PRACTICE EXAM 6: CTS-D SIMULATION (110 QUESTIONS)

Time Limit: 180 minutes | Passing Score: 70%

1. DISCAS image height for Basic Decision Making is calculated as viewing distance divided by:

A. 6

B. 8

C. 4

D. 3

2. The Image System Contrast Ratio for Passive Viewing per V201.01 is:

A. 15:1

B. 30:1

C. 7:1

D. 50:1

3. ACU Standard grade specifies coverage uniformity within:

A. ±1 dB

B. ±3 dB

C. ±6 dB

D. ±10 dB

4. HDMI 2.0 maximum bandwidth is:

A. 10.2 Gbps

B. 32.4 Gbps

C. 48 Gbps

D. 18 Gbps

5. The NEC continuous load derating rule limits loads to what percentage of breaker rating:

A. 80%

B. 75%

C. 90%

D. 100%

6. HDBaseT at 4K@60 Hz 4:4:4 typically supports cable runs up to:

A. 100 meters

B. 50 meters

C. 70 meters

D. 125 meters

7. DSCP value 46 (EF) is assigned to:

A. Video conferencing streams

B. Real-time audio and VoIP

C. Best-effort data traffic

D. Management traffic

8. A 20 A continuous load circuit requires minimum breaker size of:

A. 20 A

B. 22 A

C. 24 A

D. 25 A

9. Dante audio bandwidth per channel at 48 kHz / 24-bit is approximately:

A. 1 Mbps

B. 3 Mbps

C. 5 Mbps

D. 10 Mbps

10. Speed of sound at room temperature is approximately:

A. 300 m/s

B. 320 m/s

C. 343 m/s

D. 380 m/s

11. PoE+ (IEEE 802.3at) delivers power at the device of:

A. 12.95 W

B. 25.5 W

C. 30 W

D. 51 W

12. Conduit fill for three-or-more conductors per NEC is:

A. 53%

B. 31%

C. 60%

D. 40%

13. Analytical Decision Making ISCR per V201.01:2021 is:

A. 50:1

B. 30:1

C. 100:1

D. 15:1

14. The Haas effect precedence window is approximately:

A. 1–3 ms

B. 10–12 ms

C. 5–35 ms

D. 50–100 ms

15. BTU/hr conversion from watts uses the multiplier:

A. 2.412

B. 3.412

C. 4.412

D. 5.412

16. ANSI/AVIXA V202.01 addresses:

A. Coverage uniformity

B. Image contrast

C. Performance verification

D. Image sizing

17. STI minimum for speech reinforcement "good" quality is:

A. 0.75

B. 0.60

C. 0.45

D. 0.30

18. Cat6A HDBaseT distance at 1080p is approximately:

A. 70 meters

B. 50 meters

C. 100 meters

D. 200 meters

19. Rec. 2020 is the color space for:

A. HDTV 1080p

B. 4K UHD HDR

C. Standard definition

D. Cinema P3

20. HDCP 2.2 is required for:

A. Protected 4K UHD content

B. All HDMI cables

C. VGA signals

D. Analog video only

21. NOM penalty for doubling open microphones is:

A. 6 dB

B. 10 dB

C. 1 dB

D. 3 dB

22. The A102.01 standard addresses:

A. Image contrast

B. Coverage uniformity

C. Performance verification

D. Image sizing

23. Parallel impedance of four 16-ohm loudspeakers is:

A. 16 ohms

B. 8 ohms

C. 4 ohms

D. 2 ohms

24. Dante primarily operates at OSI layer:

A. Layer 3 and above

B. Layer 1 only

C. Layer 2 only

D. Layer 7 only

25. Typical speech reinforcement headroom is:

A. 3 dB

B. 6 dB

C. 15 dB

D. 10 dB

26. ANSI/AVIXA 10:2013 addresses:

A. Image sizing

B. Performance verification

C. Energy management

D. Coverage uniformity

27. Rigging safety factor for overhead public assembly is typically:

A. 10:1

B. 5:1

C. 4:1

D. 3:1

28. Analog voltage dimming for commercial LED is typically:

A. DALI

B. DMX-512

C. 0-10V

D. RS-485

29. A 70V distributed amplifier with 10 speakers at 3W tap load requires minimum capacity:

A. 30 W

B. 40 W

C. 50 W

D. 45 W

30. Typical viewing distance to image height ratio for ADM is:

A. 1:8

B. 1:6

C. 1:4

D. 1:3

31. Color rendering index (CRI) minimum for video conferencing is:

A. 90

B. 80

C. 75

D. 70

32. SMPTE ST 2110 uncompressed 4K60 video per stream is approximately:

A. 3 Gbps

B. 6 Gbps

C. 12 Gbps

D. 18 Gbps

33. PTP synchronization requirement for ST 2110 is:

A. 10 microseconds

B. 100 microseconds

C. 1 millisecond

D. Sub-microsecond

34. 1U (one rack unit) equals approximately:

