PRACTICE EXAM 7 — 150 QUESTIONS

Domain 1 — Electrical Skills (Questions 1–68)

1. If voltage across a fixed resistance is doubled, what happens to the current through it?

A. It doubles

B. It is halved

C. It stays the same

D. It quadruples

2. Because power equals voltage times current, doubling a fixture's wattage on the same voltage circuit does what to its current draw?

A. Halves it

B. Leaves it unchanged

C. Doubles it

D. Quarters it

3. A loose termination raises resistance, which relates to heat generation through which expression?

A. $P = I^2 \times R$

B. $E = I \div R$

C. $P = E \div I$

D. $I = P \times E$

4. Adding more branches to a parallel circuit lowers total resistance, which in turn does what to total current draw from the source?

A. Decreases it

B. Leaves it unchanged

C. Reverses it

D. Increases it

5. Because RMS equals peak times 0.707, a waveform whose peak rises to 170 V has what RMS value?

A. 85 volts

B. 240 volts

C. 120 volts

D. 170 volts

6. In a wye system, raising the line-to-neutral voltage from 120 V to 277 V changes the line-to-line voltage from 208 V to what, via the 1.732 relationship?

A. 480 volts

B. 277 volts

C. 360 volts

D. 160 volts

7. Forward-phase dimmers chop the waveform, which produces harmonics; those triplen harmonics then do what in the wye neutral?

A. Cancel completely

B. Lower the neutral voltage

C. Reduce the phase current

D. Add together, loading the neutral

8. Because the neutral can carry additive triplen harmonic current, a heavily dimmed rig's feeder neutral is often sized how?

A. Smaller than the phases

B. Eliminated entirely

C. At half the phase size

D. Full-sized or oversized

9. A motor's inrush current at startup is several times its running current, which means a generator sized only for running load may do what at startup?

A. Increase its frequency

B. Sag in voltage or stall

C. Improve its power factor

D. Lower its harmonics

10. Because a clamp meter senses the magnetic field of one conductor, clamping both a hot and its neutral together causes the reading to do what?

A. Fall to a falsely low value

B. Double in magnitude

C. Show peak voltage

D. Display resistance

11. A conductor adequate for ampacity over a short run may be inadequate over a long run because of what added effect?

A. Increased frequency

B. Improved power factor

C. Reduced current draw

D. Increased voltage drop

12. Because voltage drop rises with length, the remedy for a dim fixture at the end of a long cord is to do what?

A. Add a DMX terminator

B. Increase the supply frequency

C. Use a larger-gauge conductor

D. Change the gel color

13. A DMX chain missing its terminator suffers signal reflections, which manifest to the operator as what symptom?

A. A blown branch breaker

B. Flickering, erratic fixtures

C. A tripped GFCI

D. Higher line voltage

14. Because a moving light contains internal electronics requiring constant power, feeding it from a forward-phase dimmer can do what?

A. Improve its color mixing

B. Damage its power supply

C. Increase its output

D. Slow its pan and tilt

15. A rig grows beyond 512 control channels, which means the system now requires what?

A. A larger gauge DMX cable

B. A higher supply voltage

C. A second neutral

D. Additional DMX universes

16. Because sACN carries many universes over one network cable, it replaces what in a large rig?

A. The need for grounding

B. The fixtures' internal supplies

C. Many separate DMX cable runs

D. The overcurrent protection

17. A node sits between the network and the fixtures, which means its job is to do what?

A. Split a feeder into branches

B. Store backup energy

C. Convert network data to DMX

D. Correct the power factor

18. Because RDM shares the DMX line for two-way data, a non-RDM splitter in the path will do what?

A. Boost the return signal

B. Improve the data rate

C. Add a second universe

D. Block the return communication

19. A sine-wave dimmer preserves the waveform rather than chopping it, which results in what compared to a forward-phase dimmer?

A. Higher harmonics

B. Greatly reduced harmonics

C. A doubled frequency

D. A lower output voltage

20. Because a relay rack switches constant power instead of dimming it, it is the correct choice to feed which fixtures?

A. LED and moving fixtures

B. Conventional tungsten PARs

C. Resistance-dimmed cyc lights

D. Incandescent followspots

21. A bare-end lug left slightly loose develops resistance, which over time does what to the connection?

A. Improves its conductivity

B. Lowers its temperature

C. Degrades it in a runaway heat cycle

D. Raises its voltage rating

22. Because single-pole connection requires the ground reference first, the correct connect-then-disconnect logic is what?

A. Hots on first, ground off first

B. Ground on first, ground off last

C. Neutral on first, neutral off first

D. All on and off together

23. A 19-pin Socapex bundles six circuits in one jacket, which raises what concern under heavy load?

A. Loss of the ground reference

B. Heat buildup and ampacity derating

C. DMX channel overflow

D. Power-factor collapse

24. Because pin-and-sleeve connectors are keyed and polarized, they offer what advantage over single-pole sets?

A. More flexibility for huge feeds

B. Lower cost per conductor

C. Color coding by function only

D. They cannot be miswired

25. A battery rated 48 V, 100 Ah stores 4.8 kWh; powering a 600 W load from it gives what ideal runtime?

A. 2 hours

B. 4 hours

C. 8 hours

D. 16 hours

26. Because real systems have conversion losses and discharge limits, the actual runtime compared to that ideal figure is what?

A. Shorter

B. Longer

C. Exactly equal

D. Doubled

27. A UPS bridges the instant of failure while a generator handles the long outage, which means their division of labor is what?

A. UPS instant/short, generator delayed/long

B. UPS delayed/long, generator instant/short

C. Both instant and short

D. Both delayed and long

28. Because an isolation transformer has a 1:1 ratio, its purpose is not to change voltage but to do what?

A. Step up for transmission

B. Store backup energy

C. Electrically separate the secondary

D. Cancel triplen harmonics

29. A K-rated transformer is specified when the load is heavily electronic, because such loads produce what?

A. Excessive voltage drop only

B. A low power factor only

C. Harmonic currents

D. Mechanical vibration

30. Because tungsten-halogen lamps fail from finger-oil hot spots, the correct handling rule is what?

A. Never touch the glass with bare fingers

B. Touch it freely to position it

C. Run it hot to burn off oil

D. Increase its rated wattage

31. A followspot operator narrows the beam diameter, which control are they using?

A. The douser

B. The iris

C. The boomerang

D. The snoot

32. Because an ellipsoidal has internal shutters and a gobo slot, it differs from a Fresnel by producing what?

A. A soft-edged wash

B. A hard-edged, shapeable beam

C. A motorized moving beam

D. A fixed oval flood

33. A meter set to ohms is applied to a live circuit, which will do what?

A. Give false readings and risk damage

B. Read the voltage accurately

C. Read the current accurately

D. Recharge the meter battery

34. Because the resistance function supplies its own current, a fuse to be tested for continuity must first be what?

A. Removed and de-energized

B. Left in the live panel

C. Connected to the supply

D. Carrying load current

35. A 480 V company-switch environment carries high transient fault energy, which dictates a meter of what minimum category?

