# PRACTICE EXAM 17: CTS-D SIMULATION (110 QUESTIONS)

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

1. Which statement about DISCAS image sizing is accurate:

A. BDM uses divisor 6; ADM uses divisor 4

B. BDM uses divisor 4; ADM uses divisor 6

C. Passive uses divisor 6; BDM uses divisor 8

D. ADM uses divisor 8; BDM uses divisor 4

2. Which statement about HDMI versions is accurate:

A. HDMI 2.0 supports 48 Gbps bandwidth

B. HDMI 2.1 supports 18 Gbps bandwidth

C. HDMI 2.0 supports 18 Gbps; HDMI 2.1 supports 48 Gbps

D. HDMI 2.0 and 2.1 have identical bandwidth

3. Which statement about PoE standards is accurate:

A. PoE+ delivers 51 W at device

B. PoE delivers 25.5 W at device

C. PoE++ Type 4 delivers 30 W at device

D. PoE delivers 12.95 W; PoE+ delivers 25.5 W; PoE++ Type 4 delivers 71 W

4. Which comparison of 70V versus low-impedance audio is accurate:

A. Low-impedance has lower cable loss over distance

B. 70V has lower cable loss over long runs due to higher transmission voltage

C. 70V provides higher audio fidelity than low-impedance

D. Both systems have identical cable loss characteristics

5. Which statement about NEC conduit fill is accurate:

A. Three or more conductors: 40%; two conductors: 31%; one conductor: 53%

B. Three or more conductors: 53%; two conductors: 40%

C. All conductor counts: 40% fill

D. Three or more conductors: 31%; one conductor: 40%

6. Which statement about ISCR grades per V201.01 is accurate:

A. Passive 15:1; BDM 50:1; ADM 80:1

B. Passive 7:1; BDM 50:1; ADM 80:1

C. Passive 7:1; BDM 15:1; ADM 50:1; FMV 50:1

D. Passive 7:1; BDM 15:1; ADM 50:1; FMV 80:1

7. Which comparison of ACU grades is accurate:

A. High ±3 dB; Standard ±6 dB; Basic ±9 dB

B. High ±1 dB; Standard ±6 dB; Basic ±9 dB

C. High ±1 dB; Standard ±3 dB; Basic ±6 dB

D. High ±2 dB; Standard ±4 dB; Basic ±8 dB

8. Which statement about HDCP versions is accurate:

A. HDCP 1.4 supports protected 4K UHD content

B. HDCP 2.2 is the minimum version for protected 4K UHD content

C. HDCP is only needed for audio content

D. Any HDCP version supports all resolutions

9. Which statement about Dante audio networking is accurate:

A. Approximately 1 Mbps per channel at 48 kHz/24-bit with sub-millisecond latency

B. Approximately 10 Mbps per channel at 48 kHz/24-bit

C. Dante operates only at Layer 1 of the OSI model

D. Maximum 128 channels per Gigabit link

10. Which comparison of amplifier classes is accurate:

A. Class AB: 80-95% efficient; Class D: 50-60% efficient

B. Class AB and Class D have identical efficiency

C. Class D: 50-60% efficient; Class AB: 80-95% efficient

D. Class AB: 50-65% efficient; Class D: 80-95% efficient

11. Which statement about HDBaseT distance is accurate:

A. 100 m at all resolutions including 4K@60 Hz 4:4:4

B. 70 m at 1080p; 100 m at 4K@60 Hz

C. 100 m at 1080p; approximately 70 m at 4K@60 Hz 4:4:4

D. 50 m maximum at any resolution

12. Which statement about NEC continuous derating is accurate:

A. 90% of breaker rating for continuous loads

B. 80% of breaker rating for loads operating 3+ hours continuously

C. 70% of breaker rating for all loads

D. No derating required for continuous loads

13. Which statement about the Sabine formula is accurate:

A. Imperial coefficient 0.049; metric coefficient 0.161

B. Imperial coefficient 0.161; metric coefficient 0.049

C. Single universal coefficient of 0.1

D. Coefficient varies by room shape

14. Which comparison of display technologies for 24/7 operation is accurate:

A. Consumer displays are rated for continuous duty

B. Consumer and commercial displays have identical duty ratings

C. Gaming monitors are preferred for 24/7 signage

D. Commercial-grade displays are specifically engineered for continuous duty

15. Which statement about BTU conversion is accurate:

A. Watts × 2.412 = BTU/hr

B. Watts × 3.412 = BTU/hr

C. Watts × 4.412 = BTU/hr

D. Watts × 5.412 = BTU/hr

16. Which comparison of ST 2110 versus SDI is accurate:

A. SDI requires PTP synchronization

B. ST 2110 uses coaxial cable exclusively

C. ST 2110 uses IP networking with PTP synchronization; SDI uses coaxial

D. SDI and ST 2110 use identical infrastructure

17. Which statement about TLS versions is accurate:

A. TLS 1.2 is the minimum acceptable; TLS 1.0 and 1.1 are deprecated

B. TLS 1.0 remains the current standard

C. All TLS versions are equally secure

D. TLS applies only to web browsers, not AV devices

18. Which statement about video conferencing latency is accurate:

A. 500 ms is acceptable for natural conversation

B. 300 ms is the recommended target

C. Latency doesn't affect video call quality

D. Under 150 ms preserves natural conversational flow

19. Which comparison of prescriptive versus performance specifications is accurate:

A. Prescriptive specifications encourage competitive bidding

B. Performance specifications define functional outcomes allowing multiple products

C. Performance specifications name specific products

D. Prescriptive and performance specifications are identical

20. Which statement about the Haas effect is accurate:

A. Applies to sounds arriving more than 100 ms apart

B. Only applies to reflected sound, not reinforced sound

C. Sounds within 5-35 ms fuse perceptually with first-arriving source

D. The Haas effect is irrelevant to AV design

21. Which comparison of DALI versions is accurate:

A. DALI-1: 128 devices; DALI-2: 256 devices

B. DALI-1 and DALI-2 support identical device counts

C. DALI-1: 32 devices; DALI-2: 64 devices

D. DALI-1: 64 devices per circuit; DALI-2: 128 devices per circuit

22. Which statement about the inverse square law is accurate:

A. Doubling distance reduces SPL by 6 dB in free field

B. Doubling distance reduces SPL by 3 dB

C. Doubling distance reduces SPL by 10 dB

D. Distance has no effect on SPL

23. Which comparison of color spaces is accurate:

A. Rec. 709 serves cinema; DCI-P3 serves HDTV

B. Rec. 2020 serves standard definition

C. Rec. 601 serves 4K UHD

D. Rec. 709 serves HDTV; DCI-P3 serves cinema; Rec. 2020 serves UHD/HDR

24. Which statement about NOM penalty is accurate:

A. $10 \times \log_{10}(N)$ where N equals amplifier count

B. $10 \times \log_{10}(N)$ where N equals number of open microphones

C. NOM penalty is fixed at 6 dB regardless of microphone count

D. NOM applies only to wireless microphones

25. Which statement about AES67 is accurate:

A. Cross-vendor AoIP interoperability standard enabling Dante/Ravenna/Livewire+ compatibility

B. Proprietary to a single manufacturer

C. Consumer audio streaming protocol

D. Video-only transport standard

26. Which comparison of AVSPV versus manufacturer testing is accurate:

A. Manufacturer bench testing replaces field verification

B. Both are equivalent for acceptance

C. AVSPV is optional for professional installations

D. AVSPV verifies installed system performance; manufacturer testing verifies component performance

27. Which statement about Cat6A is accurate:

A. Maximum frequency 250 MHz

B. Maximum frequency 100 MHz

C. Maximum frequency 500 MHz supporting 10GBASE-T

D. Maximum frequency 1000 MHz

28. Which statement about IGMP snooping is accurate:

A. Prevents multicast flooding to unsubscribed switch ports

B. Manages DHCP addressing

C. Controls VLAN assignment

D. Handles DNS resolution

29. Which comparison of online versus standby UPS is accurate:

A. Both have identical transition times