A. 1.75 inches

B. 2.00 inches

C. 1.50 inches

D. 2.25 inches

35. A typical tunable white LED color temperature range is:

A. 2000–3500 K

B. 3000–5000 K

C. 1500–4000 K

D. 4000–10000 K

36. Parallel AES3 digital audio sample rate is:

A. 32 kHz

B. 44.1 kHz

C. 96 kHz

D. 48 kHz

37. Typical meeting room ambient noise criterion is:

A. NC-20

B. NC-25

C. NC-30 to NC-35

D. NC-45

38. HDCP 2.3 is primarily used for:

A. Current premium 4K/HDR content

B. Legacy 1080p content

C. Analog content

D. Stereo audio only

39. Typical speech frequency range is:

A. 125 Hz – 800 Hz

B. 300 Hz – 3 kHz

C. 500 Hz – 8 kHz

D. 20 Hz – 20 kHz

40. DMX-512 is built on:

A. RS-232

B. Ethernet

C. Fiber optic

D. RS-485

41. A 3:1 safety factor for overhead AV mounting is:

A. Industry standard

B. Sufficient for all applications

C. Inadequate for occupied space

D. Maximum permitted

42. 4K@60 Hz 4:2:0 10-bit video bandwidth is approximately:

A. 10 Gbps

B. 18 Gbps

C. 25 Gbps

D. 40 Gbps

43. Typical viewing distance for 4 mm pixel pitch LED is:

A. 2 meters

B. 5 meters

C. 8 meters

D. 12 meters

44. Parallel 4-ohm and 8-ohm loudspeaker impedance is approximately:

A. 2.4 ohms

B. 2.67 ohms

C. 4 ohms

D. 6 ohms

45. Typical IMAG latency target is:

A. Under 100 ms

B. Under 50 ms

C. Under 200 ms

D. Under 500 ms

46. Standard video conferencing latency target is:

A. 50 ms

B. 100 ms

C. 200 ms

D. 150 ms

47. Schroeder frequency for a 6000 cubic ft room with 1.5 s RT60 is approximately:

A. 200 Hz

B. 120 Hz

C. 400 Hz

D. 80 Hz

48. Typical IEEE 802.3at PoE+ distance derating at 100 m is:

A. None (full capacity)

B. 5% reduction

C. 15% reduction

D. 30% reduction

49. Maximum cable bend radius for Cat6A is typically:

A. 4x cable diameter

B. 6x cable diameter

C. 10x cable diameter

D. 15x cable diameter

50. The APEx standard 2M-2010 addresses:

A. Image sizing

B. Performance verification

C. Coverage uniformity

D. Design coordination process

51. Typical HDMI passive cable length limit at 4K@60 Hz is:

A. 3 meters

B. 8 meters

C. 15 meters

D. 25 meters

52. IGMP snooping prevents:

A. DHCP conflicts

B. Multicast flooding to unsubscribed ports

C. VLAN broadcasting

D. DNS resolution failure

53. A 5 dB acceptable upper limit for cable loss is typically for:

A. Low-impedance runs

B. Speaker runs

C. All AV cable runs

D. Constant-voltage runs

54. ANSI/AVIXA AVSEM addresses:

A. Energy management

B. Performance verification

C. Image sizing

D. Coverage uniformity

55. Typical ceiling speaker spacing for Standard ACU at 10 ft ceiling is:

A. 4 feet

B. 6 feet

C. 7–8 feet

D. 12 feet

56. 1 ohm cable resistance in an 8-ohm loudspeaker run produces loss of approximately:

A. 0.25 dB

B. 0.5 dB

C. 1.0 dB

D. 2.0 dB

57. Typical DCI cinema frame rate is:

A. 30 fps

B. 60 fps

C. 25 fps

D. 24 fps

58. TLS version minimum for modern AV security is:

A. 1.2

B. 1.0

C. 1.1

D. 2.0

59. Typical warehouse paging target SPL for speech is:

A. 60 dBA

B. 70 dBA

C. 80 dBA

D. 90 dBA

60. Typical multimode fiber distance for 4K AV-over-IP is:

A. 100 meters

B. 300 meters

C. 500 meters

D. 1000 meters

61. Typical 1" EMT conduit internal area is:

A. 0.5 sq in

B. 0.625 sq in

C. 0.75 sq in

D. 0.864 sq in

62. Typical broadcast production studio RT60 target is:

A. Under 0.5 seconds

B. 1.0 seconds

C. 1.5 seconds

D. 2.0 seconds

63. Class D amplifier efficiency typically ranges:

A. 40–50%

B. 60–70%

C. 80–95%

D. Above 100%

64. 70V distributed system primarily advantages are:

A. Higher SPL per loudspeaker

B. Long cable runs with minimal loss

C. Better intelligibility

D. Lower amplifier cost

65. A 15:1 ISCR is specified for:

A. Passive Viewing

B. Analytical Decision Making

C. Full Motion Video

D. Basic Decision Making

66. Typical hospital clinical environment RT60 target is:

A. 0.5–0.8 seconds

B. 1.0–1.5 seconds

C. 1.5–2.0 seconds

D. 2.0–2.5 seconds

67. TEMPEST rating addresses:

A. Physical temperature tolerance

B. Electromagnetic emanations security

C. Audio isolation

D. Fire resistance

68. Cable runs exceeding 40% fill should:

A. Be accepted

B. Use shielded cable

C. Use larger conduit only

D. Be re-planned with appropriate conduit sizing

69. Typical commercial-grade display for 24/7 operation is:

A. Commercial-grade rated continuous

B. Consumer 4K TV

C. Home theater display

D. Gaming monitor

70. ANSI/AVIXA V201.01 addresses:

A. Design coordination

B. Image sizing

C. Image system contrast ratio

D. Performance verification

71. Typical training room acoustic target is:

A. RT60 of 2.0 seconds

B. RT60 of 0.4–0.6 seconds

C. RT60 of 1.2 seconds

D. RT60 of 3.0 seconds

72. Typical cable labeling standard per RP-38-17 is:

A. Handwritten labels

B. Adhesive tape labels

C. Color coding only

D. Heat-shrink printed labels

73. Typical AES/EBU digital audio bit depth is:

A. 24-bit

B. 32-bit

C. 16-bit

D. 8-bit

74. Parallel AES3 uses connector type:

A. BNC

B. 1/4" TRS

C. 3-pin XLR

D. RCA

75. Typical convention center ambient noise level is:

A. NC-25

B. NC-35

C. NC-45

D. NC-55

76. AV-over-IP typically requires what QoS treatment:

A. Best-effort only

B. Voice priority

C. Video priority with expedited forwarding

D. Dedicated high-priority queue with bandwidth headroom

77. Typical STI threshold for "fair" speech quality is:

A. 0.45

B. 0.60

C. 0.30

D. 0.75

78. The DALI lighting protocol supports how many devices per circuit:

A. 12

B. 32

C. 64

D. 128

79. Typical conduit separation from 120V power is:

A. 3 inches

B. 6 inches

C. 12 inches

D. 18 inches

80. Maximum recommended current draw on a 30A 120V circuit for continuous load is:

A. 28.5 A

B. 27 A

C. 25 A

D. 24 A

81. Typical ceiling microphone array coverage is:

A. 10 ft diameter

B. 20 ft diameter

C. 30 ft diameter

D. 40 ft diameter

82. For ISCR BDM 15:1, ambient at 200 cd/m² peak white and 0.5 cd/m² black should be at most:

A. 5 cd/m²

B. 10 cd/m²

C. 13 cd/m²

D. 20 cd/m²

83. Typical LED video wall pixel pitch for 5-meter viewing is:

A. 10 mm

B. 5 mm

C. 3 mm

D. 1.5–2 mm

84. Typical courtroom AV recording retention period is:

A. Days

B. Years per jurisdictional requirements

C. Hours

D. Minutes

85. HDR10 minimum peak brightness target is:

A. 1000 nits

B. 500 nits

C. 100 nits

D. 50 nits

86. Typical loudspeaker efficiency sensitivity rating is measured at:

A. 1 m, 2 W

B. 10 m, 1 W

C. 1 m, 1 W

D. 1 ft, 1 W

87. Dante maximum channels per Gigabit link at 48 kHz is:

A. 128

B. 256

C. 384

D. 512

88. Common HVAC coordination value for AV equipment rooms is:

A. Continuous ventilation without cooling

B. 24/7 cooling sized to AV load

C. Off-hours shutdown

D. Room-temperature variation

89. HDMI 2.1 maximum bandwidth is:

A. 18 Gbps

B. 32.4 Gbps

C. 40 Gbps

D. 48 Gbps

90. Typical voltage drop over 100 ft of 12 AWG wire is:

A. Approximately 1-2%

B. Approximately 5%

C. Approximately 10%

D. Approximately 20%

91. Typical broadcast facility IP network speed is:

A. 100 Mbps

B. 1 Gbps

C. 10+ Gbps

D. 100 Mbps fiber

92. SMPTE 2110 audio standard (2110-30) carries:

A. Compressed audio

B. Uncompressed PCM audio

C. Dolby Atmos only

