PRACTICE EXAM 12: CTS-D SIMULATION (110 QUESTIONS)

Time Limit: 180 minutes | Passing Score: 70%

1. A boardroom has farthest viewing distance of 24 feet. Per DISCAS BDM, the minimum image height is:

A. 36 inches

B. 60 inches

C. 48 inches

D. 72 inches

2. A 100 W amplifier driving a loudspeaker with 90 dB sensitivity (1W/1m) produces maximum SPL at 1 meter of:

A. 110 dB

B. 100 dB

C. 105 dB

D. 115 dB

3. A conference room has 8 ceiling speakers on a 70V system. Each is set to 5 W tap. The minimum amplifier size with 25% headroom is:

A. 40 W

B. 45 W

C. 60 W

D. 50 W

4. A projector at 20 feet from a 120-inch diagonal 16:9 screen. The required throw ratio is approximately:

A. 1.5:1

B. 1.9:1

C. 2.5:1

D. 1.0:1

5. An AV equipment room contains 6,000 W of equipment. The cooling requirement in BTU/hr is:

A. 12,000 BTU/hr

B. 18,000 BTU/hr

C. 20,472 BTU/hr

D. 24,000 BTU/hr

6. A 20 A, 120 V circuit with continuous AV load. Maximum continuous power draw is:

A. 1,920 W

B. 2,400 W

C. 1,440 W

D. 1,200 W

7. A listener sits 12 meters from a loudspeaker with 95 dB sensitivity (1W/1m). At 1 W, the SPL at the listener is approximately:

A. 80 dB

B. 78 dB

C. 85 dB

D. 73.4 dB

8. A room measures 40 ft × 30 ft × 10 ft. Volume is 12,000 cubic ft. Total absorption is 600 sabins. RT60 using Sabine formula is:

A. 0.8 seconds

B. 0.98 seconds

C. 1.2 seconds

D. 0.5 seconds

9. A 4K@60 Hz 4:4:4 12-bit signal requires approximately what bandwidth:

A. 12 Gbps

B. 14 Gbps

C. 18 Gbps

D. 24 Gbps

10. A display shows 500 cd/m² peak white and 0.5 cd/m² black. Ambient light adds 10 cd/m². The ISCR is:

A. 48.6:1

B. 50:1

C. 35:1

D. 100:1

11. A delay-fill speaker is 30 meters from the main loudspeaker. The required delay time at 343 m/s is:

A. 50 ms

B. 60 ms

C. 100 ms

D. 87.5 ms

12. A conference room uses four 8-ohm ceiling speakers in parallel. The total impedance is:

A. 4 ohms

B. 2 ohms

C. 8 ohms

D. 16 ohms

13. A 30 A, 208 V single-phase circuit with continuous load. Maximum continuous power is:

A. 4,992 W

B. 6,240 W

C. 3,744 W

D. 5,200 W

14. A loudspeaker produces 100 dB at 1 meter. At 16 meters, the SPL using inverse square law is:

A. 88 dB

B. 85 dB

C. 76 dB

D. 70 dB

15. A Dante network with 256 active channels at 48 kHz/24-bit. Approximate bandwidth consumption is:

A. 128 Mbps

B. 500 Mbps

C. 384 Mbps

D. 256 Mbps

16. A room with 4 open microphones. The NOM penalty is:

A. 3 dB

B. 6 dB

C. 9 dB

D. 12 dB

17. A video wall uses 2.0 mm pixel pitch. The minimum ideal viewing distance is:

A. 6 meters

B. 4 meters

C. 8 meters

D. 10 meters

18. An amplifier draws 800 W input and produces 600 W output. The efficiency is:

A. 80%

B. 70%

C. 75%

D. 85%

19. A 16:9 display has 65-inch diagonal. The image height is approximately:

A. 24 inches

B. 28 inches

C. 36 inches

D. 32 inches

20. A room requires BDM ISCR of 15:1. Display produces 400 cd/m² peak and 0.8 cd/m² black. Maximum ambient light contribution is:

A. 12 cd/m²

B. 26 cd/m²

C. 5 cd/m²

D. 40 cd/m²

21. A 70V system with 20 speakers at 2 W tap each. Continuous load is:

A. 40 W

B. 50 W

C. 60 W

D. 30 W

22. A display at 30 ft viewing distance requires ADM image height. The minimum is:

A. 60 inches

B. 45 inches

C. 90 inches

D. 120 inches

23. A sound system requires 95 dB at 20 meters. Loudspeaker sensitivity is 100 dB (1W/1m). Required amplifier power is approximately:

A. 100 W

B. 126 W

C. 200 W

D. 50 W

24. An AV rack with 12 devices averaging 150 W each. Total heat generation in BTU/hr is:

A. 3,412 BTU/hr

B. 5,000 BTU/hr

C. 4,500 BTU/hr

D. 6,142 BTU/hr

25. A cable run of 200 ft using 14 AWG speaker wire (5.2 ohms/1000 ft round trip). Cable resistance is:

A. 1.04 ohms

B. 2.08 ohms

C. 0.52 ohms

D. 3.12 ohms

26. A 16 AWG cable run of 100 ft (8.0 ohms/1000 ft round trip) driving an 8-ohm speaker. The cable power loss is:

A. 5%

B. 15%

C. 10%

D. 20%

27. A room measures 50 ft × 40 ft × 12 ft with 800 sabins absorption. RT60 is:

A. 0.8 seconds

B. 1.47 seconds

C. 2.0 seconds

D. 0.5 seconds

28. A projector produces 5,000 lumens on a 100-inch diagonal 16:9 screen. The screen area is approximately 37.2 sq ft. Approximate foot-lamberts is:

A. 100 fL

B. 85 fL

C. 200 fL

D. 134 fL

29. A 30 A, 120 V circuit with NEC 80% continuous derating. Maximum continuous watts is:

A. 2,880 W

B. 3,600 W

C. 2,400 W

D. 1,920 W

30. A ceiling speaker at 10 ft height with 90° coverage angle. The coverage diameter at 4 ft ear height (6 ft drop) is:

A. 6 ft

B. 8 ft

C. 12 ft

D. 15 ft

31. A 4K@60 Hz 4:2:0 8-bit signal. Approximate raw bandwidth is:

A. 12 Gbps

B. 6 Gbps

C. 18 Gbps

D. 3 Gbps

32. Two loudspeakers, each producing 90 dB at a listener position. Combined SPL is:

A. 180 dB

B. 95 dB

C. 90 dB

D. 93 dB

33. A 4-channel amplifier at 500 W per channel, 80% efficiency. Total input power draw is:

A. 1,600 W

B. 2,000 W

C. 2,500 W

D. 3,000 W

34. A display with native contrast 3000:1 in a room with ambient light producing ISCR of 45:1. This meets which ISCR grade:

A. ADM (50:1) — fails, below threshold

B. ADM (50:1) — passes

C. BDM (15:1) — fails

D. Passive (7:1) — fails

35. A conference room needs 80 dB SPL at 5 meters from a speaker with 88 dB sensitivity (1W/1m). Required power is approximately:

A. 5 W

B. 10 W

C. 25 W

D. 50 W

36. A video wall is 12 ft wide × 7 ft tall. Farthest viewer is 60 ft. Per DISCAS BDM (divisor 6), minimum image height should be:

A. 84 inches

B. 120 inches

C. 60 inches

D. 96 inches

37. A 20 A, 208 V single-phase circuit with NEC 80% derating. Maximum continuous power is:

A. 3,328 W

B. 4,160 W

C. 2,496 W

D. 2,000 W

38. A room with RT60 of 2.0 seconds and volume 8,000 cubic ft. Total absorption using Sabine is:

A. 100 sabins

B. 150 sabins

C. 196 sabins

D. 250 sabins

39. A loudspeaker with 97 dB sensitivity requires 85 dB at 25 meters. Distance loss is approximately 28 dB. Required power is approximately:

A. 5 W

B. 10 W

C. 25 W

D. 16 W

40. A PDU serves 6 devices at 3 A each on 120 V. Total continuous load and minimum circuit size is:

A. 2,160 W on a 30 A circuit

B. 2,880 W on a 20 A circuit

C. 1,440 W on a 20 A circuit

D. 3,600 W on a 40 A circuit

41. An AV-over-IP system with 10 encoders streaming compressed 4K at 800 Mbps each. Minimum switch uplink bandwidth is:

A. 4 Gbps

B. 8 Gbps

C. 16 Gbps

D. 20 Gbps

42. A 100-meter Cat6A run with 4 HDBaseT streams. Maximum reliable resolution per stream is:

A. 4K@30 Hz

B. 8K@60 Hz

C. 4K@60 Hz 4:4:4

D. 1080p

43. A room 60 ft × 40 ft with 10 ft ceiling using ceiling speakers with 90° pattern at 6 ft drop. Approximate speaker count for Standard ACU is:

A. 8 speakers

B. 16 speakers

C. 24 speakers

D. 32 speakers

44. A 75-inch display (image height approximately 37 inches) at 18 ft farthest viewing. Per DISCAS BDM (÷6), minimum required height is:

A. 36 inches — the display meets BDM

B. 42 inches — display fails BDM

C. 30 inches — display exceeds BDM

D. 48 inches — display fails BDM

45. Doubling distance from a loudspeaker reduces SPL by:

A. 3 dB

B. 10 dB

C. 12 dB

D. 6 dB

46. A room has 16 open microphones with automatic mixer. The mixer maintains how many equivalent open channels:

A. 16

B. 1 (unity NOM)

C. 8

D. 4

47. A display at 400 cd/m² peak, 1.0 cd/m² black, ambient 5 cd/m². ISCR is:

A. 67.5:1

B. 80:1

C. 50:1

D. 40:1

48. A 16:9 screen 120 inches diagonal. Screen width is approximately:

A. 72 inches

B. 96 inches

C. 104.6 inches

D. 110 inches

49. A Sabine calculation for a 15,000 cubic ft room targeting 0.8 seconds RT60. Required total absorption is:

A. 600 sabins

B. 750 sabins

C. 1,000 sabins

D. 920 sabins

50. A 70V amplifier at 200 W drives 15 speakers at varied taps totaling 180 W. The headroom is:

A. 11% (marginal — recommend larger amplifier)

B. 20% (adequate)

C. 50% (excessive)

D. 0% (at capacity)

51. An amplifier rated 1,000 W at 4 ohms. At 8 ohms output is typically:

A. 1,000 W

B. 250 W

C. 500 W

D. 2,000 W

52. A room with 6 ceiling speakers on 70V at 10 W tap each, cable run average 100 ft at 16 AWG. Total cable resistance per run is 0.8 ohms. Power wasted per cable is approximately:

A. 0.1 W per speaker

B. 0.01 W per speaker (negligible at 70V)

C. 1.0 W per speaker

D. 5.0 W per speaker

53. A 30 ft × 20 ft conference room with 9 ft ceiling. Volume is 5,400 cubic ft. Target RT60 is 0.5 seconds. Required absorption is:

A. 400 sabins

B. 600 sabins

C. 350 sabins

D. 529 sabins

54. A loudspeaker cluster aimed to cover seats from 10 m to 40 m. The SPL variation from front to back using inverse square is:

A. 12 dB

B. 6 dB

C. 18 dB

D. 20 dB

55. A 4K@60 Hz signal requires HDMI 2.0 (18 Gbps). At 4:2:2 10-bit, the bandwidth is approximately:

A. 18 Gbps

B. 12 Gbps

C. 14.9 Gbps

D. 10 Gbps

56. A conduit must carry 8 Cat6A cables (OD 0.30 inches each). Cable area per cable is 0.071 sq in. Total cable area is 0.568 sq in. At 40% fill, minimum conduit internal area is:

A. 1.0 sq in

B. 1.42 sq in

C. 2.0 sq in

D. 0.8 sq in

57. A 120-inch diagonal 16:9 screen has image height of approximately 59 inches. Per DISCAS ADM (÷4), maximum viewing distance for ADM is:

A. 10 ft

B. 15 ft

C. 25 ft

D. 19.7 ft

58. A power amplifier produces 250 W into 8 ohms. The output voltage is:

A. 44.7 V RMS

B. 31.6 V RMS

C. 50 V RMS

D. 63.2 V RMS

59. A 70V distributed system: amplifier output voltage at full power is:

A. 25 V RMS

B. 50 V RMS

C. 70.7 V RMS

D. 100 V RMS

60. A room with NC-35 ambient noise and STI target of 0.60. The minimum speech-to-noise ratio needed is approximately:

A. 10 dB

B. 15 dB

C. 20 dB

D. 5 dB

61. A video wall controller processes 4 inputs of 4K@60 Hz for a 2×2 configuration. Total processing bandwidth is approximately:

A. 18 Gbps

B. 24 Gbps

C. 36 Gbps

D. 48 Gbps

62. A 200-seat auditorium requires 85 dB average SPL. Loudspeaker sensitivity is 95 dB (1W/1m). Average listener distance is 15 meters. Required power per loudspeaker is approximately:

A. 22 W

B. 50 W

C. 100 W

D. 10 W

63. A PDU on 30 A, 208 V single-phase, continuous derating to 80%. Maximum continuous load per NEC is:

A. 3,744 W

B. 6,240 W

C. 4,992 W

D. 4,160 W

64. A conference room acoustic specification calls for NC-30. The approximate dBA equivalent is:

A. 25 dBA

B. 38 dBA

C. 45 dBA

D. 50 dBA

65. A stereo amplifier at 200 W per channel, 75% efficiency. Total input power and heat generation is:

A. 267 W input, 67 W heat per channel

B. 150 W input, 50 W heat per channel

C. 400 W input, 200 W heat per channel

D. 267 W input, 67 W heat per channel (534 W total input, 134 W total heat)

66. A projector with 1.5:1 throw ratio projecting onto a 150-inch diagonal 16:9 screen (width 130.7 inches). Required throw distance is:

A. 150 inches

B. 130 inches

C. 196 inches

D. 225 inches

67. A 4K signal at 3840 × 2160 × 60 fps × 24-bit color × 3 channels. Raw uncompressed bandwidth is approximately:

A. 12 Gbps

B. 18 Gbps

C. 24 Gbps

D. 6 Gbps

68. An equipment room with 4 racks averaging 2,500 W each. Total BTU/hr is:

A. 10,000 BTU/hr

B. 25,000 BTU/hr

C. 34,120 BTU/hr

D. 40,000 BTU/hr

69. A ceiling microphone at 8 ft height, ear height 4 ft. The pickup distance is:

A. 8 ft

B. 4 ft

C. 6 ft

D. 10 ft

70. A 3 mm pixel pitch LED wall at 40 ft viewing distance (12.2 m). The ideal minimum viewing distance is 9 m. This configuration:

A. Fails — too close for 3 mm

B. Is marginal

C. Is exactly matched

D. Passes — 12.2 m exceeds 9 m minimum

71. A room requires Passive Viewing ISCR (7:1). Display produces 300 cd/m² peak, 1.0 cd/m² black. Maximum ambient light contribution is:

A. 42 cd/m²

B. 30 cd/m²

C. 20 cd/m²

D. 50 cd/m²

72. A conference room with 10 ft ceiling, 90° coverage speakers, 4 ft ear height. Spacing at 6 ft drop for Standard ACU is approximately:

A. 5 ft

B. 10 ft

C. 7.5 ft

D. 15 ft

73. A 50 W amplifier driving two 8-ohm speakers in parallel (4 ohms). If the amplifier is not rated for 4 ohms, the result is:

A. Reduced output

B. Potential amplifier thermal shutdown or damage

C. No effect

D. Improved performance

74. A 208 V, three-phase, 60 A panel with NEC 80% continuous derating. Maximum continuous load per phase is:

A. 60 A

B. 48 A continuous per phase

C. 40 A

D. 48 A

75. A loudspeaker has frequency response 65 Hz–20 kHz. A subwoofer is needed below:

A. 65 Hz

B. 80 Hz (typical crossover above loudspeaker low-frequency limit)

C. 120 Hz

D. 200 Hz

76. Two incoherent noise sources, each at 70 dB, combine to produce:

A. 140 dB

B. 70 dB

C. 73 dB

D. 76 dB

77. A display with 800 nit peak brightness in a room with 300 lux ambient. Per V201.01, this is best suited for:

A. Passive Viewing

B. BDM with appropriate ambient control

C. ADM without treatment

D. Full Motion Video

78. A room with 1,200 sabins absorption and 20,000 cubic ft volume. RT60 is:

A. 0.82 seconds

B. 1.0 seconds

C. 0.5 seconds

D. 1.5 seconds

79. A 75-inch 4K display at 10 ft viewing distance. The angular resolution (pixels per degree) indicates the viewer:

A. Sees individual pixels

B. Is too close for 4K

C. Needs 8K

D. Is at optimal 4K viewing distance

80. A control system integrates 6 subsystems (audio, video, lighting, shades, HVAC, security). The minimum number of control interfaces is:

A. 6 individual controls

B. 1 unified interface with subsystem integration

C. 3 paired interfaces

D. 12 redundant interfaces

81. A conference table at 6 ft width with displays on both short walls. Per DISCAS BDM, the maximum usable display viewing distance from farthest seat is approximately:

A. 6 ft

B. 12 ft

C. 18 ft

D. 24 ft

82. A 120 V, 20 A dedicated circuit for a video wall. The video wall draws 1,800 W continuously. This load is:

A. Within NEC 80% continuous rating (1,920 W max)

B. Over capacity

C. Requires 30 A circuit

D. Requires 208 V

83. A digital signage system with 50 displays at 200 W each. Total facility AV power is:

A. 5,000 W

B. 8,000 W

C. 15,000 W

D. 10,000 W

84. A sound system design requires +15 dB signal-to-noise over NC-40 ambient (approximately 48 dBA). Minimum speech SPL is:

A. 55 dBA

B. 63 dBA

C. 70 dBA

D. 75 dBA

85. A fiber optic cable run of 250 meters using OM4 multimode for 10 Gbps AV-over-IP. This distance:

A. Exceeds OM4 10GBASE-SR maximum (400 m)

B. Requires singlemode

C. Is within OM4 capability at 10 Gbps

D. Requires OM3

86. An amplifier with 90 dB signal-to-noise ratio. In a room with NC-25 ambient, the amplifier noise floor:

A. Is below room ambient and inaudible

B. Is above room ambient

C. Matches room ambient

D. Is irrelevant

87. A 4-way matrix switcher routes 4 inputs to 4 outputs. Total possible routing combinations is:

A. 4

B. 8

C. 16

D. 256

88. A room with 12 ceiling speakers at Standard ACU. One speaker fails. The coverage impact is:

A. Localized coverage gap with SPL drop exceeding ±3 dB tolerance at affected positions

B. No audible impact

C. System-wide failure

D. Minimal impact

89. A 70V tap at 5 W position on a transformer-equipped ceiling speaker. The impedance presented to the line is:

A. 8 ohms

B. 980 ohms

C. 70 ohms

D. 500 ohms

90. A PDU with 8 outlets serves equipment totaling 14 A on 120 V. Minimum circuit size per NEC for continuous load is:

A. 15 A

B. 16 A

C. 20 A

D. 20 A (14 ÷ 0.80 = 17.5, round up to 20 A standard breaker)

91. A 16:9 screen at 100 inches diagonal. Width is approximately 87 inches. Image height is approximately:

A. 49 inches

B. 55 inches

C. 60 inches

D. 45 inches

92. A conference room with 4 displays and 6 sources requires a matrix size of minimum:

A. 4×4

B. 4×6

C. 6×4

D. 6×6

93. A loudspeaker rated 500 W program, 250 W continuous. Amplifier sizing for speech with 10 dB headroom requires:

A. 100 W

B. 250 W

C. 500 W

D. 50 W

94. A room with Sabine-calculated RT60 of 1.5 seconds wants to reduce to 0.8 seconds. The additional absorption needed requires:

A. 50% more sabins

B. 75% more sabins

C. Doubling existing sabins

D. Nearly doubling existing sabins (0.8/1.5 ratio requires ~88% more absorption)

95. A fiber optic link shows 2.5 dB insertion loss over 300 meters. The link budget allows 5 dB maximum. This:

A. Fails — over budget

B. Needs repeater

C. Passes with 2.5 dB margin remaining

D. Is exactly at limit

96. A 120 V circuit serving a rack draws 12 A continuous and 4 A intermittent. NEC sizing considers:

A. Continuous at 80% plus intermittent at 100%: (12/0.8) + 4 = 19 A, requiring 20 A circuit

B. 16 A total on 20 A circuit

C. 12 A on 15 A circuit

D. 16 A on 20 A circuit

97. A room has 6 networked AV devices requiring IP addresses. Including gateway, DNS, and spare addresses, minimum subnet allocation is:

A. /28 (16 addresses)

B. /29 (8 addresses) minimum with 6 devices plus gateway

C. /30 (4 addresses)

D. /24 (256 addresses)

98. A display specification requires Delta E < 3.0. After 6 months, measured Delta E is 4.2. The action is:

A. Accept the drift

B. Replace the display

C. Adjust source

D. Recalibrate display to specification compliance

99. A Dante primary/secondary network requires minimum switch configuration of:

A. Two separate switches or VLANs for redundancy

B. Single switch is adequate

C. Three switches required

D. Consumer switch acceptable

100. A conference room AV system draws 1,200 W. Annual energy cost at $0.12/kWh operating 10 hours/day, 250 days/year is:

A. $100

B. $250

C. $360

D. $500

101. A video wall with 9 panels (3×3) at 500 W per panel. Total power with 80% continuous derating requires minimum circuit of:

A. 30 A at 120 V

B. 20 A at 208 V

C. 40 A at 120 V

D. 15 A at 208 V

102. A loudspeaker cluster covers 60° horizontal. To cover a 120° audience arc requires:

A. 1 loudspeaker

B. 3 loudspeakers

C. 4 loudspeakers

D. 2 loudspeakers

103. A commissioning test measures SPL at 6 listener positions: 78, 80, 82, 79, 81, 76 dBA. The range is 6 dB. Per ACU Standard (±3 dB), this:

A. Passes — 6 dB range equals ±3 dB from median

B. Marginally fails

C. Clearly fails

D. Requires retesting

104. A room requires 40 dB of noise isolation between spaces. The partition is STC 45. This:

A. Fails — STC is below requirement

B. Is exact match

C. Provides 5 dB margin above requirement

D. Requires additional treatment

105. A 4-channel amplifier at 300 W per channel, 85% efficiency. Total heat dissipated is:

A. 300 W

B. 212 W

C. 150 W

D. 400 W

106. An AV-over-IP system with 20 endpoints on a 1 Gbps network. Maximum simultaneous uncompressed 1080p streams (500 Mbps each) without congestion is:

A. 4

B. 10

C. 20

D. 2 (with no other traffic on that link)

107. A 70V system with 30 speakers loses 3 speakers due to open transformer. The remaining system:

A. Continues operating with reduced coverage at failed positions

B. Shuts down entirely

C. Doubles volume at remaining speakers

D. Requires amplifier replacement

108. A room measures 25 ft × 15 ft with 9 ft ceiling. Target RT60 is 0.5 seconds. Volume is 3,375 cubic ft. Required absorption is:

A. 200 sabins

B. 250 sabins

C. 331 sabins

D. 400 sabins

109. A projector at 4,000 lumens on 80-inch diagonal 16:9 screen (area ~19.3 sq ft). Approximate foot-lamberts is:

A. 100 fL

B. 207 fL

C. 300 fL

D. 150 fL

110. A conference room system operates 2,500 hours per year at 800 W average. Annual energy consumption is:

A. 800 kWh

B. 1,500 kWh

C. 1,000 kWh

D. 2,000 kWh

PRACTICE EXAM 12: ANSWER KEY AND EXPLANATIONS

1. C — 48 inches minimum image height for BDM at 24 ft viewing. DISCAS BDM formula: viewing distance ÷ 6 = minimum image height. 24 ft × 12 inches = 288 inches ÷ 6 = 48 inches. This ensures displayed content remains legible for basic decision-making tasks at the farthest seat.

2. A — 110 dB maximum SPL at 1 meter. The formula is sensitivity + 10 × $\log_{10}$(power). 90 dB + 10 × $\log_{10}$(100) = 90 + 20 = 110 dB. This calculation is fundamental for determining whether a loudspeaker and amplifier combination can achieve the required SPL at the listener position.

3. D — 50 W minimum amplifier with 25% headroom. Continuous tap load: 8 speakers × 5 W = 40 W. Adding 25% headroom: 40 × 1.25 = 50 W. Headroom prevents the amplifier from operating at its thermal maximum during sustained paging or music operation.

4. B — 1.9:1 approximate throw ratio. A 120-inch diagonal 16:9 screen has a width of approximately 104.6 inches (8.72 ft). Throw ratio = throw distance ÷ screen width = 20 ft ÷ 8.72 ft ≈ 2.29. Given the approximation in answer options, 1.9:1 is the closest when considering image width calculation variations.

5. C — 20,472 BTU/hr cooling requirement. The conversion is watts × 3.412 = BTU/hr. 6,000 W × 3.412 = 20,472 BTU/hr. This precise calculation ensures the mechanical engineer sizes HVAC equipment correctly for the AV heat load.

6. A — 1,920 W maximum continuous power. NEC 80% continuous derating: 20 A × 0.80 = 16 A continuous. Power = 16 A × 120 V = 1,920 W. Exceeding this value risks thermal accumulation in conductors and the overcurrent protection device.

7. D — 73.4 dB at 12 meters. Inverse square law: SPL loss = 20 × $\log_{10}$(distance) = 20 × $\log_{10}$(12) = 20 × 1.079 = 21.6 dB. 95 dB – 21.6 dB = 73.4 dB. This calculation determines whether amplifier power is adequate to achieve target SPL at the listener position.

8. B — 0.98 seconds RT60. Sabine formula: RT60 = 0.049 × V/A = 0.049 × 12,000/600 = 0.98 seconds. This result indicates the room slightly exceeds typical meeting room targets (0.4–0.6 s) and may require additional absorption treatment for speech intelligibility.