B. Online double-conversion has zero transition; standby requires 5-20 ms transfer

C. Standby UPS has zero transition time

D. Online UPS has longer transition than standby

30. Which statement about DSCP markings is accurate:

A. DSCP 46 (EF) marks video conferencing

B. DSCP 34 (AF41) marks real-time audio

C. All AV traffic uses DSCP 0

D. DSCP 46 (EF) marks real-time audio; DSCP 34 (AF41) marks video conferencing

31. Which comparison of STC ratings for speech privacy is accurate:

A. STC 20 provides adequate conference room privacy

B. STC 30 provides adequate conference room privacy

C. STC 40+ is the minimum for speech privacy between conference rooms

D. STC rating is irrelevant to speech privacy

32. Which statement about rigging safety factors is accurate:

A. 10:1 required for overhead loads above occupied space; 3:1 for non-occupied

B. 3:1 is adequate for all overhead applications

C. 5:1 is the universal rigging standard

D. Safety factors are optional for AV rigging

33. Which statement about DMX-512 is accurate:

A. Uses Ethernet as physical layer

B. Uses fiber optic as physical layer

C. Uses RS-232 as physical layer

D. Uses RS-485 as physical layer with up to 512 channels

34. Which comparison of HDMI passive cable versus active cable at 4K@60 is accurate:

A. Passive reaches 50 feet at 4K@60

B. Passive typically limited to 15 ft; active optical extends beyond

C. Passive and active have identical distance capability

D. Active cable is shorter range than passive

35. Which statement about the CTS-D exam structure is accurate:

A. 50 questions with 60 minutes

B. 200 questions with 240 minutes

C. 110 questions with 150 minutes to complete

D. 75 questions with 90 minutes

36. Which comparison of RT60 targets by room type is accurate:

A. Broadcast studio under 0.5 s; meeting room 0.4-0.6 s; auditorium 1.0-1.3 s

B. All rooms target 1.0 second RT60

C. Studios target 2.0 s; meeting rooms target 1.5 s

D. RT60 targets are identical for all room types

37. Which statement about SMPTE ST 2110 synchronization is accurate:

A. NTP provides adequate synchronization

B. GPS is the only synchronization option

C. Manual time sync is sufficient

D. Sub-microsecond PTP (IEEE 1588) is required

38. Which comparison of fiber types for AV-over-IP is accurate:

A. Singlemode is limited to 100 meters

B. Multimode OM4 supports approximately 300-400 m; singlemode supports kilometers

C. Multimode and singlemode have identical distance ratings

D. Fiber is limited to 50 meters for AV

39. Which statement about assistive listening per ADA is accurate:

A. Required in assembly spaces with fixed seating scaled to seating capacity

B. Optional for all venue types

C. Required only in theaters

D. Only applies to venues with 1000+ seats

40. Which statement about the APEx 2M-2010 standard is accurate:

A. Governs image contrast ratio

B. Governs performance verification

C. Governs AV design coordination with allied trades

D. Governs energy management

41. Which comparison of HIPAA versus standard AV security is accurate:

A. HIPAA and standard security are identical

B. Standard security exceeds HIPAA requirements

C. HIPAA is optional for healthcare AV

D. HIPAA requires encrypted transport, access controls, and audit logging beyond standard practice

42. Which statement about pixel pitch viewing distance is accurate:

A. Pitch (mm) × 1,000 = minimum distance (mm)

B. Pitch (mm) × 3,000 = minimum ideal viewing distance (mm)

C. Pitch (mm) × 5,000 = minimum distance (mm)

D. Pixel pitch does not affect viewing distance

43. Which statement about AV system punchlist generation is accurate:

A. Generated at substantial completion walk-through with specification references

B. Generated at project kickoff

C. Generated at mid-construction

D. Generated only if problems are reported

44. Which comparison of 70V tap load versus amplifier sizing is accurate:

A. Amplifier should match tap load exactly

B. Amplifier should be sized below tap load

C. Amplifier should exceed tap load by 25-33% for headroom

D. Tap load is irrelevant to amplifier sizing

45. Which statement about fire-rated penetrations is accurate:

A. Generic caulking is acceptable for fire-rated walls

B. UL-listed firestop assemblies are required for all rated penetrations

C. Foam insulation meets fire code

D. Painted fire coating is adequate

46. Which comparison of BDM versus ADM viewing tasks is accurate:

A. BDM requires higher contrast than ADM

B. BDM and ADM have identical requirements

C. ADM has a smaller image height requirement than BDM

D. BDM requires 15:1 ISCR; ADM requires 50:1 ISCR and larger image height

47. Which statement about AV system commissioning per AVSPV is accurate:

A. Integrator verbal assurance replaces measured verification

B. Pass/fail criteria are optional

C. All verification items must be measured and documented per specification

D. Only audio items require measurement

48. Which statement about AVSEM is accurate:

A. Addresses AV system energy management including scheduling and power reduction

B. Addresses image sizing

C. Addresses coverage uniformity

D. Addresses cable labeling

49. Which comparison of control system UI approaches is accurate:

A. Maximum button density improves user experience

B. Complex interfaces serve all users equally

C. Manufacturer default UI is always optimal

D. Preset scenarios with minimal buttons produce highest user adoption

50. Which statement about cable labeling per RP-38-17 is accurate:

A. Handwritten labels meet the standard

B. Heat-shrink printed labels at both cable ends per standard requirements

C. Color coding alone is sufficient

D. Labels are only needed at one end

51. Which comparison of prescriptive versus performance warranty specifications is accurate:

A. Manufacturer warranty alone is adequate

B. No warranty specification is needed

C. Specification must define parts, labor, duration, start date, and coverage scope

D. Integrator determines warranty terms

52. Which statement about NEC isolated ground receptacles is accurate:

A. Identified by orange triangle marking per NEC

B. Identified by red dot marking

C. Identified by blue square marking

D. No special identification required

53. Which comparison of AV-over-IP versus HDBaseT distribution is accurate:

A. HDBaseT scales better than AV-over-IP for large systems

B. AV-over-IP and HDBaseT have identical scalability

C. HDBaseT supports unlimited endpoints

D. AV-over-IP provides greater scalability; HDBaseT provides simpler point-to-point distribution

54. Which statement about loudspeaker sensitivity rating is accurate:

A. Measured at 10 m, 10 W

B. Measured at 1 m, 1 W producing SPL rating in dB

C. Measured at 1 ft, 1 W

D. Measurement distance and power are not standardized

55. Which comparison of DCI-P3 versus Rec. 709 color spaces is accurate:

A. Rec. 709 has wider gamut than DCI-P3

B. DCI-P3 and Rec. 709 are identical

C. DCI-P3 is wider gamut serving cinema; Rec. 709 serves HDTV

D. Rec. 709 serves cinema projection

56. Which statement about AEC processing is accurate:

A. AEC tail length must match or exceed room RT60 for effective echo cancellation

B. AEC tail length is fixed regardless of room acoustics

C. AEC is only needed in rooms without loudspeakers

D. AEC eliminates the need for acoustic treatment

57. Which comparison of speech reinforcement versus music headroom is accurate:

A. Speech and music require identical headroom

B. Speech requires more headroom than music

C. No headroom is needed for either application

D. Speech requires 10 dB headroom; music requires 15-20 dB

58. Which statement about AV network QoS is accurate:

A. QoS is optional for AV-over-IP networks

B. Dedicated queuing with bandwidth reservation prevents AV stream degradation

C. Best-effort delivery is adequate for professional AV

D. QoS only affects audio streams

59. Which statement about as-built drawings is accurate:

A. Document actual installed condition including all field changes and substitutions

B. Identical to original construction documents

C. Only show equipment that changed

D. Are optional at project closeout

60. Which comparison of CRI requirements by application is accurate:

A. Video conferencing requires CRI 70; broadcast requires CRI 90

B. All applications require CRI 100

C. Video conferencing requires CRI 90+; broadcast requires CRI 90+

D. CRI is irrelevant to AV applications

61. Which statement about conduit separation from power is accurate:

A. Signal cables may share conduit with power cables

B. Shielded cable eliminates all separation requirements

C. Separation is only needed for fiber optic cable

D. NEC requires separation between signal and power cables with minimum 6-inch clearance

62. Which comparison of TEMPEST versus standard commercial security is accurate:

A. TEMPEST and commercial security are equivalent

B. TEMPEST prevents electromagnetic emanation of classified information beyond standard security

C. Commercial security exceeds TEMPEST requirements

D. TEMPEST applies only to consumer equipment

63. Which statement about AV substitution procedures is accurate:

A. Formal request with performance documentation submitted per specification timeline

B. Integrator may substitute freely without notification

C. Any equivalent product is automatically accepted

D. Substitutions are never permitted

64. Which comparison of NTP versus PTP synchronization is accurate:

A. NTP provides sub-microsecond accuracy

B. NTP and PTP provide identical accuracy

C. PTP provides sub-microsecond accuracy; NTP provides millisecond accuracy

D. PTP is less accurate than NTP

65. Which statement about seismic bracing for AV is accurate:

A. Seismic bracing is optional everywhere

B. Only applies to buildings over 10 stories

C. Required by manufacturer only

D. Required by IBC/ASCE 7 in designated seismic zones for overhead equipment

66. Which comparison of ISCR calculation factors is accurate:

A. ISCR depends only on display native contrast

B. ISCR accounts for both display performance and ambient light contribution

C. Ambient light does not affect ISCR

D. ISCR is a fixed display specification

67. Which statement about plenum-rated cable is accurate:

A. Standard consumer cable is acceptable above ceilings

B. Cable type doesn't affect fire safety

C. CMP plenum-rated cable required per NEC for air-handling spaces

D. Only power cables require plenum rating

68. Which statement about control system source code at closeout is accurate:

A. Source code transfers to owner per specification for independent future modification capability

B. Source code is always integrator property

C. Source code is not transferable

D. Programming does not require documentation

69. Which comparison of STI quality grades is accurate:

A. 0.45 is "good" quality; 0.75 is "poor" quality

B. STI scale runs from -1 to +1

C. All STI values above 0.30 are acceptable

D. 0.75 is "good"; 0.60 is minimum acceptable; below 0.45 is "poor"

70. Which statement about punchlist classification is accurate:

A. All punchlist items are cosmetic

B. Items classified as non-conforming, incomplete, or defective with specification reference

C. Integrator determines classification

D. Classification is unnecessary

71. Which comparison of Dante primary/secondary networks is accurate:

A. Single switch serves both primary and secondary

B. Primary and secondary share the same VLAN

C. Separate switches or VLANs provide redundancy for failover protection

D. Secondary network is optional for professional installations

72. Which statement about AV equipment room HVAC coordination is accurate:

A. Mechanical engineer must size dedicated cooling matched to AV heat load (wattage × 3.412 BTU/hr)

B. Equipment rooms don't need dedicated cooling

C. Rack fans alone manage all heat

D. Room temperature doesn't affect equipment reliability

73. Which comparison of online and line-interactive UPS types is accurate:

A. Line-interactive has zero transition time

B. Both types are identical in operation

C. Online is preferred for consumer applications

D. Online double-conversion provides zero transition; line-interactive requires brief transfer time

74. Which statement about AV system training specification is accurate:

A. Single group session serves all users

B. Tiered training matching end users, technical staff, and administrators

C. Training is always optional

D. Manufacturer training replaces integrator obligation

75. Which comparison of HDMI eARC versus standard ARC is accurate:

A. eARC requires HDMI 2.1 and supports uncompressed multi-channel audio

B. Standard ARC supports uncompressed audio

C. eARC and ARC have identical capability

D. ARC requires HDMI 2.1

76. Which statement about AV power factor in modern equipment is accurate:

A. Modern PFC achieves 0.50-0.60

B. Power factor is irrelevant to AV

C. Modern PFC achieves 0.90+ reducing reactive power and current draw

D. Legacy equipment has higher power factor than modern

77. Which comparison of Rec. 2020 versus Rec. 709 is accurate:

A. Rec. 709 has wider color gamut than Rec. 2020

B. Rec. 2020 provides wider gamut for 4K UHD/HDR; Rec. 709 serves HDTV 1080p

C. Both standards define identical color spaces

D. Rec. 2020 serves standard definition only

78. Which statement about AV rack thermal management is accurate:

A. Open racks never overheat

B. Cable management doesn't affect airflow

C. Equipment density is irrelevant to temperature

D. Front-to-rear airflow with blanking panels prevents hot-air recirculation

79. Which statement about the APEx design coordination process is accurate:

A. Establishes the framework for coordinating AV design with electrical, mechanical, and architectural trades

B. Governs image sizing

C. Governs performance verification

D. Governs cable labeling

80. Which comparison of 4K@60 Hz at various color depths is accurate:

A. 8-bit and 12-bit require identical bandwidth

B. 12-bit requires more bandwidth than 8-bit at the same resolution and frame rate

C. 8-bit requires approximately 18 Gbps; 12-bit requires approximately 18 Gbps

D. Color depth doesn't affect bandwidth

81. Which statement about AV emergency audio integration is accurate:

A. AV systems continue normal operation during fire alarm

B. Emergency notification is lower priority than background music

C. No integration between AV and fire alarm is required

D. Fire alarm must override all AV audio per NFPA code requirements

82. Which comparison of prescriptive and performance specification approaches is accurate:

A. Prescriptive names specific products; performance defines functional outcomes

B. Performance names specific products; prescriptive defines outcomes

C. Both approaches are identical

D. Neither approach permits substitutions