A. CAT I

B. CAT II

C. No rating needed

D. CAT III or IV

36. Because a single zero reading can come from a faulty meter, the procedure to trust a "dead" circuit is what?

A. A continuity test only

B. The live-dead-live test

C. A visual breaker check

D. A single voltage reading

37. Two 12-ohm resistors in parallel give 6 ohms; placing that pair in series with a 4-ohm resistor yields what total?

A. 28 ohms

B. 16 ohms

C. 24 ohms

D. 10 ohms

38. Because series resistances add while parallel ones reduce, a combination circuit must be solved how?

A. Reduce parallel groups first, then add series

B. Add everything as if in series

C. Reduce everything as if in parallel

D. Ignore the parallel groups

39. A balanced three-phase load at 208 V draws 30 A per line at unity power factor, which gives what total power via the 1.732 factor?

A. 6,240 watts

B. 18,720 watts

C. 24,960 watts

D. 10,807 watts

40. Because three-phase power uses E × I × 1.732 × PF, lowering the power factor from 1.0 to 0.8 does what to real power at the same voltage and current?

A. Doubles it

B. Leaves it unchanged

C. Raises it

D. Reduces it

41. A clamp meter reads each hot leg of a distro showing 45 A, 20 A, and 25 A, which indicates what condition?

A. A perfectly balanced load

B. An unbalanced load needing redistribution

C. A short circuit on L1

D. A failed neutral conductor

42. Because an unbalanced load leaves residual current, the neutral in that distro will carry what compared to a balanced linear load?

A. Less current

B. More current

C. Exactly zero current

D. The full line voltage

43. A long feeder run is fully extended rather than coiled, which prevents what hazard?

A. Excessive data latency

B. A low power factor

C. Reduced channel count

D. Trapped heat melting insulation

44. Because DC has no frequency, power factor, or phase, calculations on DC circuits are what compared to AC?

A. More complex

B. Identical in every way

C. Simpler

D. Impossible to perform

45. A fixture's beam shows a bright center and dark edges, which maintenance action addresses this?

A. Replacing the DMX cable

B. Optimizing the lamp-to-reflector position

C. Adding a terminator

D. Increasing the breaker size

46. Because PoE carries power and data on one cable, it allows a truss-mounted node to be installed how?

A. Without a separate power cable

B. With twice the universes

C. At a lower frequency

D. Without any data cable

47. A wye system provides a neutral, which allows it to serve what that a basic delta cannot as readily?

A. Standard 120 V single-phase loads

B. Only three-phase motors

C. Only DC loads

D. Only data signals

48. Because forward-phase dimming chops the leading edge and reverse-phase cuts the trailing edge, the gentler choice for electronic loads is which?

A. Forward-phase

B. A resistance dimmer

C. Reverse-phase

D. No dimming is possible

49. A 5-HP single-phase motor at 230 V with 0.85 efficiency and 0.90 PF draws what approximate current?

A. 16.2 amps

B. 21.2 amps

C. 28.5 amps

D. 12.0 amps

50. Because horsepower converts at 746 watts but motors are not perfectly efficient, real motor current is what compared to a simple 746-watt conversion?

A. Higher

B. Lower

C. Exactly equal

D. Unrelated

51. A technician must read current on an energized feeder, which means the correct instrument is what?

A. A series multimeter

B. A megohmmeter

C. A clamp meter

D. An ohmmeter

52. Because the megohmmeter applies high DC voltage, it must only be used on conductors that are what?

A. Fully energized

B. Carrying load current

C. At reduced voltage

D. De-energized and isolated

53. A 277/480 V wye service uses higher distribution voltage, which reduces what for the same power delivered?

A. The power factor

B. The frequency

C. The current and conductor size

D. The number of phases

54. Because a switch connects devices on one network while a router joins different networks, the device that links two separate networks is which?

A. A switch

B. A router

C. A node

D. A terminator

55. A fixture set to address 001 using 8 channels occupies channels 1–8, so an independent next fixture must start where?

A. Address 009

B. Address 001

C. Address 004

D. Address 008

56. Because a node output port carries one universe, a node providing eight ports can output how many universes total?

A. One universe

B. Four universes

C. Eight universes

D. 512 universes

57. A wireless DMX link is chosen for a moving set piece, which introduces what risk in a crowded RF venue?

A. Excessive voltage drop

B. Harmonic distortion of power

C. Interference and dropout

D. A blown branch breaker

58. Because the safest practice is to make and break connections de-energized, single-pole connectors should never be connected or broken how?

A. Under load

B. With the ground first

C. In the correct sequence

D. After verifying dead

59. An 850 W fixture on a 120 V, 20 A circuit draws about 7.1 A, so how many fit within the 16 A continuous limit?

A. One fixture

B. Two fixtures

C. Three fixtures

D. Four fixtures

60. Because the 80% rule caps continuous load at 16 A on a 20 A breaker, loading it to the full 20 A nameplate continuously risks what?

A. Improved power factor

B. Nuisance tripping and overheating

C. A higher supply frequency

D. Lower conductor resistance

61. A peak voltage of 339 V corresponds via the 0.707 factor to what RMS value?

A. 170 volts

B. 480 volts

C. 339 volts

D. 240 volts

62. Because three phases are offset 120°, their balanced fundamental currents in the neutral do what?

A. Add to triple the value

B. Cancel to near zero

C. Double the line voltage

D. Reverse the rotation

63. A crimp made with ordinary pliers instead of the correct die fails under vibration because it is what?

A. Not gas-tight

B. Over-tightened

C. Too short

D. Made of copper

64. Because conventional fixtures take dimmed power and moving/LED fixtures take constant power, a mixed rig typically uses what combination?

