphitheater. The needs assessment must additionally address:

A. Standard indoor requirements only

B. Indoor acoustic treatment

C. Consumer equipment

D. Weather exposure, IP rating requirements, and seasonal usage patterns

33. During programming, a hospital client mentions telemedicine expansion. The AV infrastructure implication is:

A. Infrastructure backbone supporting current telemedicine rooms with growth capacity for additional locations

B. No impact

C. Single room design

D. Consumer equipment

34. A specification must define AV system documentation deliverables at closeout. The minimum documentation includes:

A. Equipment list only

B. As-built drawings only

C. As-built drawings, programming documentation, user guides, training records, and warranty information

D. Manufacturer brochures only

35. The AV designer must coordinate speaker placement in a worship space with the acoustical consultant. The coordination addresses:

- A. Equipment cost
- B. Coverage pattern, RT60 impact, intelligibility targets, and loudspeaker-to-listener geometry
- C. Speaker aesthetics only
- D. Amplifier selection

36. During design development, the client adds a requirement for digital signage in the lobby. The specification impact includes:

- A. Display specification only
- B. Mounting hardware only
- C. Network connection only
- D. Display, CMS, network, content workflow, and mounting specifications

37. A needs assessment for a financial trading floor identifies 24/7 operation. The design implication is:

- A. Redundant systems, mission-critical power, continuous-duty equipment, and failover capability
- B. Standard commercial equipment
- C. Consumer equipment
- D. Budget-focused design

38. The AV designer must specify AV system grounding requirements. The coordination is with:

- A. Architect
- B. Electrical engineer for single-point ground and isolated ground receptacle specifications
- C. Mechanical engineer

D. General contractor

39. A specification must address AV system cybersecurity. The minimum requirement includes:

A. No security needed

B. Standard passwords

C. Network segmentation, encrypted transport, access controls, and firmware management

D. Physical locks only

40. During the needs assessment, a museum client describes interactive exhibits requiring visitor engagement. The design implication is:

A. Standard display

B. Audio-only

C. Static signage

D. Interactive technology with touch, gesture, or proximity-sensing engagement capability

41. The AV designer must coordinate ceiling-mounted microphone placement with the HVAC diffuser layout. The coordination addresses:

A. HVAC efficiency

B. Acoustic noise from diffusers impacting microphone pickup quality

C. Equipment cost

D. Cable routing only

42. A specification must address AV equipment rack thermal management. The specification should define:

- A. Rack ventilation, cooling capacity, and thermal monitoring requirements
- B. Open rack only
- C. No thermal specification
- D. Manufacturer default

43. During design development, the interior designer selects a dark ceiling finish for a room with ceiling speakers. The AV coordination concern is:

- A. Equipment cost
- B. Cable routing
- C. Speaker grille color matching and acoustic transparency of ceiling material
- D. No concern

44. A needs assessment for a performing arts center identifies both amplified and acoustic performances. The design implication is:

- A. Amplified-only system
- B. Variable acoustic treatment capability supporting both amplified and unamplified performance types
- C. Acoustic-only design
- D. No acoustic treatment

45. The AV designer must specify AV pathway requirements through fire-rated walls. The specification must reference:

- A. NEC only

- B. Manufacturer data
- C. UL-listed firestop assemblies maintaining the wall's fire rating
- D. Generic caulking

46. During programming, a corporate client identifies executive-level and standard conference rooms. The design implication is:

- A. Tiered specification with enhanced capabilities for executive rooms and standardized for general use
- B. Identical specification for all rooms
- C. Executive rooms only
- D. Standard rooms only

47. A specification must address AV system power conditioning. The specification should include:

- A. Standard power only
- B. Consumer power strips
- C. No conditioning needed
- D. UPS, surge protection, and power conditioning appropriate to system criticality level

48. The AV designer must coordinate display mounting with the structural engineer. The coordination addresses:

- A. Display aesthetics
- B. Structural capacity for display weight, mounting method, and seismic bracing requirements
- C. Cable routing
- D. Display selection

49. During the needs assessment, a hotel client describes banquet operations with rapid room turnover. The design implication is:

- A. Preset scene control with rapid reconfiguration capability minimizing staff intervention
- B. Fixed installation
- C. Portable equipment only
- D. Manual setup each event

50. A specification must define control system user interface design requirements. The specification should include:

- A. No UI specification
- B. Integrator decides
- C. Use-case-driven scenarios, button layouts, and user experience requirements
- D. Manufacturer default

51. The AV designer must coordinate AV infrastructure with the security consultant. The coordination addresses:

- A. Camera placement
- B. Lock hardware
- C. Alarm systems
- D. Shared pathway usage, access control integration, and network coordination

52. During design development, a client requests "wireless everything" for a conference room. The designer should:

- A. Specify all wireless

- B. Explain wireless limitations and specify hybrid wired/wireless infrastructure
- C. Refuse wireless entirely
- D. Defer to IT

53. A specification must address AV system remote monitoring. The specification should define:

- A. Monitoring protocol, alert thresholds, management interface, and reporting requirements
- B. No monitoring
- C. Manual monitoring only
- D. Manufacturer default

54. The AV designer must coordinate video wall structural support with the architect. The coordination addresses:

- A. Wall aesthetics
- B. Cable pathway
- C. Video wall content
- D. Wall structural capacity, backing material, and recessed niche dimensions

55. During the needs assessment, a government client identifies classified and unclassified spaces in the same building. The design implication is:

- A. Single system serves both
- B. Shared network
- C. Physically separate AV systems with no cross-connection between classified and unclassified
- D. Consumer equipment

56. A specification must define AV system acceptance testing criteria. The specification should reference:

- A. Manufacturer testing only
- B. AVSPV verification item list with pass/fail criteria for each measured parameter
- C. Integrator self-certification
- D. Visual inspection only

57. The AV designer must coordinate recessed floor boxes with the architect's flooring specification. The coordination addresses:

- A. Equipment selection
- B. Cable type
- C. Amplifier location
- D. Floor box trim, finish, cover type, and flush-mount compatibility with specified flooring material