83. Which statement about IGMP version differences is accurate:

A. IGMPv3 adds source-specific multicast capability over IGMPv1/v2

B. All IGMP versions are identical

C. IGMPv1 supports source-specific multicast

D. IGMPv3 is a proprietary protocol

84. Which comparison of DISCAS viewing task categories is accurate:

A. Passive requires the largest image height

B. ADM requires the smallest image height

C. BDM ÷6; ADM ÷4; Passive ÷8 — ADM requires largest image at given distance

D. All categories use the same divisor

85. Which statement about AV system cybersecurity is accurate:

A. AV devices are not vulnerable to network attacks

B. Standard passwords provide adequate security

C. Physical locks are the only security needed

D. Network segmentation, encryption, and access controls are required

86. Which comparison of firestop methods is accurate:

A. Any sealant meets fire code

B. Only UL-listed assemblies tested to maintain fire rating are code-compliant

C. Foam expansion is always code-compliant

D. Firestop is optional for non-structural walls

87. Which statement about AV closeout documentation is accurate:

A. Includes as-builts, programming, user guides, training records, warranty, and credentials

B. Equipment list alone is sufficient

C. Manufacturer brochures replace as-builts

D. Documentation is optional

88. Which comparison of AV-over-IP compression approaches is accurate:

A. Uncompressed 4K requires approximately 100 Mbps

B. Compressed and uncompressed have identical bandwidth

C. Visually lossless compression enables 4K on Gigabit; uncompressed requires 10+ Gbps

D. Compression is not available for 4K

89. Which statement about building automation integration with AV is accurate:

A. Occupancy sensing, scheduling, and energy management benefit from BAS/AV coordination

B. BAS and AV should never integrate

C. BAS integration only affects lighting

D. AV operates independently of building systems

90. Which comparison of parallel versus series speaker impedance is accurate:

A. Parallel increases total impedance

B. Series and parallel produce identical impedance

C. Series decreases total impedance

D. Parallel decreases impedance; series increases impedance

91. Which statement about AV specification Division placement is accurate:

A. AV specifications always appear in Division 27

B. AV is typically Division 27 (Communications) with coordination in Division 26 (Electrical)

C. AV specifications belong in Division 1

D. Division placement is irrelevant

92. Which comparison of amplifier power at different impedances is accurate:

A. Power doubles when impedance doubles

B. Power is constant regardless of impedance

C. Power approximately doubles when impedance halves for voltage-source amplifiers

D. Impedance doesn't affect power output

93. Which statement about warranty specification is accurate:

A. Must define parts, labor, duration, start date, and coverage scope independent of manufacturer

B. Manufacturer warranty is always sufficient

C. Warranty specifications are optional

D. Integrator determines all warranty terms

94. Which comparison of ISCR ambient light impact on different viewing tasks is accurate:

A. Passive viewing tolerates less ambient light than ADM

B. ADM and Passive tolerate equal ambient light

C. Ambient light has no effect on ISCR

D. Passive viewing tolerates more ambient light than ADM due to lower ISCR threshold

95. Which statement about RF frequency coordination is accurate:

A. Required only in rural areas

B. Required in dense venues to identify available frequencies and avoid interference

C. Modern wireless auto-coordinates without survey

D. RF coordination is obsolete

96. Which comparison of STI targets by application is accurate:

A. All applications target STI 0.50

B. Hospitals and courtrooms have lower targets than offices

C. Worship spaces target 0.70+; public address targets 0.60; broadcast targets 0.75+

D. STI targets are identical across all spaces

97. Which statement about IP addressing for AV devices is accurate:

A. Static IP or DHCP reservation with documented schedule ensures consistent device communication

B. DHCP without reservation is preferred

C. IP addressing doesn't affect AV operation

D. Integrator handles all addressing without documentation

98. Which comparison of screen aspect ratios is accurate:

A. 4:3 is ideal for widescreen content

B. 16:9 and 4:3 display identical content equally

C. Aspect ratio doesn't affect viewing experience

D. 16:9 matches widescreen sources; 4:3 wastes area with letterboxed widescreen content

99. Which statement about AV infrastructure growth capacity is accurate:

A. Design only for current needs

B. Include documented growth capacity in pathways, network, and power for planned expansion

C. Maximum oversizing is always appropriate

D. Growth capacity is integrator's responsibility

100. Which comparison of DCI cinema versus standard commercial display calibration is accurate:

A. Both use identical calibration targets

B. Commercial displays require DCI calibration

C. DCI requires P3 color space calibration; commercial uses sRGB or Rec. 709

D. Calibration is unnecessary for either application

101. Which statement about AV system acceptance testing is accurate:

A. Formal AVSPV verification with documented measurements against pass/fail criteria

B. Integrator self-certification is adequate

C. Visual inspection replaces measurement

D. Owner verbal approval constitutes acceptance

102. Which comparison of sound masking versus acoustic treatment is accurate:

A. Sound masking and acoustic treatment serve identical purposes

B. Sound masking replaces the need for acoustic treatment

C. Acoustic treatment replaces the need for sound masking

D. Sound masking raises ambient floor; acoustic treatment controls reverberation — both may be needed

103. Which statement about AV system remote monitoring is accurate:

A. Monitoring is only needed during warranty

B. Monitoring protocol, alert thresholds, and reporting requirements should be specified

C. Monitoring is integrator's discretion

D. No monitoring is needed for professional systems

104. Which comparison of live reinforcement versus playback headroom is accurate:

A. Live reinforcement needs more headroom due to unpredictable transient peaks

B. Playback needs more headroom than live

C. Both require identical headroom

D. No headroom difference exists between applications

105. Which statement about AV system energy management per AVSEM is accurate:

A. Scheduling is the only energy strategy

B. Only affects broadcast facilities

C. Includes scheduling, occupancy sensing, standby modes, and efficient equipment selection

D. Energy management has no measurable impact

106. Which comparison of HDMI cable ratings for permanent installation is accurate:

A. Consumer HDMI is acceptable in walls

B. Cable rating doesn't affect code compliance

C. Only data cables need rating for in-wall

D. CL2/CL3 or CMP rated cables required per NEC for in-wall and plenum installation

107. Which statement about AV coordination during schematic design is accurate:

A. AV coordination begins during construction

B. Infrastructure requirements must be communicated during SD for architectural and MEP incorporation

C. AV coordination is only needed during commissioning

D. Integrator handles all design coordination

108. Which statement about AV system grounding is accurate:

A. Single-point ground reference coordinated with electrical engineer prevents ground loops

B. Multiple ground points improve audio quality

C. Grounding is unnecessary for digital systems

D. Building steel serves as adequate AV ground

109. Which comparison of automatic versus manual microphone mixing is accurate:

A. Manual mixing provides better NOM management than automatic

B. Automatic mixing provides equivalent results to no mixing

C. Automatic mixing maintains unity NOM gain eliminating multi-mic penalty

D. NOM penalty is identical with and without automatic mixing

110. Which statement about post-occupancy evaluation is accurate:

A. Post-occupancy is unnecessary after commissioning

B. Only hardware issues are identified post-occupancy

C. Post-occupancy reveals only integrator errors

D. Reveals user experience insights informing both current optimization and future design improvements

# PRACTICE EXAM 17: ANSWER KEY AND EXPLANATIONS

1. A — BDM uses divisor 6 and ADM uses divisor 4 per DISCAS V202.01. The divisor determines minimum image height: smaller divisors produce larger required images for more demanding viewing tasks. Passive uses divisor 8 (least demanding) and Full Motion Video uses divisor 3 (most demanding).

2. C — HDMI 2.0 supports 18 Gbps and HDMI 2.1 supports 48 Gbps. This bandwidth difference determines which resolutions, frame rates, and color depths each version can transport. HDMI 2.1's nearly 3× bandwidth increase enables 8K@60 Hz and 4K@120 Hz capabilities.

3. D — PoE delivers 12.95 W, PoE+ delivers 25.5 W, and PoE++ Type 4 delivers 71 W at the powered device. Each tier represents increased power delivery over standard category cable. Source-side power is higher to account for cable resistance loss over the maximum 100-meter run.

4. B — 70V systems have lower cable loss over long runs because higher transmission voltage means lower current for the same power. Lower current through cable resistance dissipates less power as heat. This is the fundamental advantage enabling 70V distribution over distances impractical for low-impedance systems.

5. A — NEC Chapter 9 specifies 40% fill for three or more conductors, 31% for two, and 53% for one. These limits prevent cable damage during installation and thermal accumulation during operation. Most AV installations involve three or more conductors, making 40% the most commonly applied fill percentage.

6. D — The complete ISCR grade progression is Passive 7:1, BDM 15:1, ADM 50:1, and FMV 80:1. Each grade requires progressively higher contrast to support increasingly demanding viewing tasks. Ambient light contribution affects all grades by adding luminance to both the image and surrounding black level.

7. C — ACU grades are High ±1 dB, Standard ±3 dB, and Basic ±6 dB per A102.01:2017. These tolerance bands define how much SPL variation is acceptable across listener positions. Standard (±3 dB) is the most commonly specified grade for conference and meeting room applications.

8. B — HDCP 2.2 is the minimum version required for protected 4K UHD content throughout the signal chain. Every device from source through distribution to display must support HDCP 2.2. A single non-compliant device causes protected content to blank or downgrade.

9. A — Dante consumes approximately 1 Mbps per channel at 48 kHz/24-bit with sub-millisecond latency over Gigabit Ethernet. This low per-channel bandwidth enables high channel density — up to 512 channels per Gigabit link. Sub-millisecond latency supports live performance applications.

10. D — Class AB efficiency ranges 50-65% while Class D achieves 80-95%. The efficiency difference represents heat dissipation — Class D's switching topology wastes far less power as heat. This directly impacts equipment room cooling requirements and amplifier form factor.

11. C — HDBaseT specifies 100 meters at 1080p but reduces to approximately 70 meters at 4K@60 Hz 4:4:4. Higher bandwidth signals experience greater attenuation, reducing reliable distance. Cat6A cable is required for 4K bandwidth performance at any distance.

12. B — NEC requires 80% derating for loads operating 3 or more hours continuously. A 20 A circuit supports only 16 A continuous; a 30 A circuit supports 24 A continuous. This prevents thermal accumulation in conductors and overcurrent protection devices.

13. A — Imperial coefficient is 0.049 (seconds per cubic foot per sabin) and metric coefficient is 0.161. The Sabine formula RT60 = coefficient × Volume/Absorption calculates reverberation time. Using the wrong coefficient produces results off by a factor of approximately 3.

14. D — Commercial-grade displays are specifically engineered for continuous 24/7 duty with enhanced thermal management. Consumer displays lack heavy-duty power supplies and extended-life backlights needed for continuous operation. Consumer panels typically fail within 6-12 months of 24/7 use.

15. B — Watts × 3.412 = BTU/hr is the standard thermal conversion factor. This calculation translates AV equipment electrical consumption into cooling load units for HVAC coordination. Incorrect conversion factors produce improperly sized cooling systems.

16. C — ST 2110 uses IP networking with PTP synchronization while SDI uses dedicated coaxial cable. ST 2110 separates video, audio, and metadata into independent IP streams synchronized by PTP. SDI carries everything on a single coaxial cable without network infrastructure.

17. A — TLS 1.2 is the minimum acceptable version; TLS 1.0 and 1.1 are formally deprecated due to cryptographic vulnerabilities. Modern AV devices on networks must use TLS 1.2 or higher for secure communication. TLS 1.3 is the current recommended standard.

18. D — Under 150 ms end-to-end latency preserves natural conversational flow for video conferencing. Higher latency disrupts turn-taking, causes talking over each other, and creates frustrating communication delays. Broadcast applications require even tighter tolerances (under 40 ms lip-sync).

19. B — Performance specifications define functional outcomes allowing multiple products to compete on capability. This encourages competitive bidding while ensuring any selected product

meets the required performance. Prescriptive specifications name specific products and limit competition.

20. C — The Haas effect causes sounds arriving within 5-35 ms to fuse perceptually with the first-arriving source. The earlier source determines apparent localization even if the delayed source is louder. This principle is the foundation of delay-fill loudspeaker design in distributed systems.

21. D — DALI-1 supports 64 devices per circuit while DALI-2 expanded to 128 devices. DALI provides individual addressable control of luminaires on a simple two-wire bus. The doubled capacity in DALI-2 enables larger lighting zones without additional circuits.

22. A — Doubling distance reduces SPL by 6 dB in free-field conditions per the inverse square law. Sound intensity decreases to one-quarter with each distance doubling. This fundamental principle drives all loudspeaker coverage calculations and amplifier power sizing.

23. D — Rec. 709 serves HDTV, DCI-P3 serves digital cinema, and Rec. 2020 serves UHD/HDR content. Each color space defines progressively wider gamut: Rec. 709 is narrowest, DCI-P3 is intermediate, and Rec. 2020 is widest. Display calibration must match the intended content's color space.