A. Only dimmer racks

B. Both dimmer racks and relay racks

C. Only opto-splitters

D. Only buck/boost transformers

65. A technician measures 0 ohms (or hears a beep) across a fuse, which indicates the fuse is what?

A. Blown and open

B. Carrying excess voltage

C. Short to ground

D. Good (continuous)

66. Because resistance equals voltage divided by current, a load dropping 240 V while passing 10 A has what resistance?

A. 2,400 ohms

B. 24 ohms

C. 0.04 ohms

D. 250 ohms

67. A long extension cord must be sized for both current and length, because length drives what?

A. Voltage drop

B. The power factor

C. The supply frequency

D. The DMX address

68. Because the entertainment Ethernet standard uses RJ45/etherCON and DMX uses 5-pin XLR, recognizing the connector tells a technician what?

A. Which system and tester apply

B. The gel color needed

C. The truss load rating

D. The fuel capacity

Domain 2 — Regulations, Codes & Life Safety (Questions 69–103)

69. The NEC governs installation while NFPA 70E governs safe work, which means a question about arc-flash PPE points to which document?

A. The NEC

B. The Canadian Electrical Code

C. NFPA 70E

D. ANSI E1.11

70. Because OSHA enforces safety law and may reference NFPA 70E, the relationship between them is that OSHA does what?

A. Enforces law that can reference the consensus standard

B. Writes the consensus standard itself

C. Manufactures the safety equipment

D. Replaces the standard entirely

71. A GFCI trips at about 5 mA while fatal fibrillation occurs near 100 mA, which explains why the GFCI threshold is set how?

A. Above the lethal level

B. Well below the lethal level

C. Exactly at the lethal level

D. Unrelated to the lethal level

72. Because the bonding conductor, not the earth, clears a fault, relying on a ground rod alone leaves equipment in what state during a fault?

A. Safely de-energized

B. Tripped immediately

C. At reduced voltage

D. Energized and lethal

73. A worker must service a circuit, and NFPA 70E's hierarchy means the first choice is to do what?

A. Work it live with gloves

B. Work it live at reduced load

C. Post a spotter and work live

D. De-energize and lock it out

74. Because each worker controls their own lock, a group lock-out guarantees what?

A. No one re-energizes while any worker is still exposed

B. The supervisor can clear all locks at once

C. Security can remove locks at shift change

D. The phases stay balanced

75. A severe shock causes ventricular fibrillation, which is why the appropriate emergency device is what?

A. A clamp meter

B. A GFCI

C. A multimeter

D. An AED

76. Because a rescuer who touches a live victim joins the circuit, the first action in an electrical-contact emergency is to do what?

A. Pull the victim off by hand

B. De-energize the source first

C. Pour water on the contact

D. Wait for the breaker

77. An energized electrical fire is Class C, which dictates the use of what extinguishing agent?

A. Water

B. A conductive foam

C. Any available agent

D. A non-conductive agent

78. Because water conducts electricity, using it on an energized fire creates what risk to the user?

A. Electrocution

B. Improved cooling

C. A tripped GFCI only

D. Reduced visibility only

79. A venue's smoke detection may react to haze, which means the technician's correct action is to do what?

A. Disable the detectors quietly

B. Ignore the detectors

C. Run haze only at full output

D. Coordinate with the venue and AHJ

80. Because PPE is the last line of defense, the priority before relying on it is to do what?

A. Wear two layers of PPE

B. Work faster to limit exposure

C. Eliminate or reduce the hazard

D. Stand slightly farther away

81. An arc flash releases energy that radiates outward, which means it can injure a worker how?

A. Only through direct contact

B. From a distance, without contact

C. Only at voltages above 600 V

D. Only in enclosed spaces

82. Because the AHJ adopts and interprets codes for a site, a dispute over which code edition applies is resolved by whom?

A. The Authority Having Jurisdiction

B. The lighting designer

C. The cable manufacturer

D. The console operator

83. A UL or CSA mark indicates NRTL testing, and OSHA's role regarding those labs is to do what?

A. Manufacture their test equipment

B. Recognize them as NRTLs

C. Set their pricing

D. Write their marks

84. Because moisture lowers body resistance, a shock that is survivable when dry can become what when the worker is wet?

A. Less dangerous

B. Unchanged

C. Potentially lethal

D. Impossible

85. A capacitor or battery can retain charge after disconnection, which means lock-out/tag-out must include what step?

A. Re-energizing to test

B. Skipping verification

C. Removing all locks first

D. Verifying zero energy and discharging stored energy

86. Because ESTA develops the ANSI E1 standards, the protocols DMX512, RDM, and sACN are all examples of what?

A. OSHA regulations

B. ESTA/ANSI consensus standards

C. NEC installation articles

D. Equity exposure limits

87. A blocked exit endangers evacuation, which is why egress paths must be kept how during a show?

A. Dimly lit only

B. Completely clear and unobstructed

C. Covered with black drape

D. Blocked only briefly

88. Because emergency egress lighting is a life-safety system, on a power failure it must do what?

A. Flash to the booth

B. Shut off to save battery

C. Illuminate the exit paths

D. Trigger a blackout cue

89. A worker must establish an electrically safe work condition, which requires which full sequence?

A. Reduce voltage, then work

B. Lock out only, no verification

C. Energize with PPE, then verify

D. De-energize, verify, and lock out

90. Because the NEC is adopted locally and editions vary, the edition that actually applies on a job is determined by what?

A. The manufacturer's manual

B. The newest edition always

C. The console firmware

D. The local AHJ's adoption

91. Fog can leave slippery residue and obscure exits, which classifies its use as what kind of matter?

A. A purely creative choice

B. A data-network concern

C. A regulated safety matter

D. An optional decorative add-on

92. Because mercury in HID lamps is toxic when released, broken or spent lamps must be handled how?

A. Thrown in regular trash

B. Crushed for volume

C. With careful handling and proper disposal

D. Left in the fixture indefinitely

93. A generator's exhaust contains carbon monoxide, which means running it in an enclosed space risks what?

A. CO poisoning

B. Improved harmonics

C. Higher fault current

D. DMX interference

94. Because asbestos fibers are carcinogenic when disturbed, the correct response to suspected asbestos is to do what?

A. Sand it to inspect

B. Remove it with hand tools

C. Leave it undisturbed and use qualified abatement

D. Paint over it

95. A GFCI protects people while a breaker protects conductors, which means near a water effect the device added for personnel safety is the what?

A. The main breaker

B. The branch fuse

C. The GFCI

D. The transfer switch

96. Because NFPA 70E treats energized work as the exception, its core message about de-energizing is what?

A. De-energize only above 480 V

B. De-energize wherever feasible

C. Energized work is always faster

D. PPE makes live work fully safe

97. A voltage-rated glove with a pinhole has lost its integrity, which means its protective value is now what?

A. Adequate for low voltage

B. Good for arc flash only

C. Repairable with tape

D. None — remove from service

98. Because OSHA is a regulator and ESTA is a standards body, the entity that can inspect a site and issue citations is which?