58. During design development, a client requests video conferencing capability in 40 rooms. The infrastructure implication is:

- A. Network bandwidth assessment, codec standardization, and centralized management capability
- B. Individual standalone systems
- C. Consumer solutions
- D. No network impact

59. A specification must address AV system energy management. The reference standard is:

- A. NEC
- B. NFPA
- C. ANSI/AVIXA AVSEM

D. TIA-568

60. The AV designer discovers during programming that the client's IT policy prohibits devices on the corporate network. The design implication is:

- A. Ignore IT policy
- B. Dedicated AV network infrastructure separate from corporate LAN
- C. No network needed
- D. Consumer Wi-Fi

61. A specification must define AV drawing deliverables during design phases. The typical progression is:

- A. Final drawings at programming
- B. Construction drawings at schematic
- C. No drawings required
- D. Conceptual at programming, schematic at SD, design development, then construction documents

62. The AV designer must coordinate ceiling speaker locations with the fire protection engineer. The coordination addresses:

- A. Sprinkler head clearance and ceiling grid coordination with speaker locations
- B. Equipment cost
- C. Cable type
- D. Amplifier selection

63. During the needs assessment, a corporate client describes frequent visitor presentations using personal devices. The design implication is:

- A. BYOD-focused design
- B. No visitor accommodation
- C. BYOD wireless presentation, wired backup, and guest network access capability
- D. Fixed source only

64. A specification must address AV equipment seismic bracing. The specification should include:

- A. Manufacturer default
- B. Seismic zone-appropriate bracing for racks, displays, and overhead equipment per local code
- C. No bracing required
- D. Standard mounting only

65. The AV designer must coordinate AV system programming with the building automation system. The coordination addresses:

- A. Occupancy-based activation, scheduling integration, and energy management between AV and BAS
- B. Equipment cost
- C. Display selection
- D. Cable routing

66. During design development, a client requests recording capability for all conference rooms. The specification impact includes:

- A. Camera addition only
- B. Audio addition only

- C. Display change only
- D. Recording infrastructure, storage, codec, privacy policy, and consent workflow

67. A needs assessment for a sports venue identifies game-day and non-game-day operational modes. The design implication is:

- A. Game-day design only
- B. Dual-mode system supporting both high-intensity game-day and reduced non-game-day operations
- C. Non-game design only
- D. Consumer equipment

68. The AV designer must specify AV system color calibration requirements. The specification should include:

- A. No calibration
- B. Manufacturer default
- C. Consumer settings
- D. Target color space, Delta E tolerance, calibration methodology, and recalibration schedule

69. A specification must define AV contractor qualifications. The specification should include:

- A. No qualifications needed
- B. Price-based selection only
- C. CTS-certified staff, relevant project experience, manufacturer certifications, and bonding capacity
- D. Self-certification

70. The AV designer must coordinate AV pathway routing with the plumbing engineer. The coordination addresses:

- A. Separation from water lines and coordination of pathway routing to prevent moisture exposure
- B. Equipment cost
- C. Cable type
- D. Display selection

71. During programming, a client identifies that boardroom decisions must not be recorded or accessible remotely. The design implication is:

- A. Standard videoconferencing
- B. Cloud-based system
- C. Consumer equipment
- D. Air-gapped system with no recording capability and physical disconnect for all communication

72. A specification must address display color temperature standardization. The specification should define:

- A. No standardization
- B. Target color temperature, calibration procedure, and verification measurements across all displays
- C. Manufacturer default
- D. Consumer settings

73. The AV designer must coordinate AV equipment room location with the architect. The coordination addresses:

- A. Proximity to served spaces, pathway efficiency, adequate size, HVAC access, and power availability

- B. Aesthetics only
- C. Cost only
- D. Architect decides alone

74. During the needs assessment, a client states they want to eliminate all visible technology. The design implication is:

- A. Standard visible equipment
- B. Consumer equipment
- C. No AV system
- D. Concealed equipment with architectural integration, hidden speakers, and invisible technology design

75. A specification must address AV system spare parts and maintenance stock. The specification should include:

- A. No spares needed
- B. Integrator decides
- C. Recommended spare parts inventory, replacement lamp stock, and critical component backup
- D. Consumer approach

76. The AV designer must coordinate AV system access panels with the architect. The coordination addresses:

- A. No access needed
- B. Access panel locations, sizes, and finishes coordinated with architectural design for service access
- C. Integrator decides
- D. Standard sizes only

77. During design development, the mechanical engineer reports that the AV equipment room HVAC capacity is insufficient. The coordination response is:

- A. Provide updated BTU/hr heat load schedule for MEP to resize HVAC serving the AV room
- B. Accept insufficient cooling
- C. Reduce equipment count
- D. Move equipment to another room

78. A specification must define AV system signal flow documentation. The specification should require:

- A. No signal flow
- B. Verbal description
- C. Equipment list only
- D. Detailed signal flow diagrams showing all source-to-destination routing

79. The AV designer must coordinate AV cable pathway fill with NEC requirements. The pathway sizing must account for:

- A. Equipment cost
- B. Current cable count plus growth capacity at or below NEC fill percentages
- C. Display selection
- D. Amplifier location

80. During the needs assessment, a client describes a training room used for both instructor-led and self-paced learning. The design implication is:

- A. Instructor-led only
- B. Self-paced only

- C. Dual-mode design supporting instructor-led presentation and individual self-paced workstation modes
- D. No AV needed

81. A specification must address AV system network requirements. The specification should define:

- A. VLAN assignments, QoS policies, bandwidth requirements, and multicast configuration
- B. Standard IT network
- C. No network specification
- D. Consumer Wi-Fi

82. The AV designer must coordinate AV system commissioning schedule with the general contractor. The coordination addresses:

- A. Integrator decides alone
- B. Designer decides alone
- C. No coordination needed
- D. Commissioning timeline integrated into construction schedule with adequate duration before substantial completion