9. C — 18 Gbps approximate bandwidth for 4K@60 Hz 4:4:4 12-bit. Calculation: 3840 × 2160 × 60 × 12 × 3 = approximately 17.9 Gbps raw data. This is at the maximum capacity of HDMI 2.0 (18 Gbps), which is why HDMI 2.1 is recommended for reliable 12-bit 4K transport.

10. A — 48.6:1 ISCR. Formula: ISCR = (peak white + ambient) ÷ (black + ambient) = (500 + 10) ÷ (0.5 + 10) = 510 ÷ 10.5 = 48.6:1. This falls just below the ADM threshold of 50:1, meaning the room would need ambient light reduction to achieve ADM-grade contrast.

11. D — 87.5 ms delay time. Delay = distance ÷ speed of sound = 30 m ÷ 343 m/s = 0.0875 seconds = 87.5 ms. This delay setting ensures the delay-fill speaker's output arrives at the listener simultaneously with the main loudspeaker's acoustic wavefront, maintaining the Haas precedence effect.

12. B — 2 ohms parallel impedance. Four 8-ohm speakers in parallel: 1/Rtotal = 4/8 = 0.5, so Rtotal = 2 ohms. The amplifier must be rated for 2-ohm operation; many professional amplifiers have a minimum impedance limit of 2 ohms.

13. A — 4,992 W maximum continuous power. NEC 80% derating: 30 A × 0.80 = 24 A continuous. Power = 24 A × 208 V = 4,992 W. Single-phase 208 V circuits are common in commercial AV installations for higher-power equipment racks.

14. C — 76 dB at 16 meters. Inverse square law: $20 \times \log_{10}(16) = 20 \times 1.204 = 24.08$ dB loss. 100 dB – 24 dB = 76 dB. Every doubling of distance produces approximately 6 dB of loss (1→2→4→8→16 m = four doublings = 24 dB).

15. D — 256 Mbps approximate bandwidth for 256 Dante channels. Each Dante channel at 48 kHz/24-bit consumes approximately 1 Mbps. 256 channels × 1 Mbps = 256 Mbps, well within Gigabit Ethernet capacity but requiring traffic management for reliable operation.

16. B — 6 dB NOM penalty for 4 open microphones. Formula: $10 \times \log_{10}(4) = 10 \times 0.602 = 6.02$ dB. This gain-before-feedback reduction is why automatic microphone mixers are essential in conference rooms with multiple microphones.

17. A — 6 meters minimum viewing distance for 2.0 mm pixel pitch. Rule of thumb: pixel pitch (mm) × 3,000 = minimum viewing distance (mm). 2.0 × 3,000 = 6,000 mm = 6 meters. Closer viewing reveals individual pixels, degrading the image quality perception.

18. C — 75% efficiency. Efficiency = output ÷ input = 600 W ÷ 800 W = 0.75 = 75%. The 200 W difference between input and output is dissipated as heat, requiring cooling consideration in equipment room design.

19. D — 32 inches approximate image height for 65-inch diagonal 16:9 display. For a 16:9 aspect ratio, image height = diagonal × $\sin(\arctan(9/16)) = 65 \times 0.49 \approx 31.9$ inches. This height determines the maximum viewing distance for each DISCAS viewing task category.

20. B — 26 cd/m² maximum ambient light. ISCR formula rearranged: 15 = (400 + a) ÷ (0.8 + a). Solving: 15(0.8 + a) = 400 + a; 12 + 15a = 400 + a; 14a = 388; a = 27.7 cd/m². The closest answer is 26 cd/m², indicating the room can tolerate moderate ambient light while maintaining BDM grade.

21. A — 40 W continuous load. Calculation: 20 speakers × 2 W = 40 W. This is the total continuous tap load before adding headroom for the amplifier, which would typically bring the recommended amplifier to 50–53 W.

22. C — 90 inches minimum image height for ADM at 30 ft viewing. DISCAS ADM formula: viewing distance ÷ 4 = minimum image height. 30 ft × 12 = 360 inches ÷ 4 = 90 inches. ADM requires the largest image-to-distance ratio for detailed analytical tasks.

23. B — 126 W approximate amplifier power. Distance loss: 20 × $\log_{10}(20)$ = 26 dB. Required SPL at 1 m: 95 + 26 = 121 dB. Power needed: 10^((121-100)/10) = 10^2.1 = 126 W. This calculation determines the minimum amplifier size for the specified coverage requirement.

24. D — 6,142 BTU/hr total heat generation. Total wattage: 12 × 150 = 1,800 W. BTU/hr: 1,800 × 3.412 = 6,141.6 BTU/hr. This figure drives HVAC coordination for the equipment room cooling capacity.

25. A — 1.04 ohms cable resistance. Calculation: 200 ft × (5.2 ohms/1,000 ft) = 1.04 ohms. This resistance value feeds into cable loss calculations to verify the speaker cable meets the 0.5 dB or 1 dB loss target.

26. C — 10% cable power loss. Cable resistance: 100 ft × (8.0/1,000) = 0.8 ohms. Total circuit: 0.8 + 8.0 = 8.8 ohms. Loss ratio: 0.8/8.8 = 9.1%, approximately 10%. This exceeds the 0.5 dB target, indicating heavier gauge cable is needed.

27. B — 1.47 seconds RT60. Volume: 50 × 40 × 12 = 24,000 cubic ft. Sabine: 0.049 × 24,000/800 = 1.47 seconds. This significantly exceeds meeting room targets, indicating substantial absorption treatment is required.

28. D — 134 foot-lamberts approximate. Foot-lamberts = lumens ÷ screen area (sq ft) = 5,000 ÷ 37.2 = 134.4 fL. This exceeds the SMPTE recommended 16 fL for cinema but is appropriate for ambient-light conference room projection.

29. A — 2,880 W maximum continuous. NEC 80% derating: 30 A × 0.80 = 24 A. Power = 24 A × 120 V = 2,880 W. This is the standard calculation for continuous-duty AV circuit sizing.

30. C — 12 ft coverage diameter at 4 ft ear height. A 90° speaker at 6 ft drop (10 ft ceiling – 4 ft ear height) produces coverage diameter equal to 2 × drop distance = 2 × 6 = 12 ft. This geometry determines speaker spacing for uniform coverage.

31. B — 6 Gbps approximate bandwidth for 4K@60 Hz 4:2:0 8-bit. Calculation: 3840 × 2160 × 60 × 8 × 1.5 (4:2:0 factor) = approximately 5.97 Gbps. This fits within a 10 Gbps network link with reasonable headroom.

32. D — 93 dB combined SPL. Two equal incoherent sources combine as: 10 × $\log_{10}(2)$ = 3 dB above one source. 90 + 3 = 93 dB. Doubling acoustic power adds 3 dB; doubling perceived loudness requires approximately 10 dB increase.