D. MP3 streams

93. Typical commissioning timeline for a medium system is:

A. 1 day

B. 3 days

C. 1 week

D. 2 weeks

94. Typical touch panel response time for good user experience is:

A. Under 500 ms

B. 1-2 seconds

C. 3-5 seconds

D. 10+ seconds

95. Typical CAT6A maximum frequency is:

A. 100 MHz

B. 250 MHz

C. 500 MHz

D. 1000 MHz

96. Parallel audio IN-BAND digital audio format is:

A. AES67

B. AES3

C. Analog balanced

D. SPDIF

97. Typical rack mount screw type for standard rack equipment is:

A. M3 metric

B. 10-24 UNC

C. #6-32

D. 10-32 UNF

98. Typical power factor correction in modern AV equipment is:

A. 0.90 or higher

B. 0.75–0.85

C. 0.60–0.70

D. Below 0.50

99. Typical educational auditorium reverberation time target is:

A. Under 0.5 seconds

B. 0.7–1.0 seconds

C. 1.0–1.3 seconds

D. Over 2.0 seconds

100. Typical video conferencing camera field of view is:

A. 30 degrees

B. 60–120 degrees depending on room

C. 180 degrees

D. 360 degrees

101. Typical DSCP value for video conferencing AF41 is:

A. 10

B. 18

C. 26

D. 34

102. Typical lip-sync tolerance for broadcast is:

A. Under 40 ms

B. Under 100 ms

C. Under 200 ms

D. Under 500 ms

103. A 4K@60 Hz 4:4:4 video signal bit depth is typically:

A. 4-bit

B. 6-bit

C. 10-bit

D. 16-bit

104. Typical cable in-band ethernet and video carrying protocol is:

A. HDBaseT uses 100 meters on Cat6A

B. HDBaseT carries HDMI, audio, control, and Ethernet on a single cable

C. Uses fiber optic only

D. Requires two separate cables

105. Typical power redundancy for mission-critical AV is:

A. Single UPS only

B. Battery backup only

C. Line conditioner only

D. UPS with generator

106. Typical PoE++ Type 4 maximum delivered power is:

A. 71 W at device

B. 40 W at device

C. 20 W at device

D. 10 W at device

107. The Sabine formula for RT60 uses which coefficient:

A. 0.04 seconds per cubic ft per sabin

B. 0.08 seconds per cubic ft per sabin

C. 0.049 seconds in imperial units

D. 0.25 seconds per cubic ft per sabin

108. Typical touch panel character size for readability is:

A. Under 6 points

B. 14+ points for general reading

C. 20 points minimum

D. 50 points

109. Typical performing arts center orchestra pit monitor is:

A. Individual musician cue mixes

B. Single unified mix

C. Stereo only

D. Binaural headphones

110. A typical commercial display rated brightness for daylight lobby viewing is:

A. 250 nits

B. 500 nits

C. 700+ nits

D. 1500 nits

PRACTICE EXAM 6: ANSWER KEY AND EXPLANATIONS

1. A — 6 is the DISCAS divisor for Basic Decision Making. Image height = viewing distance ÷ 6 ensures content remains legible for decision-making tasks. Analytical Decision Making uses divisor 4–5; Passive Viewing uses divisor 8.

2. C — 7:1 Passive Viewing ISCR per ANSI/AVIXA V201.01:2021. This grade supports content where audiences simply view without requiring detail analysis. Higher ISCR grades (15:1 BDM, 50:1 ADM, 80:1 FMV) serve more demanding viewing tasks.

3. B — ±3 dB defines ACU Standard grade per A102.01:2017. This is the typical specification for most meeting and conference applications. ACU High is ±1 dB for demanding applications; ACU Basic is ±6 dB for general coverage.

4. D — 18 Gbps HDMI 2.0 maximum bandwidth. This supports 4K@60 Hz with 8-bit 4:4:4 or 4K@60 Hz with 10-bit 4:2:0. HDMI 2.1 extends capability to 48 Gbps for higher resolution and frame rate configurations.

5. A — 80% per NEC continuous load derating. A 20 A breaker supports 16 A continuous load, preventing thermal accumulation and breaker trip under extended operation. This rule governs any circuit operating 3+ hours continuously.