83. During design development, an acoustical consultant recommends additional absorption treatment. The AV designer's coordination is:

- A. Ignore recommendation
- B. Override with loudspeaker changes
- C. Evaluate impact on AV coverage, intelligibility, and system performance before specification incorporation
- D. Accept without review

84. A needs assessment for a hospital identifies both clinical and administrative AV needs. The design implication is:

- A. Clinical-only design
- B. Tiered specification addressing clinical HIPAA requirements separately from administrative general-purpose spaces
- C. Administrative-only design
- D. Single standard for all rooms

85. The AV designer must specify control system programming documentation. The specification should require:

- A. Source code, programming logic documentation, user scenario descriptions, and IP address schedules
- B. No documentation
- C. Integrator retains all documentation
- D. User guide only

86. During the needs assessment, a client describes seasonal occupancy variations in a resort property. The design implication is:

- A. Peak-season design only
- B. Off-season design only
- C. Consumer equipment
- D. Scalable system supporting peak and off-peak operation with appropriate energy management

87. A specification must define AV system owner training requirements. The specification should include:

- A. No training

- B. Tiered training for end users, technical staff, and administrators with documented curriculum
- C. Single group session
- D. Online-only

88. The AV designer must coordinate AV system emergency operation with the fire alarm system. The coordination addresses:

- A. Emergency audio override, muting of non-emergency audio, and integration with fire alarm notification
- B. No coordination needed
- C. Fire alarm handles everything
- D. AV system shutdown during emergencies

89. During design development, the client adds a requirement for digital art displays in public areas. The specification impact includes:

- A. Standard display only
- B. Commercial display only
- C. Consumer display
- D. Color-accurate displays, content management, ambient light sensing, and art-appropriate presentation mode

90. A specification must define AV system IP addressing and documentation. The specification should require:

- A. IP address schedule, subnet assignments, VLAN mapping, and device naming convention
- B. Integrator assigns addresses
- C. DHCP only
- D. No documentation

91. The AV designer must coordinate AV equipment ventilation with the mechanical engineer. The coordination addresses:

- A. Equipment aesthetics
- B. Cable routing
- C. Equipment rack airflow requirements, supply/return air positioning, and thermal load dissipation
- D. Equipment cost

92. During the needs assessment, a client describes a multi-use worship space for traditional and contemporary services. The design implication is:

- A. Traditional only
- B. Flexible system supporting both low-level traditional reinforcement and full contemporary band amplification
- C. Contemporary only
- D. No audio needed

93. A specification must address AV system software licensing. The specification should include:

- A. No licensing needed
- B. Integrator handles everything
- C. Manufacturer default
- D. License types, duration, renewal terms, and transfer of ownership to client at closeout

94. The AV designer must coordinate AV conduit stub-up locations with the electrical contractor. The deliverable is:

- A. AV infrastructure drawing showing exact stub-up locations, sizes, and quantities per room

- B. Verbal description
- C. Equipment list
- D. General location only

95. During design development, the client requests a system expansion in 3 years. The infrastructure implication is:

- A. Design only for current needs
- B. Oversized everything
- C. Infrastructure sized for current use plus documented growth capacity for planned expansion
- D. No impact

96. A specification must define AV system rack layout deliverables. The specification should require:

- A. No rack layout
- B. Rack elevation drawings showing equipment placement, ventilation, and cable management
- C. Equipment list only
- D. Manufacturer default

97. The AV designer must coordinate emergency communication with the life safety consultant. The coordination addresses:

- A. AV paging integration with fire alarm mass notification and emergency communication requirements
- B. Equipment cost
- C. Display selection
- D. Cable type

98. During the needs assessment, a client states their current system was designed by a different firm 10 years ago. The design implication is:

- A. Start from scratch
- B. Copy previous design
- C. Ignore previous system
- D. Evaluate existing infrastructure for reuse potential before specifying new systems

99. A specification must address AV system sustainable design practices. The reference standard is:

- A. NEC
- B. TIA-568
- C. ANSI/AVIXA AVSEM energy management standard
- D. NFPA

100. The AV designer must coordinate AV system clock synchronization across a campus. The coordination addresses:

- A. NTP/PTP infrastructure providing synchronized time reference across all AV systems and building systems
- B. Manual time setting
- C. Consumer clocks
- D. No synchronization

101. During design development, the architect changes ceiling height from 10 ft to 9 ft. The AV impact assessment includes:

- A. No impact

- B. Loudspeaker coverage pattern, display mounting height, projector throw, and microphone pickup geometry
- C. Cable length only
- D. Equipment cost only

102. A specification must define AV system operational modes. The specification should include:

- A. Single mode
- B. Integrator decides
- C. No modes needed
- D. Named operational scenarios with detailed system behavior for each mode

103. The AV designer must coordinate AV system requirements into the project budget. The deliverable is:

- A. Detailed AV cost estimate aligned with design phases and coordinated with project budget milestones
- B. Rough guess
- C. Integrator quote
- D. No budget coordination

104. During the needs assessment, a client describes frequent reorganization of office layouts. The design implication is:

- A. Fixed infrastructure
- B. No AV needed
- C. Flexible infrastructure with zoned pathways, wireless capability, and reconfigurable equipment
- D. Consumer portable equipment

105. A specification must address AV system maintainability. The specification should include:

- A. No maintenance planning
- B. Service access requirements, replacement part availability, and maintenance schedule
- C. Integrator handles everything
- D. Manufacturer warranty only

106. The AV designer must coordinate AV system testing with the commissioning agent. The coordination addresses:

- A. AV-specific only
- B. Integrator-only testing
- C. No coordination
- D. Integrated commissioning scope including AV verification within overall building commissioning plan

107. During design development, the client identifies that certain rooms require acoustic privacy between adjacent spaces. The specification impact is:

- A. STC rating requirements for partitions, background masking specification, and AV system noise contribution limits
- B. No AV impact
- C. Display specification only
- D. Cable routing only

108. A specification must define AV system punch-down and termination standards. The specification should include:

- A. No standard

- B. Integrator preference
- C. Termination type, connector standard, testing requirements, and workmanship criteria
- D. Consumer connectors