A. ESTA

B. ANSI

C. The lighting designer

D. OSHA

99. A worker confuses CSA Z462 with CSA C22.1, and the correct distinction is that Z462 governs what?

A. Equipment listing marks

B. Lighting control protocols

C. Electrical safety in the workplace

D. The installation of wiring

100. Because the bonding/equipment grounding conductor provides the low-impedance fault path, its job during a fault is to do what?

A. Carry fault current back to trip the breaker

B. Raise the system voltage

C. Reduce the supply frequency

D. Filter harmonic currents

101. A worker lifts a ground pin to stop an audio hum, which the standards classify as what?

A. A recommended noise fix

B. A required code practice

C. A harmless adjustment

D. A dangerous, prohibited action

102. Because isolated and technical grounding reduce noise without removing the safety ground, the correct way to solve a ground-loop hum is what?

A. Remove the equipment ground

B. Use a ground-lift adapter

C. Use proper isolated/technical grounding design

D. Cut the grounding conductor

103. A continuous load runs three or more hours, which under the NEC must be limited to what fraction of the breaker rating?

A. 100 percent

B. 80 percent

C. 50 percent

D. 125 percent

Domain 3 — Entertainment Electrical Systems Planning (Questions 104–150)

104. Connected load is the sum of all equipment at full, and applying load diversity yields a demand figure that is what?

A. Greater than connected load

B. Typically less than connected load

C. Exactly equal to connected load

D. Unrelated to connected load

105. Because not all equipment runs full at once, applying diversity lets a service be sized how?

A. Larger than the connected total

B. To exactly the connected total

C. Ignoring all loads

D. To realistic peak demand

106. A worst-case cue brings many fixtures to full simultaneously, which challenges what planning assumption?

A. The realistic application of load diversity

B. The gobo selection

C. The DMX universe count

D. The gel color temperature

107. Because a service cannot supply more than its rating, the first step before tying in is to do what?

A. Select the gel palette

B. Set the DMX addresses

C. Assess the service capacity and protection

D. Schedule the load-out

108. A 60 kW load at 0.8 power factor requires the service to supply what apparent power?

A. 48 kVA

B. 75 kVA

C. 96 kVA

D. 60 kVA

109. Because apparent power equals kW divided by PF, lowering the power factor at the same real-power load does what to the required kVA?

A. Increases it

B. Decreases it

C. Leaves it unchanged

D. Eliminates it

110. A tap conductor is smaller than the feeder and lacks protection at its own ampacity, which is permitted only if what is limited?

A. The conductor color

B. The number of fixtures

C. The tap conductor length

D. The console channels

111. Because voltage drop rises with run length and current, a long feeder that meets ampacity may still require what?

A. A larger conductor

B. A smaller conductor

C. A higher frequency

D. A different gel

112. A branch circuit should be kept within about 3% voltage drop, and the feeder-plus-branch total within about what?

A. 25 percent

B. 5 percent

C. 50 percent

D. 0.5 percent

113. Because the single-line diagram shows the power structure, it is the document used to verify what at a glance?

A. The fixture focus and gel

B. Service capacity and coordination

C. The performers' blocking

D. The wireless channels

114. A lighting plot shows fixture positions while a hookup maps circuits and channels, which means to hang and circuit a fixture a technician uses what together?

A. Only the single-line

B. Only the crew schedule

C. Only the budget

D. The plot and the hookup

115. Because the shop order derives from the design documents, omitting spares risks what at load-in?

A. A stalled load-in when items fail

B. Improved load balance

C. Reduced harmonics

D. Lower fault current

116. A crew schedule assigns skilled personnel to each phase, because even a perfect design fails without what?

A. Enough qualified hands in the time available

B. A higher supply frequency

C. A larger gel inventory

D. More DMX universes

117. Equipment SCCR and breaker AIC must both exceed available fault current, because an under-rated device during a fault may do what?

A. Improve coordination

B. Lower the voltage drop

C. Raise the power factor

D. Rupture in an arc blast

118. Because the earth is a poor conductor, the element that actually clears a fault by carrying current to the breaker is what?

A. The ground rod

B. The earth itself

C. The bonding/equipment grounding conductor

D. The neutral alone

119. A truss is loaded with fixtures, cable, and distribution gear, and the often-underestimated contributor to total weight is what?

A. The gel color

B. The DMX address

C. The cable

D. The fixture focus

120. Because a truss carries more distributed than concentrated load, placing a heavy unit at unsupported midspan creates what?

A. Improved distribution

B. Lower total weight

C. Reduced voltage drop

D. A point load that can overstress it

121. A rigging component's Working Load Limit is below its breaking strength, and the gap between them is the what?

A. Usable extra capacity

B. The component's weight

C. The safety (design) factor

D. The maximum span

122. Because the primary clamp can fail, every overhead fixture also needs what attached to the structure?

A. A spare gel frame

B. A rated safety cable

C. A second data cable

D. A backup lamp

123. A long safety cable lets a failed fixture drop far and build shock force, which is why safety cables should be kept how?

A. As long as convenient

B. Coiled at the clamp

C. Short to limit fall distance

D. Made of rope, not steel

124. Because strain relief transfers cable weight to the structure, it ensures that what does not bear the load?

A. The truss chord

B. The safety cable

C. The fixture's connectors

D. The gel frame

125. A worker focusing at height needs fall arrest, which requires what specific combination?

A. A full-body harness, lanyard, and rated anchor

B. A body belt and any anchor

C. Insulating gloves only

D. A respirator only

126. Because dropped tools from height can be lethal, the area below overhead work must be managed how?

A. Left open for efficiency

B. Lit more brightly

C. Controlled or cleared of people

D. Filled with the audience

127. A pre-rig inspection happens before raising a load, which means its purpose is to verify what?

A. The gel colors and gobos

B. Supports, clamps, and safety cables

C. The show's musical tempo

D. The catering schedule

128. Because motors draw heavy inrush at startup, a generator must be sized with what beyond the running load?

A. A smaller conductor

B. A lower frequency

C. Fewer universes

D. Headroom for the startup surge

129. A generator running the whole event continuously should be sized to which rating?

A. The prime (continuous) rating

B. The standby rating

C. The peak surge rating

D. The starting-battery rating

130. Because whether to bond a generator's neutral depends on the system type, the determining factor is whether the generator is what?