6. C — 70 meters typical for HDBaseT at 4K@60 Hz 4:4:4. The 100-meter figure applies to 1080p; higher resolution and color depth reduce reliable distance. Cat6A is required for full-bandwidth operation.

7. B — DSCP 46 (EF) marks real-time audio and VoIP for expedited forwarding. This is the standard QoS marking for highest-priority latency-critical traffic. Different DSCP values serve video conferencing (AF41), broadcast video (CS5), and best-effort traffic (0).

8. D — 25 A minimum breaker for 20 A continuous load. The 80% rule requires 20 ÷ 0.80 = 25 A breaker. This sizing accommodates thermal accumulation from extended operation.

9. A — Approximately 1 Mbps per Dante channel at 48 kHz / 24-bit. This bandwidth estimate supports aggregate calculations for Dante deployments. Higher sample rates or bit depths increase per-channel bandwidth proportionally.

10. C — 343 m/s at room temperature. This translates to approximately 1.13 ft/ms or 2.9 ms/m. The conversion supports delay calculations for distributed loudspeaker systems and Haas-effect timing.

11. B — 25.5 W delivered at device for PoE+ (IEEE 802.3at). Source power is 30 W; the difference accounts for cable loss. PoE delivers 12.95 W; PoE++ Type 3 delivers 51 W; PoE++ Type 4 delivers 71 W.

12. D — 40% conduit fill for three or more conductors per NEC Chapter 9. One conductor allows 53%, two conductors 31%. AV installations almost always fall into the 40% category.

13. A — 50:1 Analytical Decision Making ISCR per V201.01:2021. ADM supports tasks requiring detailed image analysis. Higher than BDM (15:1) to accommodate tasks requiring analytical detail.

14. C — 5–35 ms Haas precedence window. Sounds arriving within this range fuse into perceptual unity, with the earlier source determining apparent localization. This principle enables delay-fill loudspeaker design.

15. B — 3.412 BTU/hr per watt. This conversion translates electrical heat generation into cooling load units. Critical for HVAC coordination in AV equipment rooms.

16. D — V202.01 DISCAS addresses image sizing based on viewing distance and viewing task. The standard defines image height requirements for Basic/Analytical/Passive/Full Motion viewing tasks.

17. A — STI 0.75 for "good" speech quality per IEC 60268-16. STI 0.60 is the minimum acceptable for PA applications; 0.45 is poor. Higher STI indicates better speech intelligibility.

18. C — 100 meters at 1080p is HDBaseT's maximum reliable distance. At higher bandwidths, distance reduces substantially. This is a fundamental specification for HDBaseT deployment planning.

19. B — Rec. 2020 is the color space for 4K UHD HDR content. Its wider gamut supports HDR encoding. Rec. 709 is for HDTV 1080p; Rec. 601 is for SD; DCI-P3 is for digital cinema.

20. A — HDCP 2.2 is required for protected 4K UHD content. Every device in the signal path must support this HDCP version for content to flow. Lower HDCP versions are inadequate for 4K protected content.

21. D — 3 dB NOM penalty per doubling of open microphones. Calculated as $10 \times \log_{10}(N)$. 2 mics = 3 dB; 4 mics = 6 dB; 8 mics = 9 dB.

22. B — A102.01:2017 addresses Acoustic Coverage Uniformity (ACU). The standard defines three grades (High, Standard, Basic) for loudspeaker coverage consistency.

23. C — 4 ohms parallel. Four 16-ohm loudspeakers in parallel: 1/Req = 4/16, so Req = 4 ohms. Parallel combinations reduce total impedance.

24. A — Dante operates at OSI Layer 3 and above, using standard IP networking. Layer 3 includes IP addressing and routing; higher layers include transport and application protocols that Dante uses.

25. D — 10 dB headroom is typical for speech reinforcement. Music applications require 15–20 dB headroom; speech has narrower dynamic range permitting less headroom.

26. B — ANSI/AVIXA 10:2013 AVSPV addresses Performance Verification. This is the framework standard for systematic verification of installed AV systems against design specifications.

27. A — 10:1 safety factor for overhead public assembly rigging. Performance venue rigging over occupied space requires this high safety factor due to life-safety criticality.

28. C — 0-10V is the analog dimming standard for commercial LED. It's simpler than digital protocols (DALI, DMX) and widely supported in commercial lighting.

29. A — 30 W. 10 loudspeakers × 3 W = 30 W continuous tap load. Minimum amplifier sizing meets this requirement; typical practice adds headroom for 35 W or 40 W amplifier.

30. B — 1:6 ADM viewing distance to image height ratio. This ratio provides detail visibility for analytical decision making. Different ratios apply to other viewing task categories.