109. The AV designer must coordinate AV requirements with the furniture vendor. The coordination addresses:

- A. Equipment cost
- B. Table connectivity (floor box access, power, cable management) and furniture-integrated technology
- C. Display selection
- D. Amplifier location

110. During the needs assessment, a client describes a facility that must operate during construction phases. The design implication is:

- A. Standard design
- B. Consumer equipment
- C. No AV during construction
- D. Phased implementation plan supporting occupied construction with minimal disruption to operations

# PRACTICE EXAM 11: ANSWER KEY AND EXPLANATIONS

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1. D — Develop baseline AV standards collaboratively with the client. AV standards establish consistency across the facility for equipment types, user experience, infrastructure, and maintenance approach. Without a standards document, each room risks becoming a unique design that increases cost, complicates training, and creates maintenance burden. The collaborative process ensures the standards reflect actual operational needs rather than designer assumptions.
2. B — Clarify the viewing task, content type, and audience to define requirements. "Best" is meaningless without defined requirements — a lobby signage wall, a boardroom presentation display, and a broadcast reference monitor all have vastly different specifications. The designer must translate subjective client desires into measurable technical parameters before any product selection can begin.
3. A — Throw ratio, screen position, and clearance above occupied zone. Ceiling height for projection depends on the projector's throw geometry relative to the screen, the lens offset, and maintaining adequate clearance above standing occupants. These are interdependent variables that must be calculated together rather than answered with a single generic number.
4. C — Performance specification is preferred when multiple products may satisfy the functional requirement. Performance specifications define measurable outcomes (frequency response, channel count, processing latency) rather than naming specific products. This approach encourages competitive bidding and ensures the designer evaluates products based on capability rather than brand preference.
5. D — AV power schedule with circuit count, voltage, amperage, and receptacle types per location. The electrical engineer requires specific, actionable data to design branch circuits and panel schedules. Equipment lists, rough estimates, or verbal confirmations lack the precision needed for electrical engineering coordination and can result in missing circuits discovered during construction.
6. A — Simple control interface with preset scenarios and minimal user decisions. When the primary stakeholder requirement is ease of use, every design decision must filter through that lens. Preset scenarios reduce user interaction to a single touch, eliminating the complexity that causes non-technical users to avoid using the system entirely.
7. C — AV infrastructure drawings showing pathway locations coordinated with electrical and architectural plans. Conduit pathways must appear on coordinated construction documents

because multiple trades share ceiling and wall cavities. Verbal descriptions and equipment lists don't convey spatial information that electricians, plumbers, and HVAC contractors need to avoid conflicts.

8. B — Addition of hearing loop or IR/RF assistive listening system per ADA requirements. Assistive listening is an ADA compliance requirement that affects specification, infrastructure, and budget. Late additions during programming require re-evaluation of room design to accommodate the hearing loop installation, additional amplification, and signage requirements.
9. D — Hybrid meeting design with camera, microphone, display, and codec as core infrastructure. Daily hybrid use means the video conferencing system is foundational infrastructure, not an add-on feature. The camera, microphone, display, and codec must be designed as an integrated system from the start rather than retrofitted into a presentation-only room.
10. A — AV equipment weight schedule with point loads and distribution loads per mounting location. Structural engineers need specific weight data at specific locations to verify ceiling and wall capacity. General categories, verbal estimates, or manufacturer brochures don't provide the location-specific point load data required for structural analysis.
11. C — DISCAS viewing geometry and ergonomic sight lines for seated viewers. Display height is determined by the relationship between viewer eye height, viewing distance, and display size — not by architect preference, installer convenience, or manufacturer suggestion. DISCAS provides the framework for calculating optimal viewing geometry.
12. B — BTU/hr schedule per room derived from equipment wattage  $\times$  3.412. Mechanical engineers need precise thermal load data per room to size HVAC systems. The 3.412 BTU/hr per watt conversion applied to each equipment location produces the specific data needed for mechanical engineering calculations.
13. D — Defer AV design until architectural plans confirm room geometry and finishes. AV design depends on confirmed room dimensions, ceiling heights, wall finishes, and window locations. Designing to assumed dimensions creates rework risk when architectural plans are finalized with different parameters.
14. A — Proactively identify AV-specific HIPAA implications and incorporate security requirements. Healthcare clients may not recognize that video conferencing, recording systems, and networked displays carry HIPAA compliance obligations. The designer's professional responsibility includes identifying these implications even when the client doesn't explicitly request them.
15. C — Separate analog and digital cable specifications with distinct requirements for each. Analog and digital cables have fundamentally different performance criteria, testing requirements, and installation practices. Combined specifications create ambiguity about which requirements apply to which cable type, leading to substitution confusion during bidding and installation.