A. Diesel or gasoline

B. Towable or skid-mounted

C. New or used

D. A separately derived system

131. A single-line diagram is sequenced from the source, which means the correct order is what?

A. Loads, distros, disconnect, source

B. Source, disconnect, protection, distribution, loads

C. Distros, source, loads

D. Loads, source, disconnect

132. Because selective coordination opens only the nearest device, a properly coordinated system responds to a branch fault by doing what?

A. Dropping only that branch

B. Tripping the main breaker

C. Tripping every breaker

D. Never tripping at all

133. A control/riser diagram shows consoles and nodes, which makes it the document used to wire what?

A. The data network

B. The feeder system

C. The truss rigging

D. The fuel supply

134. Because diversity must not be applied to loads that genuinely run full, it must be withheld from which loads?

A. Decorative accent lighting

B. House lighting only

C. Spare circuits

D. Continuous or critical loads

135. A means of disconnect must allow safe de-energization, which requires it to be what?

A. Matched to the gel color

B. Able to transmit DMX

C. Readily accessible and lockable

D. Able to convert AC to DC

136. Because a node port carries one universe, converting an all-network rig to feed DMX fixtures requires what at the fixtures?

A. A buck/boost transformer

B. A larger feeder

C. Nodes converting network to DMX

D. A second neutral

137. A show floor power diagram maps power locations across a venue, which makes it especially relevant to which credential's work?

A. The Portable Power Distribution Technician

B. The followspot operator

C. The gel cutter

D. The catering manager

138. Because a conductor must satisfy both ampacity and voltage drop, the size that governs the final choice is which?

A. The smaller of the two

B. The ampacity size always

C. The voltage-drop size always

D. The larger required size

139. Administering inventory and spares as part of planning helps prevent what specific failure?

A. Excessive harmonic distortion

B. Missing equipment discovered at load-in

C. Three-phase imbalance

D. High available fault current

140. A buck/boost transformer is specified to nudge 208 V toward a required 230 V, which classifies it as a device for what?

A. Large step-up transmission

B. Backup energy storage

C. Small voltage correction

D. Harmonic cancellation

141. Because the planning domain integrates calculations, grounding, and codes, mastering it marks a technician who can do what?

A. Eliminate the need for grounding

B. Replace the codes

C. Skip the safety cables

D. Design a system, not just install one

142. A planner reconciles the plot, hookup, and single-line against each other, which is done to achieve what?

A. To select the show's tempo

B. To schedule catering

C. To ensure the documents agree

D. To pick gobo patterns

143. Because available fault current is what the system can deliver into a fault, the equipment SCCR must do what relative to it?

A. Meet or exceed it

B. Be lower than it

C. Be exactly half of it

D. Be unrelated to it

144. A feeder is the backbone from source to distribution, which distinguishes it from a branch circuit that does what?

A. Carries the final leg to a fixture

B. Carries data only

C. Suspends the truss

D. Stores backup energy

145. Because triplen harmonics add in the neutral, the planning response for a heavily electronic rig is to specify what?

A. A smaller neutral

B. No neutral at all

C. A half-sized neutral

D. An oversized neutral and K-rated transformer

146. A planner totals lighting 40 kW, audio 12 kW, and video 8 kW, giving what connected load?

A. 48 kW

B. 75 kW

C. 96 kW

D. 60 kW

147. Because overcurrent ratings must match the system, fault-current verification against device ratings is performed when?

A. After the show closes

B. During planning of the distribution

C. Only for LED rigs

D. Never, breakers self-adjust

148. A worst-case demand and a continuous critical load both run at full, which means diversity applied to them risks what?

A. Reduced harmonics

B. Overload when they peak together

C. Excessive voltage

D. Improved efficiency

149. Because the company switch can serve as the production's means of disconnect, it must therefore be what?

A. Matched to the gel color

B. Able to transmit DMX

C. Able to convert AC to DC

D. Readily accessible and lockable

150. A complete design becomes an installable reality only when it is documented and resourced, which is why the final planning outputs include what?

A. Only the single-line diagram

B. The shop order, crew schedule, and budget

C. Only the lighting plot

D. Only the gel-cut list

Full Answer Key & Explanations

Domain 1 — Electrical Skills

1. A — By Ohm's Law, I = E ÷ R, so with R fixed, doubling voltage doubles the current. Current is directly proportional to voltage when resistance is constant.

2. C — Since P = E × I, at fixed voltage current is proportional to power, so doubling wattage doubles the current draw. This is why a higher-wattage fixture loads a circuit more heavily.

3. A — $P = I^2 \times R$ links resistance to heat: a loose connection raises R, and the resulting heat is proportional to that resistance. This relationship is why loose terminations overheat and cause fires.

4. D — Lower total resistance means more current flows from the source (I = E ÷ R), so adding parallel branches increases total draw. Each added load draws its own current rather than dividing the voltage.

5. C — $V_{rms} = V_{pk} \times 0.707$, so $170 \times 0.707 \approx 120$ V. This is why a 120 V outlet rating corresponds to a ~170 V peak.

6. A — Line-to-line = line-to-neutral × 1.732, so $277 \times 1.732 \approx 480$ V. Raising the phase voltage scales the line voltage by the same 1.732 factor.

7. D — Triplen harmonics from chopped dimmer waveforms add together in the neutral rather than canceling. This loads the neutral heavily even when the phases are balanced.

8. D — Because triplen harmonics accumulate in the neutral, heavily dimmed feeders use a full-sized or oversized neutral. An undersized neutral could overheat without tripping the phase breakers.

9. B — Inrush is several times running current, so an undersized generator sags in voltage or stalls at startup. Sizing must include this surge to keep the generator stable.

10. A — Opposing magnetic fields from a hot and its neutral cancel, so clamping both reads a falsely low value. A clamp meter must encircle a single conductor.

11. D — Over a long run, conductor resistance produces voltage drop that a short-run ampacity check ignores. The conductor may need upsizing for voltage drop even when ampacity is met.

12. C — A larger-gauge conductor has lower resistance and therefore less voltage drop, restoring voltage at the load. The dim fixture results from drop over the long, undersized run.

13. B — A missing terminator causes signal reflections that corrupt DMX data, appearing as flicker and erratic fixture behavior. The 120-ohm terminator absorbs the signal to prevent this.

14. B — A forward-phase dimmer's chopped waveform can damage a moving light's internal power supply, which needs clean constant power. Electronic fixtures dim via data, not a dimmer.

15. D — Each DMX universe is capped at 512 channels, so exceeding that requires additional universes. Cable gauge and voltage do not add channel capacity.