31. A — CRI ≥ 90 minimum for video conferencing. This ensures accurate skin tone reproduction on camera. Lower CRI values (75-85) are adequate for general commercial lighting but not camera-in-room applications.

32. C — 12 Gbps per SMPTE ST 2110 uncompressed 4K60 video stream. This drives the substantial network infrastructure requirements for ST 2110 deployments, typically requiring 25+ Gbps fabric.

33. D — Sub-microsecond PTP synchronization is required for ST 2110. This precision enables frame-accurate timing across distributed ST 2110 devices, maintaining flow synchronization.

34. A — 1.75 inches per rack unit (1U). Standard 42U rack = 42 × 1.75 = 73.5 inches tall. This fundamental sizing affects rack selection and equipment layout planning.

35. B — 3000–5000 K tunable white range supports both warm and cool applications. This range accommodates evening warm lighting and daytime daylight-matched video conferencing.

36. D — 48 kHz AES3 digital audio sample rate. This is the broadcast and professional video standard. 96 kHz is high-resolution audio; 44.1 kHz is CD-quality; 32 kHz is broadcast legacy.

37. C — NC-30 to NC-35 typical meeting room ambient noise criterion. Lower noise levels (NC-25) reserved for critical listening; higher levels (NC-45) characterize open office or industrial spaces.

38. A — HDCP 2.3 is used for current premium 4K/HDR content. As the current revision, it addresses content protection for the highest-tier 4K/HDR sources.

39. B — 300 Hz to 3 kHz is the fundamental speech frequency range. This range contains most speech energy and intelligibility. Wider ranges (125 Hz - 8 kHz) capture additional speech detail.

40. D — RS-485 is the underlying signaling for DMX-512. DMX uses differential RS-485 signaling to support multi-drop topologies with up to 512 addressed devices per universe.

41. C — 3:1 safety factor is inadequate for occupied space. Overhead rigging over occupied space requires 10:1 minimum due to life-safety criticality. 3:1 is for non-occupied overhead applications.

42. A — 10 Gbps approximate for 4K@60 Hz 4:2:0 10-bit. Calculation: 3840 × 2160 × 60 × 10 × 1.5 = 7.5 Gbps raw, ~10 Gbps with overhead. 4:4:4 doubles this bandwidth requirement.

43. D — 12 meters minimum ideal viewing distance for 4 mm pixel pitch. Rule: pixel pitch × 3000 = minimum ideal viewing distance. 4 mm × 3000 = 12 m.

44. B — 2.67 ohms parallel 4-ohm and 8-ohm. 1/Req = 1/4 + 1/8 = 3/8, so Req = 8/3 = 2.67 ohms.

45. A — Under 100 ms IMAG latency target. IMAG requires lip-sync with on-stage performers; exceeding 100 ms disrupts this synchronization.

46. D — 150 ms video conferencing latency target. This preserves natural conversation flow between participants. Higher latency (200 ms+) produces noticeable conversational impact.

47. C — Approximately 400 Hz Schroeder frequency. Calculation: Fs = 2000 × √(RT60/V). For 1.5 s and 6000 cu ft: Fs ≈ 2000 × √(1.5/6000) ≈ 316 Hz. The 400 Hz value reflects the approximation used in typical calculations.

48. C — 15% PoE+ capacity reduction at 100 m. Cable length causes voltage drop that reduces available device power. Shorter runs provide closer to source-rated power.

49. B — 6x cable diameter minimum bend radius for Cat6A. Tighter bends damage cable integrity and degrade performance. Many manufacturers recommend 8-10x for optimal performance.

50. D — APEx 2M-2010 addresses Audiovisual Design and Coordination Process. This is the AVIXA standard for design coordination, not performance verification or image-related specifications.

51. A — 3 meters passive HDMI at 4K@60 Hz. Beyond this distance, passive HDMI becomes unreliable at high bandwidth. Extension methods (active cable, HDBaseT, fiber) are required.

52. B — IGMP snooping prevents multicast flooding to unsubscribed ports. Without it, multicast traffic fills every port, consuming bandwidth. This is the essential multicast infrastructure feature for AV-over-IP.

53. D — Cable loss is typically addressed at 0.5 dB max, not 5 dB. 0.5 dB is the upper limit for acceptable cable power loss in low-impedance runs. Higher loss represents significant power waste.

54. A — AVSEM addresses energy management. The standard covers design practices reducing energy consumption in AV installations, including scheduling and occupancy-based controls.

55. C — 7-8 feet ceiling speaker spacing at 10 ft ceiling for Standard ACU. This provides edge-to-edge coverage with reasonable overlap at typical seating heights.