16. B — Reflected ceiling plan (RCP) overlay showing both AV and lighting elements. The RCP is the coordination document where ceiling-mounted elements from all trades appear together. Verbal agreements, separate drawings, or email descriptions fail to reveal conflicts that only become visible when all ceiling elements appear on one drawing.
17. D — Design primary room for 50 with overflow/streaming capability for quarterly events. Designing a 200-seat room for quarterly use wastes space 90% of the time, while a 50-seat room fails quarterly requirements. The hybrid approach serves daily needs efficiently while accommodating quarterly all-hands through overflow rooms or streaming technology.
18. A — Relocate display to alternative position coordinated with architect and structural engineer. Structural conflicts require collaborative resolution because display relocation affects viewing geometry, cable routing, and architectural aesthetics. The architect and structural engineer must participate to ensure the alternative location satisfies all disciplines.
19. C — Both parts and labor warranty duration with clear start date and coverage scope. Warranty specifications must define complete coverage terms because parts-only or labor-only warranties leave coverage gaps. Clear start dates prevent disputes about when warranty periods begin, and defined scope prevents disagreements about what is covered.
20. B — Design infrastructure with capacity for growth and technology refresh capability. "Future-proof" translates professionally to infrastructure capacity and flexibility rather than premium equipment selection. Conduit with spare capacity, network infrastructure with growth headroom, and modular equipment selections enable technology refresh without infrastructure reconstruction.
21. D — Floor plan showing rack positions with clearance requirements coordinated with HVAC and electrical. Rack placement in mechanical rooms requires coordination with HVAC ductwork, electrical panels, plumbing, and maintenance access paths. Verbal communication or equipment lists don't convey spatial relationships that prevent installation conflicts.
22. A — System design emphasizing remote management, monitoring, and simplified maintenance. Without on-site IT staff, the AV system must be manageable by a remote service provider. This drives design toward cloud-managed devices, remote diagnostic capability, and simplified hardware that doesn't require on-site expertise for routine operations.
23. A — Coordination meeting with MEP and fire protection to identify alternative routing. Fire sprinkler piping has code-mandated priority, but routing alternatives often exist that satisfy both trades. Unilateral decisions by either trade or deferring to the GC without technical input from both parties misses optimization opportunities.
24. C — AVIXA RP-38-17 is the standard for AV cable labeling. This standard defines label content, format, and application methodology specifically for AV installations. NEC, TIA, and NFPA standards serve different purposes and don't address AV-specific labeling conventions.

25. D — Intuitive one-touch operation with occupancy-sensing activation. Zero-training operation requires the system to activate and configure itself based on room occupancy and user intent. Occupancy sensing eliminates the need for users to even touch a panel for basic operation, achieving the true zero-training goal.
26. A — LMS integration for automated recording, content delivery, and session scheduling. Learning management system integration affects AV recording infrastructure, content routing, scheduling automation, and network architecture. This is a significant design driver that touches multiple system components beyond simple display or audio changes.
27. B — Substitution requests with performance documentation due 14 days before bid. The 14-day pre-bid requirement gives the designer adequate time to evaluate proposed substitutions before bid day. This protects specification integrity while allowing competitive alternatives that may offer equal or better performance.
28. D — Floor plan showing floor box locations, service types, and quantities per location. Floor boxes serve both AV and electrical needs, requiring coordinated placement that serves table layouts, power requirements, and signal routing. Exact locations on a floor plan are essential because floor boxes installed in concrete are permanent.
29. A — Accessible display positioning, assistive listening, and closed captioning capability. ADA compliance in courtrooms requires multiple accommodation types including sight-line-appropriate display positioning for persons with mobility limitations, assistive listening for hearing-impaired participants, and closed captioning for evidence display.
30. C — Coordinate with architect for window treatment or screen relocation to eliminate ambient light impact. Afternoon sunlight on a projection screen destroys image contrast regardless of projector brightness. The solution is controlling the ambient light through architectural means (shades, relocated screen, or glass treatment) rather than trying to overpower sunlight with a brighter projector.
31. B — ANSI/AVIXA 10:2013 AVSPV provides the performance verification framework. This is the industry-standard reference for AV system testing and commissioning, defining verification item lists, measurement procedures, and acceptance criteria. NEC, TIA, and NFPA serve different purposes and don't address AV-specific verification.
32. D — Weather exposure, IP rating requirements, and seasonal usage patterns. Outdoor venues introduce environmental variables absent from indoor design including rain, wind, temperature extremes, UV exposure, and seasonal operational patterns. Equipment IP ratings, weather-resistant enclosures, and seasonal storage requirements must be addressed beyond standard indoor specifications.
33. A — Infrastructure backbone supporting current telemedicine rooms with growth capacity for additional locations. Telemedicine expansion means the network backbone, codec management

platform, and infrastructure pathways must accommodate future rooms without reconstruction. This drives backbone sizing, switch port capacity, and pathway routing decisions in current design.

34. C — As-built drawings, programming documentation, user guides, training records, and warranty information. Complete closeout documentation enables the owner to operate, maintain, and modify the system independently. Missing documentation components create long-term operational dependencies on the original integrator.
35. B — Coverage pattern, RT60 impact, intelligibility targets, and loudspeaker-to-listener geometry. Worship space speaker coordination with the acoustical consultant addresses the interplay between sound reinforcement and room acoustics. Speaker placement affects reflected energy patterns, which in turn affect reverberation and intelligibility — the acoustician's core concerns.
36. D — Display, CMS, network, content workflow, and mounting specifications. Digital signage is a complete subsystem requiring coordinated specifications across multiple trades. Display specification alone ignores the content management, network connectivity, content workflow, and physical mounting that make the system functional.
37. A — Redundant systems, mission-critical power, continuous-duty equipment, and failover capability. 24/7 financial trading operations require comprehensive reliability infrastructure because system downtime directly impacts revenue. Every component must be specified for continuous duty with redundant backup for critical signal paths.
38. B — Electrical engineer for single-point ground and isolated ground receptacle specifications. AV system grounding is an electrical engineering discipline requiring coordination on single-point ground reference, isolated ground receptacle placement, and technical power system design. The electrical engineer implements these requirements on electrical construction documents.
39. C — Network segmentation, encrypted transport, access controls, and firmware management. AV cybersecurity requires the same layered approach as IT security because networked AV devices present attack surfaces. Network segmentation isolates AV traffic, encryption protects content, access controls prevent unauthorized configuration, and firmware management addresses vulnerabilities.
40. D — Interactive technology with touch, gesture, or proximity-sensing engagement capability. Museum interactive exhibits require technology that responds to visitor actions, creating engagement beyond passive viewing. The needs assessment must define interaction modality, visitor flow patterns, and content management requirements.
41. B — Acoustic noise from diffusers impacting microphone pickup quality. HVAC diffusers produce air turbulence noise that ceiling microphones readily capture, degrading speech pickup quality. Coordinating microphone placement away from diffusers, or specifying low-velocity diffusers near microphone locations, prevents this common problem.