24. B — NOM penalty equals $10 \times \log_{10}(N)$ where N is the number of open microphones. Each doubling of open microphones adds 3 dB: 2 mics = 3 dB, 4 mics = 6 dB, 8 mics = 9 dB. Automatic microphone mixers mitigate this penalty by maintaining unity NOM gain.

25. A — AES67 is the cross-vendor AoIP interoperability standard enabling compatibility between Dante, Ravenna, and Livewire+. It defines a common transport layer preventing vendor lock-in in networked audio deployments. AES67 compliance allows devices from different manufacturers to share audio over IP.

26. D — AVSPV verifies installed system performance in the actual environment while manufacturer testing verifies component performance on the bench. Installed performance depends on room acoustics, cable runs, and integration quality that bench testing cannot assess. Both are necessary but serve different purposes.

27. C — Cat6A supports maximum frequency of 500 MHz enabling 10GBASE-T signaling over 100-meter runs. Cat6 supports 250 MHz and Cat5e supports 100 MHz. The higher frequency capability is required for HDBaseT 4K and 10 Gbps AV-over-IP applications.

28. A — IGMP snooping prevents multicast flooding to switch ports that haven't subscribed to the multicast group. Without IGMP snooping, multicast AV-over-IP traffic floods every port, consuming bandwidth network-wide. This is the most critical switch configuration for AV-over-IP deployments.

29. B — Online double-conversion UPS provides zero transition time because the output continuously runs from the inverter. Standby UPS requires 5-20 ms transfer time to switch from utility to battery power. Mission-critical AV applications require online topology to prevent any interruption.

30. D — DSCP 46 (EF/Expedited Forwarding) marks real-time audio/VoIP for highest priority; DSCP 34 (AF41) marks video conferencing. Different DSCP values enable network equipment to apply appropriate priority to each traffic type. Correct marking prevents audio dropouts and video artifacts during network congestion.

31. C — STC 40+ is the minimum partition rating for speech privacy between conference rooms. At STC 30-35, normal conversational speech remains audible through partitions. STC 40+ renders speech unintelligible, protecting confidential discussions.

32. A — 10:1 safety factor is required for overhead loads above occupied space; 3:1 applies to non-occupied applications. The stringent requirement for occupied space reflects the life-safety criticality of overhead rigging failure. ASME B30 and ANSI/NAFI standards establish these requirements.

33. D — DMX-512 uses RS-485 differential signaling as its physical layer supporting up to 512 addressable channels per universe. RS-485 enables multi-drop topologies with cable runs up to 1,200 feet. Five-pin XLR connectors are the standard DMX-512 connector type.

34. B — Passive HDMI is typically limited to 15 feet at 4K@60 Hz while active optical cable extends well beyond. At 18 Gbps bandwidth, signal attenuation in passive copper exceeds receiver tolerance beyond approximately 5 meters. Active cable, HDBaseT, or fiber extension methods are required for longer runs.

35. C — The CTS-D exam consists of 110 questions with 150 minutes to complete, requiring a passing score of 350 out of 500. The exam covers four domains: creating AV solutions, conducting AV management activities, communicating with stakeholders, and performing AV design activities.

36. A — Broadcast studios target under 0.5 s; meeting rooms target 0.4-0.6 s; educational auditoriums target 1.0-1.3 s. Each room type's RT60 target reflects its primary function — broadcast requires dry acoustics, meetings need speech clarity, and auditoriums balance speech with musical warmth.

37. D — Sub-microsecond PTP (IEEE 1588) synchronization is required for SMPTE ST 2110. This precision enables frame-accurate alignment of separate audio, video, and metadata essence streams. NTP provides only millisecond accuracy, three orders of magnitude insufficient for professional media production.

38. B — Multimode OM4 supports approximately 300-400 meters while singlemode supports tens of kilometers for AV-over-IP. The distance difference makes singlemode essential for campus and long-haul applications. Multimode is more cost-effective for building-scale deployments within its distance range.

39. A — ADA requires assistive listening in assembly spaces with fixed seating, scaled to seating capacity per ADA scoping tables. The requirement is federal law, not an optional design enhancement. Specific receiver quantities are determined by the total seating count.

40. C — APEx 2M-2010 governs AV design coordination with allied trades including electrical, mechanical, structural, and architectural. It establishes the professional framework for inter-discipline collaboration. It does not govern image specifications, performance verification, or energy management.

41. D — HIPAA requires encrypted transport, access controls, and audit logging beyond standard commercial AV security practice. Healthcare video conferencing handling protected health information must comply with these federal security requirements. Standard security practices alone do not satisfy HIPAA obligations.

42. B — Pixel pitch (mm) × 3,000 = minimum ideal viewing distance (mm). For example, 2 mm pitch × 3,000 = 6,000 mm = 6 meters minimum. Closer viewing reveals individual pixels, degrading image quality perception.

43. A — Punchlist is generated at the substantial completion walk-through with specification references for each item. This formal inspection documents all items requiring attention before final acceptance. Each punchlist item must be traceable to a specific specification section.

44. C — Amplifier should exceed total tap load by 25-33% for headroom ensuring reliable continuous operation. Operating amplifiers at 100% capacity causes thermal stress and premature failure. Headroom prevents amplifier distortion during sustained paging or music operation.

45. B — UL-listed firestop assemblies are required for all penetrations through fire-rated assemblies. Code mandates tested and listed systems that maintain the wall's rated fire resistance after penetration. Generic caulking, foam, and paint do not meet fire code requirements.

46. D — BDM requires 15:1 ISCR with divisor 6; ADM requires 50:1 ISCR with divisor 4 producing larger minimum image height. ADM is the more demanding viewing task on both contrast and image size metrics. BDM serves basic decision-making while ADM serves detailed analytical work.

47. C — All verification items must be measured and documented per AVSPV specification requirements. Verbal assurance, optional criteria, or partial measurement undermine the verification process. Documented measurements provide objective evidence of specification compliance.

48. A — AVSEM addresses AV system energy management including scheduling, standby modes, occupancy sensing, and power reduction strategies. It provides the framework for sustainable AV design practices. It does not address image sizing, coverage uniformity, or cable labeling.

49. D — Preset scenarios with minimal buttons produce highest user adoption and satisfaction. Complex interfaces with maximum button density create user confusion and avoidance. One-touch scenario activation matches how non-technical users actually interact with AV systems.

50. B — Heat-shrink printed labels at both cable ends meet RP-38-17 requirements. Durable printed labels withstand decades of environmental exposure maintaining readability. Handwritten labels, color coding alone, or single-end labeling fail the standard's requirements.

51. C — Specification must define parts, labor, duration, start date, and coverage scope independent of manufacturer warranty. Complete warranty terms prevent post-installation disputes about coverage responsibility. Manufacturer, integrator, or no warranty specification all leave coverage gaps.