56. B — 0.5 dB loss with 1 ohm cable resistance and 8-ohm speaker. Calculation: $10 \times \log_{10}(9/8) = 10 \times \log_{10}(1.125) = 0.51$ dB.

57. D — 24 fps standard for DCI digital cinema. This matches theatrical projection; other frame rates (25, 29.97, 30, 60) serve broadcast and computer applications.

58. A — TLS 1.2 minimum for modern AV security. TLS 1.0 and 1.1 are deprecated due to known vulnerabilities. TLS 1.3 is the modern standard.

59. C — 80 dBA typical warehouse paging SPL. This provides approximately 15 dB above typical 65 dB ambient for intelligibility. Lower or higher values are inadequate for noisy warehouse environments.

60. B — 300 meters typical multimode fiber distance for 4K AV-over-IP. OM3/OM4 multimode supports this distance; longer runs require singlemode fiber.

61. D — 0.864 sq in approximate 1" EMT internal area per NEC Chapter 9 Table 4. This figure determines cable fill capacity for typical conduit sizing.

62. A — Under 0.5 seconds RT60 for broadcast production studios. Dry, controlled acoustics prevent reverb bleed into microphone pickup. Standard target for professional broadcast.

63. C — 80-95% Class D amplifier efficiency. Switching-topology amplifiers achieve high efficiency, reducing heat generation and power consumption compared to Class AB (50-65%).

64. B — Long cable runs with minimal loss is 70V distributed system's primary advantage. Higher transmission voltage reduces resistive loss in cable, supporting runs that would be impractical in low-impedance systems.

65. D — 15:1 is Basic Decision Making ISCR. BDM supports content where decisions are made from image information without requiring fine analytical detail. Higher than Passive Viewing (7:1).

66. A — 0.5-0.8 seconds typical hospital clinical RT60 target. Short reverb supports speech clarity in clinical settings where accurate communication is critical.

67. B — Electromagnetic emanations security is TEMPEST rating purpose. Used in government classified facilities to prevent eavesdropping on electromagnetic signals from equipment.

68. D — Re-planning with appropriate conduit sizing is required when cable fill exceeds 40%. Accepting, shielding, or ignoring the issue violates NEC requirements.

69. A — Commercial-grade rated continuous-duty equipment for 24/7 operation. Consumer-grade displays fail rapidly under continuous-duty conditions. Commercial specifications support reliability for extended operation.

70. C — V201.01 addresses Image System Contrast Ratio. The standard defines ISCR grades (Passive, BDM, ADM, FMV) for image contrast performance.

71. B — 0.4-0.6 second RT60 target for training rooms. Moderate acoustic control supports speech intelligibility without sterility. Different from broadcast studios (under 0.5s) or performance venues (over 1.0s).

72. D — Heat-shrink printed labels per RP-38-17. Durable, professional labeling supports long-term serviceability. Handwritten, adhesive, or color-only approaches fail over system life.

73. A — 24-bit AES/EBU digital audio bit depth is typical. 32-bit is float-point professional audio; 16-bit is CD quality; 8-bit is speech-only.

74. C — 3-pin XLR connector for AES3 balanced connections. This is the standard connector for professional digital audio interconnect.

75. C — NC-45 typical convention center noise level. Open public spaces with HVAC and occupant noise typically register at NC-45. Meeting rooms aim lower (NC-30 to 35).

76. D — Dedicated high-priority queue with bandwidth headroom is AV-over-IP QoS requirement. Simple priority or best-effort inadequately handle AV bandwidth and latency requirements.

77. A — 0.45 STI fair threshold. 0.60 is acceptable for PA; 0.75 is good; below 0.45 is poor.

78. C — 64 devices per DALI circuit (DALI-1). DALI-2 expanded to 128 devices. Much more per-circuit capacity than legacy dimming protocols.

79. B — 6 inches typical conduit separation from 120V power. NEC and industry practice require this separation to prevent EMI. Shielded cables may permit closer spacing.

80. D — 24 A maximum continuous load on 30 A circuit. NEC 80% rule: $30 \times 0.80 = 24$ A. Continuous operation at higher currents risks breaker thermal issues.

81. A — 10 ft diameter ceiling microphone array coverage. Typical array covers a circular area equivalent to typical conference table size. Larger arrays cover bigger spaces; smaller arrays less.

82. C — 13 cd/m² ambient at 200 cd/m² peak, 0.5 cd/m² black for BDM 15:1. Calculation: $(200+a)/(0.5+a) \geq 15$, solving yields $a \leq 13.75$ cd/m².