42. A — Rack ventilation, cooling capacity, and thermal monitoring requirements. AV equipment racks generate significant heat that must be managed to prevent equipment failure and shortened component life. Specifications must define front-to-rear airflow, blanking panel requirements, thermal monitoring, and cooling capacity matched to equipment heat load.
43. C — Speaker grille color matching and acoustic transparency of ceiling material. Dark ceiling finishes may require color-matched speaker grilles to maintain architectural intent, and the ceiling material's acoustic properties affect speaker output. These coordination items must be addressed during design development before material selections are finalized.
44. B — Variable acoustic treatment capability supporting both amplified and unamplified performance types. Performing arts centers hosting both amplified and acoustic performances require adjustable acoustics because optimal reverberation differs dramatically between the two. Variable treatment (retractable banners, adjustable curtains, rotating panels) enables the room to serve both performance types.
45. C — UL-listed firestop assemblies maintaining the wall's fire rating. Fire-rated wall penetrations are life-safety code requirements with zero tolerance for non-compliance. The specification must reference specific UL-listed firestop systems that have been tested and certified to maintain the wall's rated fire resistance after penetration.
46. A — Tiered specification with enhanced capabilities for executive rooms and standardized for general use. Different room types serve different user expectations and organizational functions. Executive rooms justify premium equipment and enhanced features, while standard rooms benefit from consistent, cost-effective specifications that simplify maintenance.
47. D — UPS, surge protection, and power conditioning appropriate to system criticality level. Power conditioning specifications scale with system criticality — mission-critical broadcast facilities require online double-conversion UPS while standard conference rooms may need only surge protection. The specification must define the appropriate level for each system.
48. B — Structural capacity for display weight, mounting method, and seismic bracing requirements. Large displays create significant point loads and moment forces on walls and ceilings that require structural verification. Seismic bracing requirements vary by geographic zone and must be specified for overhead-mounted equipment in occupied spaces.
49. A — Preset scene control with rapid reconfiguration capability minimizing staff intervention. Banquet operations with rapid turnover cannot afford lengthy AV reconfiguration between events. Preset scenes enable staff to transform the room's AV configuration with a single button press, matching event types without technical knowledge.
50. C — Use-case-driven scenarios, button layouts, and user experience requirements. Control system UI specifications must define the user experience in terms the programmer can implement. Use

cases describe what happens when users interact with the system, button layouts define the interface structure, and UX requirements establish response time and behavior expectations.

51. D — Shared pathway usage, access control integration, and network coordination. AV and security systems frequently share pathways, network infrastructure, and integration points. Coordinating these shared resources prevents conflicts during installation and ensures both systems can operate without interference.
52. B — Explain wireless limitations and specify hybrid wired/wireless infrastructure. "Wireless everything" ignores the reliability, bandwidth, and security limitations of wireless-only systems. Professional guidance includes explaining these constraints while designing a hybrid system that maximizes wireless convenience with wired reliability for critical connections.
53. A — Monitoring protocol, alert thresholds, management interface, and reporting requirements. Remote monitoring specifications must be detailed enough to enable integrators to configure monitoring systems that produce actionable alerts. Protocol selection, threshold values, management dashboards, and reporting frequency all affect operational effectiveness.
54. D — Wall structural capacity, backing material, and recessed niche dimensions. Video walls create substantial concentrated loads requiring structural backing beyond standard drywall. Recessed niche dimensions must accommodate the display depth, ventilation space, cable access, and service clearance behind the panels.
55. C — Physically separate AV systems with no cross-connection between classified and unclassified. Government security requirements mandate complete physical separation between classified and unclassified systems — no shared network, no shared pathways, no shared equipment. This is a fundamental security architecture requirement, not a design preference.
56. B — AVSPV verification item list with pass/fail criteria for each measured parameter. Acceptance testing must be based on measurable, objective criteria that both the designer and integrator agree upon before testing begins. The AVSPV framework provides this structure, preventing subjective acceptance decisions.
57. D — Floor box trim, finish, cover type, and flush-mount compatibility with specified flooring material. Floor boxes must integrate seamlessly with the architect's flooring specification — carpet, tile, wood, and polished concrete each require different trim and cover types. Coordination during design development prevents unsightly mismatches discovered during installation.
58. A — Network bandwidth assessment, codec standardization, and centralized management capability. Deploying video conferencing across 40 rooms creates substantial network traffic that must be assessed against existing infrastructure capacity. Codec standardization ensures interoperability, and centralized management prevents room-by-room troubleshooting burden.

59. C — ANSI/AVIXA AVSEM is the energy management reference standard. This standard specifically addresses AV system energy management practices including scheduling, occupancy-based activation, and standby power reduction. NEC, NFPA, and TIA serve different purposes.
60. B — Dedicated AV network infrastructure separate from corporate LAN. When IT policy prohibits AV devices on the corporate network, the AV system requires its own network infrastructure including switches, cabling, and internet access. This is a significant infrastructure and cost impact that must be identified early in design.
61. D — Conceptual at programming, schematic at SD, design development, then construction documents. Drawing deliverables progress through increasing detail levels matching architectural design phases. Each phase adds specificity — conceptual diagrams become schematics, schematics become detailed designs, and detailed designs become construction-ready documents.
62. A — Sprinkler head clearance and ceiling grid coordination with speaker locations. Fire protection sprinkler heads have code-mandated clearance requirements that speakers cannot violate. Coordinating on the reflected ceiling plan ensures both elements fit within the ceiling grid without conflicts.
63. C — BYOD wireless presentation, wired backup, and guest network access capability. Frequent visitor presentations require flexible connectivity for unknown devices. Wireless presentation provides convenience, wired backup ensures reliability, and guest network access prevents visitors from needing corporate credentials.
64. B — Seismic zone-appropriate bracing for racks, displays, and overhead equipment per local code. Seismic bracing requirements are code-mandated in seismic zones and protect occupants from falling equipment during earthquakes. The specification must reference local seismic zone requirements and define bracing methods for each equipment type.
65. A — Occupancy-based activation, scheduling integration, and energy management between AV and BAS. Building automation integration enables AV systems to respond to building-level events — lights on triggers AV activation, room unoccupied triggers system standby, and scheduled events pre-configure rooms before occupants arrive.
66. D — Recording infrastructure, storage, codec, privacy policy, and consent workflow. Conference room recording extends far beyond adding a camera. Storage capacity, codec selection, retention policies, privacy notification, and consent documentation all require specification to create a legally compliant and operationally sustainable recording system.
67. B — Dual-mode system supporting both high-intensity game-day and reduced non-game-day operations. Sports venues that operate in dual modes need systems that can scale between full game-day activation and efficient non-game-day operation. Energy management, staffing, and system complexity all benefit from designed-in mode switching.