52. A — Orange triangle marking identifies isolated ground receptacles per NEC. These specialty receptacles provide separate equipment grounding paths reducing electrical noise on sensitive AV circuits. This identification enables electricians and service technicians to verify proper receptacle type.

53. D — AV-over-IP provides greater scalability for large switched networks while HDBaseT provides simpler point-to-point distribution. AV-over-IP's network architecture enables any-source-to-any-display routing at enterprise scale. HDBaseT excels at dedicated single-cable connections within its 100-meter range.

54. B — Loudspeaker sensitivity is measured at 1 meter distance with 1 watt input power producing an SPL rating in dB. This standardized measurement enables comparison between different loudspeaker models. The rating serves as the starting point for amplifier power calculations.

55. C — DCI-P3 has wider color gamut serving digital cinema while Rec. 709 serves HDTV with narrower gamut. Cinema content mastered in DCI-P3 requires P3-calibrated displays for accurate reproduction. Displaying P3 content on Rec. 709 displays clips colors outside the narrower gamut.

56. A — AEC tail length must match or exceed room RT60 for effective echo cancellation. The algorithm must model the full duration of room reverberation to cancel acoustic echoes completely. Insufficient tail length allows late reflections to escape processing, causing audible echo for remote participants.

57. D — Speech requires 10 dB headroom while music requires 15-20 dB due to wider dynamic range. Music produces transient peaks significantly above average level that speech does not. Specifying speech headroom for music venues guarantees audible distortion during peak musical passages.

58. B — Dedicated queuing with bandwidth reservation prevents AV stream degradation on shared networks. Without QoS, AV traffic competes with enterprise data and may be delayed or dropped during congestion. Proper QoS configuration ensures AV streams receive priority treatment.

59. A — As-built drawings document actual installed condition including all field changes, substitutions, and additions. They reflect installation reality rather than original design intent. Without accurate as-builts, future service and modification work lacks reliable reference documentation.

60. C — Video conferencing requires CRI 90+ and broadcast also requires CRI 90+ for accurate on-camera color rendering. Lower CRI values produce unnatural skin tones that degrade professional video quality. CRI 70-80 is adequate for general commercial lighting but not camera-in-room applications.

61. D — NEC requires separation between signal and power cables with minimum 6-inch clearance. Parallel routing of signal cables alongside power cables creates electromagnetic coupling that introduces noise. Separation prevents interference from degrading audio and video signal quality.

62. B — TEMPEST prevents electromagnetic emanation of classified information beyond standard commercial security measures. Government classified facilities use TEMPEST-rated equipment to prevent electronic eavesdropping through electromagnetic emissions. Standard commercial security does not address this threat.

63. A — Formal substitution request with performance documentation submitted per specification timeline is the correct procedure. This protects specification integrity while allowing competitive alternatives. Unauthorized substitution, automatic acceptance, or blanket prohibition don't serve the project properly.

64. C — PTP provides sub-microsecond accuracy while NTP provides only millisecond accuracy. The three-order-of-magnitude difference makes NTP completely inadequate for SMPTE ST 2110 and other professional media applications requiring frame-accurate synchronization.

65. D — IBC and ASCE 7 require seismic bracing in designated seismic zones for overhead-mounted equipment in occupied spaces. This code requirement protects building occupants from falling equipment during earthquakes. Compliance is mandatory, not optional, in classified seismic zones.

66. B — ISCR accounts for both display performance and ambient light contribution to the viewed image. The formula ISCR = (peak white + ambient) ÷ (black + ambient) shows how ambient light degrades contrast. Native display contrast alone doesn't determine the viewer's actual contrast experience.

67. C — CMP plenum-rated cable is required per NEC for installation in air-handling spaces above ceilings. Non-rated cables produce toxic smoke during fire events in plenum spaces. This is a life-safety code requirement with zero tolerance for non-compliance.

68. A — Source code transfers to owner per specification enabling independent future modification capability. Without source code, the owner cannot modify room configurations, update device commands, or troubleshoot programming issues. Permanent dependency on the original integrator creates operational vulnerability.

69. D — STI 0.75 is "good" quality, 0.60 is minimum acceptable for PA, and below 0.45 is "poor." The STI scale ranges from 0 to 1, with higher values indicating better speech intelligibility. These thresholds guide system design and commissioning acceptance criteria.

70. B — Punchlist items are classified as non-conforming, incomplete, or defective with specification reference. Each classification determines the remediation approach and responsibility assignment. Specification references provide objective criteria for resolving disputes.

71. C — Separate switches or VLANs for primary and secondary networks provide redundancy for failover protection. Dante's redundancy architecture requires independent paths so a single network event doesn't disrupt audio. Single-switch configurations without separation eliminate redundancy protection.

72. A — Mechanical engineer must size dedicated cooling matched to AV heat load using wattage × 3.412 BTU/hr conversion. Undersized cooling causes equipment overheating and premature failure. This coordination requires precise heat load data from the AV designer.

73. D — Online double-conversion provides zero transition time while line-interactive requires brief transfer time. Online topology continuously powers the output from the inverter regardless of utility status. Mission-critical applications require online UPS to prevent any power interruption.

74. B — Tiered training matching end users, technical staff, and administrators with documented curriculum. Different user groups need different training depth and content. Single sessions cannot serve all audiences; tiered delivery ensures each group receives appropriate instruction.

75. A — eARC requires HDMI 2.1 and supports uncompressed multi-channel audio including Dolby TrueHD and DTS-HD Master Audio. Standard ARC on HDMI 2.0 supports only compressed audio formats. This distinction is critical for premium audio system specification.

76. C — Modern power factor correction achieves 0.90+ reducing reactive power and current draw. Active PFC circuits in switching power supplies approach unity power factor. Legacy equipment without PFC typically operates at 0.60-0.75, drawing more current for the same real power.

77. B — Rec. 2020 provides wider color gamut for 4K UHD/HDR content while Rec. 709 serves HDTV 1080p. Rec. 2020's expanded gamut supports HDR's extended color range. Display specifications must match the intended content's color space for accurate reproduction.

78. D — Front-to-rear airflow with blanking panels prevents hot-air recirculation in equipment racks. Without blanking panels, hot exhaust air flows back to equipment intakes, raising inlet temperatures. Proper airflow management is essential for equipment reliability and longevity.

79. A — APEx establishes the framework for coordinating AV design with electrical, mechanical, and architectural trades. This AVIXA standard defines the professional process for inter-discipline collaboration. It addresses coordination methodology, not technical measurement or specification standards.

80. B — 12-bit color depth requires more bandwidth than 8-bit at the same resolution and frame rate. Higher bit depth increases data per pixel proportionally. This is why 4K@60 Hz 4:4:4 at 12-bit exceeds HDMI 2.0's 18 Gbps capacity, requiring HDMI 2.1.

81. D — Fire alarm must override all AV audio per NFPA code requirements during emergency events. This ensures evacuation instructions are clearly audible without competition from background music or paging. AV system integration with fire alarm is a mandatory life-safety requirement.