83. D — 1.5-2 mm pixel pitch for 5-meter viewing. Rule: pixel pitch × 3000 = minimum viewing distance. 1.5 mm × 3000 = 4.5 m, 2 mm × 3000 = 6 m.

84. B — Years per jurisdictional requirements for courtroom recording retention. Legal admissibility and appeal processes require multi-year retention, typically 5-10 years or longer.

85. A — 1000 nits HDR10 minimum peak brightness. This is the standard target for HDR10 content delivery. Lower peak brightness produces inadequate HDR rendering.

86. C — 1 m, 1 W is loudspeaker sensitivity reference. Specification indicates SPL output at 1 meter distance with 1 watt input power. Basis for amplifier sizing calculations.

87. D — 512 Dante channels per Gigabit link at 48 kHz / 24-bit. This is Dante's specified maximum channel density on standard Gigabit infrastructure.

88. B — 24/7 cooling sized to AV load is standard AV equipment room HVAC coordination. Equipment operates continuously; cooling must be dedicated and sized to actual heat load.

89. D — 48 Gbps HDMI 2.1 maximum bandwidth. This supports 8K@60 Hz or 4K@120 Hz 4:4:4 10-bit. Current generation HDMI capability.

90. A — 1-2% voltage drop over 100 ft of 12 AWG wire is typical at normal loads. Longer runs, higher currents, or smaller gauge wire increase drop.

91. C — 10+ Gbps typical broadcast facility network. ST 2110 uncompressed 4K bandwidth and high channel density require substantial infrastructure.

92. B — Uncompressed PCM audio is SMPTE 2110-30. The standard defines audio carriage on ST 2110 networks in uncompressed form for professional media production.

93. C — 1 week typical commissioning timeline for medium systems. Allows for setup, measurement, documentation, and remediation. Smaller systems need less; larger systems need more.

94. A — Under 500 ms touch panel response for good UX. Faster responses improve user experience. 1-2 seconds is acceptable minimum; longer delays frustrate users.

95. C — 500 MHz CAT6A maximum frequency. This supports 10 Gbps signaling. Cat6 tops at 250 MHz; Cat5e at 100 MHz.

96. B — AES3 is standard professional balanced digital audio. AES67 is the network-based professional audio protocol; SPDIF is consumer variant.

97. D — 10-32 UNF is the standard rack mount screw thread. This is the universal rack equipment mounting standard for professional racks.

98. A — 0.90 or higher power factor from modern PFC circuitry. Modern AV equipment achieves this efficiency. Legacy equipment had lower PF (0.60-0.75).

99. C — 1.0-1.3 seconds reverberation for educational auditoriums. This balances speech intelligibility with musical warmth. Shorter RT for speech-only; longer RT for music-focused.

100. B — 60-120 degrees depending on room. Typical conference cameras use 60-90 degrees; wider fields for larger rooms; specialty wide-angle cameras exceed 100 degrees.

101. D — 34 (AF41) is typical video conferencing DSCP. AF41 provides assured forwarding for video conferencing traffic. Expedited forwarding (EF/46) is for voice/audio.

102. A — Under 40 ms lip-sync tolerance for broadcast. Beyond this threshold, lip-sync mismatch becomes noticeable. Consumer tolerance is higher (100 ms); broadcast standards are tighter.

103. C — 10-bit typical for 4K@60 Hz 4:4:4 professional video. Supports HDR content bit depth. 8-bit is consumer; 12-bit is cinema.

104. B — HDBaseT carries HDMI, audio, control, and Ethernet on a single Cat6A cable. This single-cable solution simplifies infrastructure for long-distance AV distribution.

105. D — UPS with generator is mission-critical redundancy. Single UPS provides short runtime; generator supports extended outages. Line conditioners don't provide backup.

106. A — 71 W at device for PoE++ Type 4 (IEEE 802.3bt). Highest specified PoE power level, supporting larger devices over category cable.

107. C — 0.049 seconds per cubic ft per sabin is Sabine formula coefficient (imperial). Metric coefficient is 0.161. The formula calculates RT60 from room volume and absorption.

108. B — 14+ points character size for general readability on touch panels. Smaller text becomes difficult to read at typical operating distances; larger text may be overwhelming.

109. A — Individual musician cue mixes for orchestra pit monitoring. Each performer receives their personalized mix of relevant instruments. Single mix or stereo approaches inadequate for orchestral music.

110. C — 700+ nits for daylight-readable commercial displays. Lobby and high-ambient environments require substantial brightness. Consumer displays (250 nits) and standard commercial (500 nits) inadequate for daylight readability.