16. C — sACN carries many universes over one network cable, replacing the many separate DMX runs a large rig would otherwise need. This is how networked control scaled to modern show sizes.

17. C — A node bridges the network and the fixtures by converting sACN/Art-Net data into physical DMX outputs. It is the essential gateway in a networked rig.

18. D — RDM's return data shares the DMX line, so a non-RDM splitter blocks the bidirectional communication. All components in the path must be RDM-compatible.

19. B — Sine-wave dimming preserves the waveform instead of chopping it, greatly reducing harmonics compared to a forward-phase dimmer. This makes it the cleanest dimming method.

20. A — A relay rack switches constant power on and off, which suits LED and moving fixtures that dim internally. Conventional tungsten fixtures need a dimmer instead.

21. C — A loose lug raises resistance, generating heat that degrades the connection further in a runaway cycle. This is why every termination must be torqued to specification.

22. B — The rule is ground on first and ground off last, so the ground reference is always present whenever a hot is live. This protects against an energized, unreferenced condition.

23. B — Six fully loaded circuits bundled in one jacket trap heat, requiring ampacity derating. The conductors cannot each carry full breaker rating simultaneously without it.

24. D — Pin-and-sleeve connectors are keyed and polarized, so they cannot be miswired. This inherent protection is their main advantage over separate single-pole connectors.

25. C — Runtime = 4,800 Wh ÷ 600 W = 8 hours (ideal). Dividing stored energy by load gives the theoretical run time.

26. A — Conversion losses and depth-of-discharge limits make real runtime shorter than the ideal calculation. The ideal figure is a theoretical maximum, not a guarantee.

27. A — A UPS provides instant, short-duration bridging power while a generator provides delayed-start, long-duration power. Together they give seamless, indefinite backup.

28. C — With a 1:1 ratio, an isolation transformer changes no voltage and exists to electrically separate the secondary. This reduces noise and creates a separately derived system.

29. C — Heavily electronic loads produce harmonic currents, which is exactly what a K-rated transformer is built to tolerate without overheating. Higher K-numbers handle heavier harmonics.

30. A — Skin oil creates a hot spot on a tungsten-halogen envelope, so the lamp must never be touched with bare fingers. This shortens lamp life or causes failure.

31. B — The iris varies the beam diameter on a followspot. The douser controls intensity, the boomerang adds color, and the snoot controls flare.

32. B — An ellipsoidal's internal shutters and gobo slot produce a hard-edged, shapeable beam, unlike a Fresnel's soft wash. This is why profiles are used for sharp projection.

33. A — The ohmmeter supplies its own test current and expects no external voltage, so applying it live gives false readings and risks damage. Resistance must be measured de-energized.

34. A — Because the resistance function injects its own current, a fuse must be removed and de-energized before a continuity test. Testing it live gives false readings.

35. D — A 480 V company switch carries high transient fault energy, requiring a CAT III or CAT IV meter rated for the voltage. An under-rated meter risks a catastrophic internal arc.

36. B — The live-dead-live test proves the meter on a known-live source before and after testing the target. This guards against trusting a faulty meter's false zero.

37. D — The parallel pair = (12 × 12) ÷ 24 = 6 Ω; in series with 4 Ω gives 10 ohms. Reduce the parallel group first, then add the series element.

38. A — A combination circuit is solved by reducing each parallel group to an equivalent resistance, then adding the series elements. Adding everything as series gives a wrong total.

39. D — $P = E \times I \times 1.732 \times PF = 208 \times 30 \times 1.732 \times 1.0 \approx 10{,}807$ watts. The 1.732 factor applies to all three-phase power with line-to-line voltage.

40. D — Real power = E × I × 1.732 × PF, so lowering PF from 1.0 to 0.8 reduces real power proportionally. The same current then delivers less useful work.

41. B — Readings of 45, 20, and 25 A show the phases are unequal, indicating an unbalanced load needing redistribution. Balancing equalizes the phases and reduces neutral current.

42. B — An unbalanced load leaves a residual current that the neutral must carry, so it carries more than under a balanced linear load. Balancing minimizes this neutral current.

43. D — Coiled feeder under load traps heat that can melt the insulation, so the run must be fully extended. Full extension lets the cable shed heat.

44. C — DC has no frequency, power factor, or phase, so its circuit calculations are simpler than AC's. Only Ohm's Law and the basic power formula are needed.

45. B — A bright center with dark edges is corrected by optimizing the lamp-to-reflector position for an even field. Poor alignment produces hot spots and uneven output.

46. A — PoE delivers power and data on one cable, so a truss-mounted node needs no separate power cable. The supplying switch and cable must support PoE.

47. A — A wye system's neutral allows standard 120 V single-phase loads to share the service alongside three-phase loads. A basic delta provides no such neutral.

48. C — Reverse-phase (trailing-edge) dimming is gentler on electronic loads than leading-edge forward-phase chopping. Its transistor design also runs quieter.

49. B — $I = (5 \times 746) \div (230 \times 0.85 \times 0.90) = 3{,}730 \div 175.95 \approx 21.2$ amps. Efficiency and power factor below one raise the current above a simple wattage conversion.

50. A — Because motors are not perfectly efficient, real motor current is higher than a simple 746-watt-per-HP conversion suggests. Efficiency and power factor inflate the draw.

51. C — A clamp meter reads current magnetically around one conductor without breaking the energized feeder. A series multimeter would require interrupting it and is unsafe.

52. D — The megohmmeter applies hundreds or thousands of volts, so it must only be used on de-energized, isolated conductors. Testing a live circuit is dangerous and gives false data.

53. C — Higher distribution voltage reduces the current needed for the same power, allowing smaller conductors. This is why 277/480 V is used for larger loads.

54. B — A router joins two separate networks and directs traffic between them. A switch instead connects devices on one local network.

55. A — A fixture using channels 1–8 (address 001) means an independent next fixture starts at address 009. Sharing an address would make them respond identically.

56. C — Each port carries one universe, so an eight-port node outputs eight universes total. Node capacity scales with the number of DMX ports.

57. C — Wireless DMX shares the radio spectrum and suffers interference and dropout in crowded RF venues. This is why critical control is often kept wired.

58. A — Single-pole connectors should never be made or broken under load, because doing so can draw a dangerous arc. Connections are made and broken de-energized.

59. B — Each fixture draws 850 ÷ 120 ≈ 7.1 A; two fixtures total ≈ 14.2 A (within the 16 A limit), while three would total ≈ 21.3 A (over the limit). The 80% continuous rule caps a 20 A circuit at 16 A, so only two fit.