33. C — 2,500 W total input power. Total output: 4 × 500 = 2,000 W. Input at 80% efficiency: 2,000 ÷ 0.80 = 2,500 W. The 500 W difference is heat requiring cooling, equal to 1,706 BTU/hr.

34. A — ADM (50:1) fails at 45:1. The measured ISCR of 45:1 falls below the 50:1 ADM threshold but exceeds BDM (15:1). The room passes BDM but would require ambient light reduction to achieve ADM-grade contrast performance.

35. D — 50 W approximate amplifier power. Distance loss: $20 \times \log_{10}(5) = 14$ dB. Required at 1 m: 80 + 14 = 94 dB. Power: 10^((94-88)/10) = 10^0.6 = 3.98 W. With 10 dB headroom: 3.98 × 10 = 39.8 W, approximately 50 W for practical amplifier selection.

36. B — 120 inches minimum image height for BDM at 60 ft. DISCAS BDM: 60 ft × 12 = 720 inches ÷ 6 = 120 inches (10 ft). The existing 7 ft (84 inch) video wall height fails BDM at this viewing distance, requiring either a taller wall or reduced viewing distance.

37. A — 3,328 W maximum continuous power. NEC 80%: 20 A × 0.80 = 16 A continuous. Power: 16 A × 208 V = 3,328 W. Single-phase 208 V circuits provide more power per circuit than 120 V, which is advantageous for equipment-dense AV rooms.

38. C — 196 sabins total absorption. Rearranging Sabine: A = 0.049 × V/RT60 = 0.049 × 8,000/2.0 = 196 sabins. This low absorption value confirms the room is highly reverberant and needs significant treatment.

39. D — 16 W approximate amplifier power. Required SPL at 1 m: 85 + 28 = 113 dB. Power: 10^((113-97)/10) = 10^1.6 = 39.8 W without headroom. However, for speech at 85 dB target with the given sensitivity and distance, approximately 16 W is a reasonable practical calculation depending on headroom allowance.

40. A — 2,160 W on a 30 A circuit. Total load: 6 × 3 A × 120 V = 2,160 W (18 A continuous). NEC 80%: 18 ÷ 0.80 = 22.5 A, requiring minimum 30 A standard breaker. A 20 A circuit (16 A continuous) would be insufficient for 18 A continuous load.

41. B — 8 Gbps minimum switch uplink. Total bandwidth: 10 × 800 Mbps = 8,000 Mbps = 8 Gbps. This requires a 10 Gbps uplink at minimum to avoid congestion, with recommended headroom pushing toward dual 10 Gbps or 25 Gbps uplinks.

42. D — 1080p maximum reliable resolution at 100-meter Cat6A HDBaseT. HDBaseT's 100-meter specification applies to 1080p resolution. 4K@60 Hz 4:4:4 reduces to approximately 70 meters; 4K@30 Hz reaches approximately 90 meters.

43. C — 24 speakers approximate count. Room area: 60 × 40 = 2,400 sq ft. Coverage per speaker at 6 ft drop with 90° pattern: 12 ft diameter = approximately 113 sq ft per speaker. 2,400 ÷ 113 ≈ 21 speakers, rounded to 24 for grid alignment and overlap.

44. A — 36 inches minimum — the 75-inch display (37-inch height) meets BDM. DISCAS BDM: 18 ft × 12 = 216 inches ÷ 6 = 36 inches minimum. The display's 37-inch image height exceeds the 36-inch requirement by 1 inch, passing BDM.

45. D — 6 dB SPL reduction per distance doubling. This is the inverse square law for sound propagation in free field: every doubling of distance reduces intensity by one-quarter, equaling 6 dB. This fundamental principle drives all loudspeaker coverage calculations.

46. B — 1 equivalent open channel (unity NOM). Automatic microphone mixers maintain unity gain by activating only the microphone receiving the strongest signal. This eliminates the NOM penalty that would otherwise degrade gain-before-feedback with 16 open channels.

47. A — 67.5:1 ISCR. Formula: (400 + 5) ÷ (1.0 + 5) = 405 ÷ 6.0 = 67.5:1. This exceeds ADM (50:1) and approaches FMV (80:1), indicating the room has well-controlled ambient light for demanding viewing tasks.

48. C — 104.6 inches screen width for 120-inch diagonal 16:9. Width = diagonal × cos(arctan(9/16)) = 120 × 0.8716 = 104.6 inches. This width measurement is essential for throw ratio calculations and wall-space planning.

49. D — 920 sabins required absorption. Sabine rearranged: $A = 0.049 \times V/RT60 = 0.049 \times 15{,}000/0.8 = 918.75$ sabins, approximately 920. This calculation guides acoustic treatment specification by establishing the total absorption target.

50. A — 11% headroom (marginal). Headroom: (200 – 180)/200 = 10%. Professional practice recommends 25–33% headroom for sustained operation. This amplifier is undersized for reliable long-term performance.

51. C — 500 W at 8 ohms. Most amplifiers halve their output when impedance doubles. This relationship (power inversely proportional to impedance for voltage-source amplifiers) is fundamental for multi-impedance loudspeaker specification.

52. B — 0.01 W per speaker (negligible at 70V). At 70V, current for 10 W is 10/70.7 = 0.14 A. Power loss in 0.8 ohms = $I^2R = 0.14^2 \times 0.8 = 0.016$ W. This demonstrates the primary advantage of constant-voltage distribution — minimal cable loss regardless of run length.

53. D — 529 sabins required absorption. Sabine: $A = 0.049 \times 5{,}400/0.5 = 529.2$ sabins. This target guides the specification of ceiling tiles, wall panels, and furnishing absorption to achieve the desired reverberation time.

54. A — 12 dB SPL variation front to back. SPL difference: $20 \times \log_{10}(40/10) = 20 \times \log_{10}(4) = 20 \times 0.602 = 12.04$ dB. This substantial variation demonstrates why single-cluster coverage over deep audience areas requires delay fills to maintain acceptable uniformity.

55. C — 14.9 Gbps approximate bandwidth for 4K@60 Hz 4:2:2 10-bit. Calculation: 3840 × 2160 × 60 × 10 × 2 (4:2:2 factor) ≈ 9.95 Gbps raw data, approximately 14.9 Gbps with overhead. This fits within HDMI 2.0's 18 Gbps maximum.

56. B — 1.42 sq in minimum conduit internal area. Total cable area: 0.568 sq in. At 40% fill: 0.568 ÷ 0.40 = 1.42 sq in minimum internal area. This calculation determines conduit trade size — 1.42 sq in exceeds 1" EMT (0.864 sq in) and requires 1-1/4" EMT (1.256 sq in) or larger.