82. A — Prescriptive specifications name specific products while performance specifications define functional outcomes. Prescriptive ensures exact product matching; performance enables competitive bidding. The designer selects the approach based on whether multiple products can satisfy the requirement.

83. A — IGMPv3 adds source-specific multicast (SSM) capability beyond IGMPv1 and IGMPv2. SSM enables receivers to specify which source's multicast they want, reducing unwanted traffic. This advanced filtering supports complex AV-over-IP deployments with multiple encoder sources.

84. C — The divisor progression BDM ÷6, ADM ÷4, Passive ÷8 means ADM requires the largest image height at any given viewing distance. Smaller divisors produce larger required image heights. At 20 ft viewing: Passive requires 30 inches, BDM requires 40 inches, ADM requires 60 inches.

85. D — Network segmentation, encryption, and access controls are required for AV cybersecurity. AV devices on networks present attack surfaces that must be protected with the same layered approach as IT security. Standard passwords, physical locks alone, or ignoring vulnerability are insufficient.

86. B — Only UL-listed assemblies specifically tested to maintain fire rating are code-compliant for firestop. These systems have been tested under fire conditions to verify they maintain the wall's rated resistance. Generic sealants, foam, and other materials have not been tested and do not meet code.

87. A — Complete closeout documentation includes as-builts, programming, user guides, training records, warranty, and credentials. Each document serves a specific operational need throughout the system's lifecycle. Missing components create gaps in the owner's ability to independently operate and maintain the system.

88. C — Visually lossless compression enables 4K delivery on Gigabit networks while uncompressed 4K requires 10+ Gbps infrastructure. Compression algorithms like JPEG 2000 and TICO reduce bandwidth by 10-20× without visible quality loss. This enables practical 4K distribution on standard enterprise networking.

89. A — Occupancy sensing, scheduling, and energy management benefit from coordinated BAS and AV integration. Building automation can trigger AV system activation, standby, and scene selection

based on occupancy and schedule. This integration reduces energy consumption and improves user experience.

90. D — Parallel wiring decreases total impedance while series wiring increases it. Two 8-ohm speakers in parallel produce 4 ohms; in series they produce 16 ohms. The resulting impedance must match the amplifier's rated operating range.

91. B — AV specifications typically reside in Division 27 (Communications) with coordination references in Division 26 (Electrical). This CSI MasterFormat placement ensures AV specifications appear in the expected location for bidders and contractors. Cross-references to Division 26 coordinate power and pathway requirements.

92. C — Power approximately doubles when impedance halves for voltage-source amplifiers. An amplifier rated 500 W at 8 ohms typically produces approximately 1,000 W at 4 ohms. This relationship is critical for matching amplifier capability to loudspeaker load impedance.

93. A — Warranty specification must define parts, labor, duration, start date, and scope independent of manufacturer terms. Complete warranty language prevents post-installation disputes about coverage responsibility. Relying on manufacturer warranty alone typically leaves labor coverage gaps.

94. D — Passive viewing tolerates more ambient light than ADM because its lower ISCR threshold (7:1 vs 50:1) is easier to maintain. The ISCR formula shows that higher contrast requirements are more sensitive to ambient light contribution. ADM applications require significant light control that Passive applications may not.

95. B — RF frequency coordination is required in dense venues to identify available frequencies and prevent interference. Urban venues contain numerous RF sources occupying wireless microphone frequency bands. Coordination surveys map the RF environment before any operating frequencies are assigned.

96. C — Worship spaces target STI 0.70+; public address targets STI 0.60 minimum; broadcast targets STI 0.75+. Different applications have different intelligibility requirements based on content criticality and listener expectations. Higher STI targets require more precise coverage design and acoustic treatment.

97. A — Static IP or DHCP reservation with documented schedule ensures consistent AV device communication. Control system programming references specific IP addresses; reassignment breaks these connections. Documentation enables troubleshooting, maintenance, and future network modifications.

98. D — 16:9 matches widescreen sources while 4:3 wastes approximately 25% of screen area as letterbox bars with widescreen content. Since modern content is predominantly widescreen, 4:3 screens waste usable display area. Specifying the wrong aspect ratio is a common and costly design error.

99. B — Include documented growth capacity in pathways, network, and power for planned expansion. Infrastructure capacity costs significantly less during initial construction than during retrofit. Documented growth provisions enable future expansion without pathway reconstruction.

100. C — DCI requires P3 color space calibration per SMPTE standards while commercial displays typically use sRGB or Rec. 709. Cinema screening rooms require specific calibration matching theatrical mastering standards. Commercial display calibration serves different quality targets and workflows.

101. A — Formal AVSPV verification with documented measurements against pass/fail criteria constitutes proper acceptance. Objective measurements provide auditable evidence of specification compliance. Self-certification, visual inspection, or verbal approval lack the rigor required for professional acceptance.

102. D — Sound masking raises ambient noise floor while acoustic treatment controls reverberation — both may be needed together. They serve complementary but different acoustic functions. Masking addresses speech privacy between spaces; treatment addresses intelligibility within spaces.

103. B — Monitoring protocol, alert thresholds, and reporting requirements should be specified during design. Defined monitoring parameters enable proactive problem identification before users experience failures. Leaving monitoring to integrator discretion or omitting it entirely creates reactive maintenance dependency.

104. A — Live reinforcement needs more headroom than playback due to unpredictable transient peaks from live performers. Recorded content has controlled dynamic range through mastering; live sources produce uncompressed transients. Additional headroom prevents amplifier clipping during unexpected peaks.

105. C — AVSEM includes scheduling, occupancy sensing, standby modes, and efficient equipment selection for comprehensive energy management. Multiple strategies working together produce measurable energy reduction. Single-strategy approaches miss the compounding benefit of integrated energy management.

106. D — CL2/CL3 or CMP rated cables are required per NEC for in-wall and plenum installation. Consumer cables lack fire-retardant jackets needed for permanent installation in building cavities. Using non-rated cables creates fire code violations and life-safety hazards.

107. B — AV infrastructure requirements must be communicated during schematic design for architectural and MEP incorporation. Conduit pathways, structural support, electrical circuits, and equipment room locations are difficult to add after SD decisions are locked. Late AV engagement creates costly construction-phase retrofits.

108. A — Single-point ground reference coordinated with electrical engineer prevents ground loops producing audible hum. Multiple ground paths through different rack frames create potential

differences that couple into audio signals. The electrical engineer implements the single-point ground on construction documents.

109. C — Automatic microphone mixing maintains unity NOM gain eliminating the multi-microphone penalty. The mixer activates only the microphone receiving the strongest signal, keeping the equivalent open-mic count at one. Without automatic mixing, 16 open microphones produce a 12 dB NOM penalty.

110. D — Post-occupancy evaluation reveals user experience insights informing both current system optimization and future design improvements. Commissioning verifies specification compliance; post-occupancy verifies actual user satisfaction and operational effectiveness. These insights create a feedback loop improving the designer's future work.