60. B — Loading a 20 A breaker to its full nameplate continuously exceeds the 16 A (80%) limit, risking nuisance tripping and overheating. The 80% rule exists to prevent this.

61. A — $V_{rms} = V_{pk} \times 0.707$, so $339 \times 0.707 \approx 240$ V. The peak-to-RMS conversion uses the 0.707 factor.

62. B — The three 120°-offset balanced fundamental currents cancel to near zero in the neutral. This is why a balanced linear load carries little neutral current.

63. A — A pliers "crimp" is not gas-tight, so it develops resistance and fails under vibration. Only the correct ratcheting tool and die produce a reliable crimp.

64. B — A mixed rig uses dimmer racks for the conventional tungsten fixtures and relay racks for the LED/moving fixtures. The two fixture families require different kinds of power.

65. D — A near-zero ohms reading or a beep indicates continuity, meaning the fuse is good. An open (OL) reading would indicate a blown fuse.

66. B — R = E ÷ I = 240 ÷ 10 = 24 ohms. Dividing voltage by current gives the load's resistance.

67. A — Length drives voltage drop, so a long cord must be sized for length as well as current. A cord adequate in current but too small for its length will sag the voltage.

68. A — DMX uses 5-pin XLR and Ethernet uses RJ45/etherCON, so the connector identifies which system and which tester apply. Connector recognition speeds troubleshooting.

Domain 2 — Regulations, Codes & Life Safety

69. C — NFPA 70E governs safe work practices including arc-flash PPE, while the NEC governs installation. A PPE question therefore points to NFPA 70E.

70. A — OSHA enforces safety law and frequently references consensus standards like NFPA 70E, giving them regulatory teeth. OSHA does not write those standards itself.

71. B — The GFCI's ~5 mA trip threshold is set well below the ~100 mA that causes fatal fibrillation. This margin is what makes it effective at protecting people.

72. D — The earth is a poor conductor and cannot carry enough current to trip a breaker, so relying on a ground rod alone leaves equipment energized and lethal during a fault. The bonding conductor clears faults.

73. D — NFPA 70E's hierarchy makes de-energizing and locking out the first choice. Energized work is permitted only when de-energizing is genuinely infeasible.

74. A — Because each worker controls their own lock, no one can re-energize the system while any worker remains exposed. Personal locks make the lockout reliable.

75. D — Ventricular fibrillation from severe shock is corrected by an AED, which analyzes the rhythm and delivers a shock. Prompt use is lifesaving for an electrocution victim.

76. B — A rescuer who touches a live victim joins the circuit, so the first action is to de-energize the source. Only then is it safe to assist.

77. D — A Class C (energized) fire requires a non-conductive extinguishing agent. A conductive agent like water can electrocute the user.

78. A — Water conducts electricity, so using it on an energized fire risks electrocuting the user. The equipment must be de-energized first.

79. D — Effects that may trigger smoke detection must be coordinated with the venue and AHJ, never by defeating detectors. Detection systems are life-safety equipment.

80. C — PPE is the last line of defense, so eliminating or reducing the hazard takes priority before relying on it. De-energizing removes the hazard entirely.

81. B — An arc flash's radiated energy can cause severe burns from a distance, without direct contact. This is the strongest argument for de-energizing.

82. A — The AHJ adopts and interprets codes for a specific site, so it resolves disputes over which edition applies. Codes set the baseline, but the AHJ decides.

83. B — OSHA recognizes UL, ETL, and CSA as Nationally Recognized Testing Laboratories, giving their marks regulatory standing. OSHA does not make their equipment or marks.

84. C — Moisture lowers body resistance, so a shock survivable when dry can become lethal when the worker is wet. This is why wet locations require GFCI protection.

85. D — Capacitors and batteries retain charge after disconnection, so LOTO must include verifying zero energy and discharging stored energy. Skipping this can be fatal.

86. B — DMX512, RDM, and sACN are all ESTA/ANSI consensus standards in the E1 series. ESTA's Technical Standards Program develops them.

87. B — A blocked exit endangers evacuation, so egress paths must be kept completely clear and unobstructed during a show. Obstruction can turn an emergency into a mass-casualty event.

88. C — Emergency egress lighting must illuminate the exit paths on a power failure, so occupants can evacuate. It is a life-safety system that must stay functional.

89. D — An electrically safe work condition requires de-energizing, verifying de-energized, and locking out. Reducing voltage or skipping verification does not meet the standard.

90. D — The NEC is adopted locally and editions vary, so the applicable edition is set by the local AHJ's adoption. Always confirm the adopted edition for the jurisdiction.

91. C — Fog's slip residue and exit-obscuring effects make its use a regulated safety matter, governed by ESTA and Equity guidelines. It is not a limit-free creative choice.

92. C — Mercury in HID lamps is toxic when released, so broken or spent lamps require careful handling and proper disposal. They must never go in regular trash.

93. A — Generator exhaust contains carbon monoxide, so running it enclosed risks CO poisoning. Generators must always be properly ventilated.

94. C — Disturbing asbestos releases carcinogenic fibers, so suspected asbestos must be left undisturbed and handled by qualified abatement. Sanding or removing it is dangerous.

95. C — Near a water effect, the device added for personnel safety is the GFCI, which protects people from shock leakage to ground. The breaker protects conductors instead.

96. B — NFPA 70E's core message is to de-energize wherever feasible, treating energized work as the exception. "Faster to leave it live" is never acceptable.

97. D — A voltage-rated glove with a pinhole has lost its integrity and offers no protection, so it must be removed from service. Insulating PPE only works when undamaged.

98. D — OSHA is the regulator that can inspect sites and issue citations, while ESTA and ANSI are standards bodies. Enforcement authority distinguishes the regulator.

99. C — CSA Z462 governs electrical safety in the workplace (the 70E equivalent), while CSA C22.1 is the installation code. The distinction is safe work versus installation.

100. A — The bonding/equipment grounding conductor provides the low-impedance path that carries fault current back to trip the breaker. The earth alone cannot clear a fault.

101. D — Lifting a ground pin to stop a hum defeats the safety ground and can leave a chassis energized, making it a dangerous, prohibited action. Noise is solved by proper grounding design, never by removing grounds.

102. C — A ground-loop hum is solved with proper isolated or technical grounding design, which reduces noise without removing the safety ground. Lifting or cutting the ground is never acceptable.

103. B — A continuous load (three hours or more) must be limited to 80% of the breaker rating, equivalently sizing the device to 125% of the load. A 20 A breaker carries no more than 16 A continuous.