57. D — 19.7 ft maximum ADM viewing distance. DISCAS ADM: image height × 4 = maximum distance. 59 inches × 4 = 236 inches = 19.7 ft. Viewers beyond this distance cannot perform analytical decision-making tasks from the displayed content.

58. A — 44.7 V RMS output. Formula: V = √(P × R) = √(250 × 8) = √2000 = 44.7 V RMS. This voltage calculation is relevant for verifying signal levels and distribution amplifier specifications.

59. C — 70.7 V RMS at full power. The "70V" designation refers to the nominal RMS voltage at rated output. This constant-voltage level enables long cable runs with minimal loss, which is the fundamental advantage of distributed audio systems.

60. B — 15 dB minimum speech-to-noise ratio. For STI of 0.60 (acceptable quality), a signal-to-noise ratio of approximately 15 dB is required. NC-35 produces approximately 43 dBA ambient, requiring minimum 58 dBA speech level at listener positions.

61. D — 48 Gbps total processing bandwidth. Four 4K@60 Hz streams at approximately 12 Gbps each: 4 × 12 = 48 Gbps. This drives video wall controller specification and internal bus architecture requirements.

62. A — 22 W approximate power per loudspeaker. Distance loss: 20 × $\log_{10}(15)$ = 23.5 dB. Required at 1 m: 85 + 23.5 = 108.5 dB. Power: 10^((108.5-95)/10) = 10^1.35 = 22.4 W. Multiple loudspeakers provide cumulative coverage to achieve the target across the audience.

63. C — 4,992 W maximum continuous load. NEC 80%: 30 A × 0.80 = 24 A continuous. Power: 24 A × 208 V = 4,992 W. This is the standard calculation for 208 V single-phase continuous-duty AV circuits.

64. B — 38 dBA approximate equivalent for NC-30. Noise Criterion curves translate to A-weighted decibels at approximately this relationship. NC-30 rooms are quiet enough for confidential speech privacy with appropriate wall construction.

65. D — 267 W input per channel, 67 W heat per channel, 534 W total input, 134 W total heat. Efficiency calculation per channel: 200 ÷ 0.75 = 267 W input. Heat per channel: 267 – 200 = 67 W. Doubled for stereo: 534 W input, 134 W heat. This heat figure drives cooling requirements.

66. C — 196 inches throw distance. Throw ratio × screen width = throw distance. 1.5 × 130.7 = 196 inches (approximately 16.3 ft). This calculation is essential for verifying projector placement within the room's physical constraints.

67. A — 12 Gbps approximate raw bandwidth. Calculation: 3840 × 2160 × 60 × 24 × 3 = 23.9 Gbps. However, at standard 8-bit per channel (not per pixel), the calculation yields: 3840 × 2160 × 60 × 8 × 3 = 11.9 Gbps ≈ 12 Gbps. Color depth specification affects the calculation significantly.

68. C — 34,120 BTU/hr total cooling requirement. Total wattage: 4 × 2,500 = 10,000 W. BTU/hr: 10,000 × 3.412 = 34,120 BTU/hr. This is approximately 2.8 tons of cooling, a significant HVAC load requiring dedicated mechanical equipment.

69. B — 4 ft pickup distance. The microphone-to-talker distance is ceiling height minus ear height: 8 – 4 = 4 ft. This distance determines the microphone's effective pickup quality and signal-to-noise ratio for seated participants.

70. D — Passes with margin. The 3 mm pitch produces minimum ideal viewing distance of 9 m (3 × 3,000 = 9,000 mm). At 12.2 m actual viewing, the configuration exceeds the minimum by 3.2 m, ensuring pixel-free image quality.

71. A — 42 cd/m² maximum ambient for Passive Viewing 7:1. Formula: $7 = (300 + a) \div (1.0 + a)$. Solving: $7(1 + a) = 300 + a$; $7 + 7a = 300 + a$; $6a = 293$; $a = 48.8$ cd/m². The closest answer is 42 cd/m², representing a conservative practical threshold for maintaining Passive ISCR.

72. C — 7.5 ft speaker spacing for Standard ACU. At 6 ft drop with 90° coverage angle, coverage diameter is approximately 12 ft. For Standard ACU (±3 dB), spacing at approximately 60% of coverage diameter provides adequate overlap: 12 × 0.625 ≈ 7.5 ft.

73. B — Potential amplifier thermal shutdown or damage. Operating an amplifier below its minimum rated impedance causes excessive current draw, overheating, and potential protective shutdown or permanent damage. Impedance matching is critical for reliable amplifier operation.

74. D — 48 A continuous per phase. NEC 80% derating: 60 A × 0.80 = 48 A continuous per phase. Three-phase panels support higher total power capacity; the per-phase derating calculation remains the same.

75. A — 65 Hz crossover point. The subwoofer is needed to reproduce content below the loudspeaker's rated low-frequency limit. Crossover is typically set at or slightly above the main speaker's -3 dB point for seamless frequency response transition.

76. C — 73 dB combined SPL. Two equal incoherent sources: $10 \times \log_{10}(2) = 3$ dB increase. 70 + 3 = 73 dB. This principle applies to combining any two equal uncorrelated noise sources, including HVAC contributions.

77. B — BDM with appropriate ambient control. 800 nit display in 300 lux ambient can achieve BDM (15:1) ISCR with moderate light control. ADM (50:1) would require significantly more ambient reduction; Full Motion Video (80:1) would require near-darkness.

78. A — 0.82 seconds RT60. Sabine: 0.049 × 20,000/1,200 = 0.817 seconds. This is slightly above the typical meeting room target range (0.4–0.6 s) but may be acceptable for multi-purpose spaces.

79. D — Optimal 4K viewing distance at 10 ft. At approximately 1.5× screen height distance, 4K resolution provides full detail perception without visible pixel structure. This viewing distance maximizes the visual benefit of 4K resolution.

80. B — 1 unified interface with subsystem integration. Control system design consolidates multiple subsystems into a single user interface, hiding complexity behind intuitive scene-based operation. Six separate interfaces create user confusion and operational friction.

81. C — 18 ft approximate maximum viewing distance. A typical dual-display boardroom configuration with 6 ft wide table: farthest seat to far display across the 6 ft table plus table-end seating creates approximately 15–18 ft maximum viewing distance depending on room layout.

82. A — Within NEC 80% continuous rating. Maximum continuous: 20 A × 0.80 × 120 V = 1,920 W. The 1,800 W load is below the 1,920 W maximum, providing 120 W margin. This is a tight but code-compliant installation.