68. D — Target color space, Delta E tolerance, calibration methodology, and recalibration schedule. Color calibration specifications must define measurable targets and ongoing maintenance procedures. Without specified tolerances and recalibration schedules, displays drift from intended color performance over time, degrading the visual experience.
69. C — CTS-certified staff, relevant project experience, manufacturer certifications, and bonding capacity. Contractor qualification specifications protect project quality by ensuring bidders have demonstrated competency. CTS certification, project history, manufacturer training, and financial capacity all indicate ability to execute the work professionally.
70. A — Separation from water lines and coordination of pathway routing to prevent moisture exposure. AV pathways routed near plumbing risk moisture damage from condensation or leaks. Coordination with the plumbing engineer establishes safe separation distances and identifies alternative routing when conflicts arise.
71. D — Air-gapped system with no recording capability and physical disconnect for all communication. Security-critical boardrooms requiring absolute privacy need physical isolation from all networks and recording systems. Air-gapped design means no network connection, no recording hardware, and physical disconnect switches for any communication capability.
72. B — Target color temperature, calibration procedure, and verification measurements across all displays. Standardized color temperature ensures visual consistency when multiple displays are viewed simultaneously. The specification must define the target, the method for achieving it, and the measurements that verify compliance.
73. A — Proximity to served spaces, pathway efficiency, adequate size, HVAC access, and power availability. AV equipment room location affects cable run lengths, signal quality, maintenance access, and operational efficiency. Early coordination with the architect ensures the room is properly located and sized before floor plans are finalized.
74. D — Concealed equipment with architectural integration, hidden speakers, and invisible technology design. Eliminating visible technology requires specialized design approaches including recessed displays, concealed speakers behind acoustically transparent surfaces, and hidden infrastructure. This significantly impacts equipment selection, construction coordination, and cost.
75. C — Recommended spare parts inventory, replacement lamp stock, and critical component backup. Spare parts specifications ensure the owner can respond to equipment failures without extended downtime. Critical components identified during design should be stocked on-site, particularly for mission-critical systems where procurement lead times exceed acceptable downtime.
76. B — Access panel locations, sizes, and finishes coordinated with architectural design for service access. AV equipment concealed behind walls and ceilings requires service access that must be

architecturally coordinated. Access panel locations affect both aesthetic design and maintenance efficiency — poorly placed panels create either visual disruption or inaccessible equipment.

77. A — Provide updated BTU/hr heat load schedule for MEP to resize HVAC serving the AV room. Insufficient cooling capacity requires data-driven coordination with the mechanical engineer. The updated heat load schedule provides the specific information needed to resize ductwork, diffusers, and cooling capacity for the AV equipment room.
78. D — Detailed signal flow diagrams showing all source-to-destination routing. Signal flow diagrams are the fundamental communication tool for AV system design, documenting every signal path from source to destination. These drawings enable integrators to understand system architecture, troubleshoot problems, and verify installation completeness.
79. B — Current cable count plus growth capacity at or below NEC fill percentages. Pathway sizing must accommodate current cable requirements and planned growth while remaining within NEC fill limits. Conduit sized only for current needs creates immediate problems when additional cables are needed, while oversizing wastes resources.
80. C — Dual-mode design supporting instructor-led presentation and individual self-paced workstation modes. Training rooms serving both instructor-led and self-paced learning need distinct operational modes with different equipment configurations. Instructor mode provides central presentation capability while self-paced mode enables individual workstation focus.
81. A — VLAN assignments, QoS policies, bandwidth requirements, and multicast configuration. AV network specifications must define the specific network architecture parameters that IT must implement. VLAN segmentation isolates AV traffic, QoS ensures priority handling, bandwidth calculations prevent congestion, and multicast configuration enables AV-over-IP operation.
82. D — Commissioning timeline integrated into construction schedule with adequate duration before substantial completion. Commissioning requires time for systematic verification, deficiency identification, remediation, and re-verification. Integrating this timeline into the construction schedule ensures adequate duration and prevents the common problem of compressed commissioning before occupancy.
83. C — Evaluate impact on AV coverage, intelligibility, and system performance before specification incorporation. Acoustical treatment recommendations affect AV system performance — additional absorption changes room characteristics that were part of the AV design basis. The designer must verify that recommended treatment doesn't negatively impact coverage uniformity or create new acoustic issues.
84. B — Tiered specification addressing clinical HIPAA requirements separately from administrative general-purpose spaces. Clinical and administrative spaces have fundamentally different compliance requirements. Clinical AV must address HIPAA-specific security, medical-grade

displays, and clinical workflow integration, while administrative spaces follow standard corporate specifications.