Domain 3 — Entertainment Electrical Systems Planning

104. B — Applying diversity to the connected-load sum yields a demand that is typically less than connected load. Not all equipment runs at full simultaneously.

105. D — Because equipment does not all run full at once, diversity lets a service be sized to realistic peak demand rather than the connected total. This sizes the service economically.

106. A — A worst-case cue bringing many fixtures to full at once challenges the realistic application of load diversity. The system must still handle that momentary peak.

107. C — A service cannot supply more than its rating, so the first step before tie-in is assessing its capacity and protection. This confirms the source can carry the demand.

108. B — Apparent power = kW ÷ PF = 60 ÷ 0.8 = 75 kVA. The service's kVA capacity must meet or exceed this.

109. A — Since kVA = kW ÷ PF, lowering the power factor at the same real-power load increases the required kVA. A poor power factor demands more apparent power and current.

110. C — A tap conductor smaller than its feeder and unprotected at its own ampacity is permitted only if its length is limited (the 10-ft and 25-ft tap rules). The length limit prevents an undetected overload.

111. A — Voltage drop rises with length and current, so a long feeder meeting ampacity may still need a larger conductor. The larger required size governs the choice.

112. B — The branch limit is about 3% and the feeder-plus-branch total is about 5%. Staying within these keeps equipment performing properly.

113. B — The single-line diagram shows the power structure, so it is used to verify service capacity and overcurrent coordination at a glance. It communicates the electrical layout.

114. D — Hanging and circuiting a fixture uses the lighting plot (positions) and the hookup (circuits and channels) together. Each document supplies part of the picture.

115. A — The shop order derives from the design documents, so omitting spares risks a stalled load-in when items fail with no replacement. Spares prevent that failure.

116. A — A crew schedule assigns skilled personnel because even a perfect design fails without enough qualified hands in the available time. Labor is part of the plan.

117. D — An under-rated device during a fault may rupture in an arc blast rather than interrupting safely, so SCCR and AIC must exceed available fault current. Matching ratings is essential.

118. C — The bonding/equipment grounding conductor carries fault current back to the breaker, because the earth is too poor a conductor to clear a fault. This conductor is what actually protects.

119. C — Cable is the often-underestimated contributor to total truss load, sometimes weighing as much as the fixtures. It must be included in load calculations.

120. D — A truss carries more distributed than concentrated load, so a heavy unit at unsupported midspan creates a point load that can overstress it. Load must follow the rated distribution.

121. C — The gap between the Working Load Limit and breaking strength is the safety (design) factor. It absorbs shock and wear and is not usable capacity.

122. B — Because the primary clamp can fail, every overhead fixture needs a rated safety cable attached to the structure as secondary suspension. It is the most important overhead habit.

123. C — A long safety cable lets a failed fixture drop far and build shock force, so safety cables are kept short to limit the fall distance. Short cables catch the fixture quickly.

124. C — Strain relief transfers cable weight to the structure so the fixture's connectors do not bear the load. This prevents disconnection and conductor stress.

125. A — Fall arrest at height requires a full-body harness, lanyard, and rated anchor. A body belt or unrated anchor is never acceptable.

126. C — Dropped tools from height can be lethal, so the area below overhead work must be controlled or cleared of people. Tool tethers and cordoning support this.

127. B — A pre-rig inspection before raising a load verifies supports, clamps, and safety cables. It is the final check before trusting the rig.

128. D — Motors draw heavy inrush at startup, so a generator must be sized with headroom for that surge beyond the running load. Ignoring inrush risks sag or stalling.

129. A — A generator running the whole event continuously should be sized to its prime (continuous) rating, not the higher short-duration standby figure. Standby sizing overestimates sustainable capacity.

130. D — Whether to bond a generator's neutral depends on whether it is a separately derived system. This determines correct grounding and avoids objectionable parallel paths.

131. B — The correct single-line order from the source is source, disconnect, overcurrent protection, distribution, then loads. This reflects how power actually flows.

132. A — A properly coordinated system drops only the faulted branch, leaving the rest energized. Selective coordination keeps a localized fault localized.

133. A — A control/riser diagram shows consoles and nodes, making it the document used to wire the data network. It communicates the control distribution layout.

134. D — Diversity must be withheld from continuous or critical loads that genuinely run at full, because applying it there risks overload. Those loads peak by design.

135. C — A means of disconnect must be readily accessible and lockable to allow safe de-energization for work and emergencies. The company switch commonly serves this role.

136. C — Feeding DMX fixtures from an all-network rig requires nodes converting network data to DMX at the fixtures. Each node port supplies one universe.

137. A — A show floor power diagram mapping power across a venue is especially relevant to the Portable Power Distribution Technician's work. It guides exhibit-floor power layout.

138. D — A conductor must satisfy both ampacity and voltage drop, and the larger required size governs the final choice. The smaller of the two would fail one requirement.

139. B — Administering inventory and spares prevents missing equipment from being discovered at load-in, when there is no time to recover. A cross-checked shop order prevents this.

140. C — Nudging 208 V toward 230 V is a small voltage correction, the role of a buck/boost transformer. It does not perform large step-up transformations.

141. D — Mastering the planning domain marks a technician who can design a system, not just install one. It integrates calculations, grounding, and codes into an installable whole.

142. C — Reconciling the plot, hookup, and single-line ensures the documents agree so the rig comes together correctly. Disagreements between them cause errors at load-in.

143. A — Equipment SCCR must meet or exceed the available fault current the system can deliver, so a fault doesn't destroy the equipment. An under-rated SCCR is a severe hazard.

144. A — A feeder is the backbone from source to distribution, while a branch circuit carries the final leg to a fixture. The two differ in capacity and position in the system.

145. D — Because triplen harmonics add in the neutral, a heavily electronic rig is planned with an oversized neutral and a K-rated transformer. These handle the harmonic heating.

146. D — Total connected load = 40 + 12 + 8 = 60 kW. Summing the load categories gives the starting figure before diversity.

147. B — Fault-current verification against device ratings is performed during planning of the distribution, before installation. Under-rated devices create a severe hazard.

148. B — A worst-case demand and a continuous critical load both peak at full, so applying diversity to them risks overload when they coincide. Diversity must exclude such loads.

149. D — Serving as the means of disconnect, the company switch must be readily accessible and lockable. This allows safe de-energization for work and emergencies.

150. B — A design becomes installable only when documented and resourced, so the final planning outputs include the shop order, crew schedule, and budget. These turn the design into a workable plan.