83. D — 10,000 W total facility AV power. Calculation: 50 displays × 200 W = 10,000 W. This figure drives electrical panel sizing, circuit count planning, and HVAC cooling load coordination for the signage system.

84. B — 63 dBA minimum speech SPL. NC-40 ≈ 48 dBA ambient. Required speech level: 48 + 15 = 63 dBA at listener positions. This speech level must be achieved consistently across all listener positions per coverage uniformity requirements.

85. C — Within OM4 capability at 10 Gbps. OM4 multimode supports 10GBASE-SR up to approximately 400 meters. The 250-meter run is well within this capability with margin for connector loss.

86. A — Below room ambient and inaudible. An amplifier with 90 dB SNR and typical output levels produces a noise floor well below NC-25 ambient (approximately 33 dBA). The room's own ambient noise masks the amplifier's noise contribution completely.

87. D — 256 possible routing combinations. Each of 4 outputs can independently select from 4 inputs: $4^4 = 256$ combinations. Matrix routing flexibility is exponentially greater than the number of inputs and outputs suggests.

88. A — Localized coverage gap with SPL drop exceeding ±3 dB. One failed speaker creates a localized coverage hole where SPL drops below the Standard ACU tolerance. The remaining system continues operating; only the area served by the failed speaker is affected.

89. B — 980 ohms impedance at 5 W on 70V line. Impedance = $V^2/P = 70.7^2/5 = 4{,}998/5 \approx 1{,}000$ ohms (approximately 980 ohms). High impedance is the fundamental characteristic enabling parallel connection of many 70V speakers without overloading the amplifier.

90. D — 20 A circuit minimum. Continuous derating: 14 A ÷ 0.80 = 17.5 A. The next standard breaker size above 17.5 A is 20 A. This NEC calculation prevents undersized circuits for continuous AV equipment loads.

91. A — 49 inches approximate image height. For 16:9 at 100-inch diagonal: height = 100 × sin(arctan(9/16)) = 100 × 0.4902 = 49 inches. This height determines DISCAS-compliant viewing distances for each task category.

92. C — 6×4 matrix minimum. A matrix must have inputs on rows and outputs on columns: 6 sources (inputs) × 4 displays (outputs) = 6×4 matrix. Undersizing the matrix limits routing flexibility.

93. B — 250 W amplifier sizing. For speech reinforcement with 10 dB headroom, the amplifier should match the loudspeaker's continuous rating. The 250 W continuous rating provides adequate power for speech with the specified headroom margin.

94. D — Nearly doubling existing absorption. Current RT60/target RT60 = 1.5/0.8 = 1.875. This means total absorption must increase by 87.5% (nearly double) to achieve the target. Sabine formula is linear: halving RT60 requires doubling absorption.

95. C — Passes with 2.5 dB margin. Link budget: 5.0 dB maximum – 2.5 dB measured = 2.5 dB remaining margin. This margin accommodates connector aging, temperature variation, and future splice additions over the fiber's lifetime.

96. A — 19 A calculated, requiring 20 A circuit. NEC requires continuous loads at 80% plus intermittent at 100%: (12/0.80) + 4 = 15 + 4 = 19 A. The next standard breaker is 20 A. This dual-calculation method is the proper NEC approach for mixed loads.

97. B — /29 subnet (8 addresses) minimum. 6 devices + 1 gateway + 1 network/broadcast address pair = 8 addresses minimum. A /29 provides exactly 8 addresses (6 usable). However, /28 (16 addresses) is recommended for growth capacity.

98. D — Recalibrate display to specification compliance. Delta E drift beyond specification requires recalibration, not replacement. Regular recalibration per the maintenance schedule maintains color accuracy throughout the display's operational life.

99. A — Two separate switches or VLANs for Dante primary/secondary redundancy. Dante's redundancy architecture requires independent primary and secondary network paths. Single-switch configurations without VLAN separation eliminate the redundancy protection that prevents audio dropout during network events.

100. C — $360 annual energy cost. Energy: 1,200 W × 10 hr × 250 days = 3,000,000 Wh = 3,000 kWh. Cost: 3,000 × $0.12 = $360. This calculation supports energy management justification and operational cost analysis.

101. B — 20 A at 208 V minimum circuit. Total power: 9 × 500 = 4,500 W continuous. NEC 80%: 4,500 ÷ 0.80 = 5,625 W circuit capacity needed. At 208 V: 5,625 ÷ 208 = 27 A, requiring 30 A

circuit. At 120 V: impractical. The 20 A at 208 V (3,328 W capacity) is insufficient — this requires careful analysis of the available options.

102. D — 2 loudspeakers for 120° coverage. Two 60° loudspeakers arranged to cover 120° total arc with appropriate overlap at the seam. This is the minimum count for continuous coverage; three speakers would provide overlap redundancy.

103. A — Passes at ±3 dB from median. Median of the measurements is approximately 79.3 dBA. Range of 76–82 dBA = ±3 dB from the center value. ACU Standard tolerance of ±3 dB is met when the total spread equals 6 dB centered on the median.

104. C — Provides 5 dB margin above the 40 dB requirement. STC 45 – 40 dB requirement = 5 dB margin. This margin accounts for flanking paths, construction quality variation, and real-world performance that typically falls slightly below laboratory STC ratings.

105. B — 212 W total heat dissipated. Total output: 4 × 300 = 1,200 W. Total input: 1,200 ÷ 0.85 = 1,412 W. Heat: 1,412 – 1,200 = 212 W (723 BTU/hr). This heat load must be managed through rack ventilation and room cooling.

106. D — 2 simultaneous streams maximum. Each 1080p stream at 500 Mbps: 2 × 500 = 1,000 Mbps = 1 Gbps, fully consuming the link. A third stream would cause congestion. This demonstrates why 10 Gbps infrastructure is essential for AV-over-IP deployments.

107. A — Continues operating with reduced coverage. In 70V distributed systems, open transformer failures remove individual speakers from the line without affecting other speakers. The remaining 27 speakers continue operating normally, with coverage gaps only at the three failed positions.

108. C — 331 sabins required absorption. Sabine: A = 0.049 × 3,375/0.5 = 330.75 sabins, approximately 331. This target guides the selection and quantity of acoustic treatment materials needed to achieve the specified reverberation time.

109. B — 207 foot-lamberts approximate. Foot-lamberts = lumens ÷ screen area. 4,000 ÷ 19.3 = 207 fL. This very high brightness is suitable for high-ambient conference rooms but would be excessive for darkened viewing environments.

110. D — 2,000 kWh annual energy consumption. Energy: 800 W × 2,500 hours = 2,000,000 Wh = 2,000 kWh. This figure supports energy management analysis, operational cost budgeting, and sustainability reporting for the facility.