85. A — Source code, programming logic documentation, user scenario descriptions, and IP address schedules. Complete programming documentation enables the owner to maintain, modify, and troubleshoot the control system independently. Without source code and logic documentation, the owner becomes permanently dependent on the original integrator for any system changes.
86. D — Scalable system supporting peak and off-peak operation with appropriate energy management. Resort properties with seasonal occupancy variations benefit from systems that scale operationally. Full activation during peak season and reduced operation during off-peak periods balances guest experience with operational cost efficiency.
87. B — Tiered training for end users, technical staff, and administrators with documented curriculum. Different user groups need different training depth and content. End users need operational training, technical staff need troubleshooting skills, and administrators need system management capability — a single group session cannot serve all three audiences effectively.
88. A — Emergency audio override, muting of non-emergency audio, and integration with fire alarm notification. Life safety integration requires AV systems to respond appropriately during emergencies — paging must override background audio, emergency messages must reach all zones, and non-emergency content must cease to prevent confusion during evacuation.
89. D — Color-accurate displays, content management, ambient light sensing, and art-appropriate presentation mode. Digital art displays require color accuracy, appropriate presentation framing, and ambient-responsive brightness that differs from standard digital signage. The specification must address art-specific requirements beyond standard commercial display parameters.
90. A — IP address schedule, subnet assignments, VLAN mapping, and device naming convention. IP documentation enables maintenance, troubleshooting, and future expansion by providing a clear map of the network architecture. Without this documentation, network modifications become trial-and-error exercises that risk system disruption.
91. C — Equipment rack airflow requirements, supply/return air positioning, and thermal load dissipation. Rack ventilation coordination with the mechanical engineer ensures cooling air reaches equipment and hot exhaust air exits efficiently. Supply and return air positioning relative to rack orientation determines whether cooling is effective or recirculates hot air.
92. B — Flexible system supporting both low-level traditional reinforcement and full contemporary band amplification. Multi-use worship spaces require dramatic audio flexibility between gentle traditional reinforcement and powerful contemporary amplification. The system must transition between these modes without compromising either worship style.
93. D — License types, duration, renewal terms, and transfer of ownership to client at closeout. Software licensing affects long-term operational costs and system functionality. Specifications

must define license terms clearly so the client understands ongoing costs and the integrator transfers all license ownership at project completion.

94. A — AV infrastructure drawing showing exact stub-up locations, sizes, and quantities per room. Conduit stub-ups are installed during concrete pours and cannot be relocated afterward. Exact locations on construction drawings are essential because errors in stub-up placement create permanent infrastructure problems.
95. C — Infrastructure sized for current use plus documented growth capacity for planned expansion. Planned expansion requires designed-in infrastructure capacity rather than future reconstruction. Documenting the growth capacity ensures future designers understand available capacity without repeating infrastructure analysis.
96. B — Rack elevation drawings showing equipment placement, ventilation, and cable management. Rack elevation drawings communicate the physical arrangement of equipment within each rack, including ventilation space, cable management, power distribution, and service access. These drawings prevent installation conflicts and ensure proper thermal management.
97. A — AV paging integration with fire alarm mass notification and emergency communication requirements. Life safety communication is code-mandated and supersedes all other AV functions during emergencies. The AV designer must coordinate paging system integration with fire alarm mass notification to ensure compliant emergency communication.
98. D — Evaluate existing infrastructure for reuse potential before specifying new systems. Existing infrastructure (conduit, cable pathways, structural supports, power circuits) may have reuse value that reduces project cost and construction disruption. Assessment before specification prevents unnecessary demolition of serviceable infrastructure.
99. C — ANSI/AVIXA AVSEM is the energy management reference standard. This standard specifically defines sustainable AV design practices including energy-efficient equipment selection, automated scheduling, and power management strategies. It provides the framework for incorporating energy management into AV specifications.
100. A — NTP/PTP infrastructure providing synchronized time reference across all AV systems and building systems. Campus-wide clock synchronization ensures consistent event timing, synchronized recordings, and coordinated system behavior across buildings. The synchronization protocol (NTP for general timing, PTP for media-critical applications) must be specified in the infrastructure design.
101. B — Loudspeaker coverage pattern, display mounting height, projector throw, and microphone pickup geometry. A one-foot ceiling height change affects multiple AV design parameters. Loudspeaker coverage angles change, display mounting geometry shifts, projector throw calculations require recalculation, and ceiling microphone pickup zones are altered.

102. D — Named operational scenarios with detailed system behavior for each mode. Operational mode specifications tell the control system programmer exactly what every device does in each scenario. Named modes (Presentation, Video Conference, All Hands, Standby) with specific device states eliminate programming interpretation that leads to user experience problems.
103. A — Detailed AV cost estimate aligned with design phases and coordinated with project budget milestones. Budget coordination ensures AV costs are visible to the project team at each design phase. Detailed estimates prevent budget surprises and enable value engineering decisions before construction commitments are made.
104. C — Flexible infrastructure with zoned pathways, wireless capability, and reconfigurable equipment. Frequent office reorganization requires infrastructure that accommodates layout changes without construction. Zoned pathways serve areas rather than specific rooms, wireless capability eliminates cable dependencies, and reconfigurable equipment adapts to new layouts.
105. B — Service access requirements, replacement part availability, and maintenance schedule. Maintainability specifications ensure the installed system can be serviced efficiently throughout its operational life. Service access provisions, identified replacement parts, and scheduled maintenance activities prevent the system from becoming inaccessible or unsupported after installation.
106. D — Integrated commissioning scope including AV verification within overall building commissioning plan. AV commissioning performed in isolation from building commissioning misses integration points with lighting, HVAC, and building automation. Coordinated commissioning verifies that cross-system integrations function correctly.
107. A — STC rating requirements for partitions, background masking specification, and AV system noise contribution limits. Acoustic privacy between rooms involves wall construction (STC rating), background sound masking to raise ambient noise floor, and limiting AV system noise contribution. All three elements must be specified together for effective privacy.
108. C — Termination type, connector standard, testing requirements, and workmanship criteria. Termination specifications define the quality standard for cable connections that directly affect signal integrity and system reliability. Specification of connector types, termination methods, testing procedures, and acceptable workmanship prevents the installation quality problems that cause chronic system issues.
109. B — Table connectivity (floor box access, power, cable management) and furniture-integrated technology. Furniture and AV must be coordinated because conference tables often integrate power, data, cable retraction, and device connectivity. Floor box locations must align with table cable wells, and furniture dimensions affect display viewing geometry.
110. D — Phased implementation plan supporting occupied construction with minimal disruption to operations. Occupied construction requires detailed phasing that maintains operational continuity

in occupied areas while construction proceeds in adjacent spaces. The phased plan sequences infrastructure, equipment installation, and commissioning to minimize disruption to ongoing operations.