# Residential Systems Installation & Maintenance

## Written Exam – 100 Questions Across 7 Categories – 60 Minutes Allowed

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### Electronic Systems Technical Skills

1. The device normally used at the point where the telephone or cable company’s responsibility ends & the homeowner’s responsibility begins is called ________.
   - a. Demarc
   - b. NIC
   - c. DDI
   - d. NIB

2. ________ is the technology infrastructure transmission standard in use today.
   - a. POTS
   - b. TCP/IP
   - c. IP
   - d. Windows RCP

3. When wiring a steel-framed building, use the cutouts in the metal framing material & use a __________ to protect the cable.
   - a. grommet
   - b. piece of PVC conduit
   - c. nail guard
   - d. warning tag

4. Ohm's law states the voltage in a circuit is equal to the current times the resistance.
   - a. True
   - b. False

5. To help protect against Electromagnetic Interference, EMI, use a cable with __________.
   - a. shielding
   - b. a large gauge
   - c. solid conductors
   - d. stranded conductors
6. Keypads should be mounted __________ inches AFF, Above Finished Floor.
   a. 24 to 36
   b. 12 to 24
   c. 48 to 52
   d. 72 to 84

7. When installing Cat-5e cable, the minimum bend radius to maintain is __________.
   a. 1/2 inch
   b. 1 inch
   c. 1½ inches
   d. 2 inches

8. To avoid EMI, place low voltage cables parallel to, & a minimum of __________ inches from electrical power cables, & preferably __________ inches.
   a. 2, 12
   b. 6, 12
   c. 12, 24
   d. 24, 36

9. When terminating Category 5e cable on a 66 block or 110 block, use __________ termination.
   a. IDC, Insulation Displacement Contact
   b. IDC, Installation Direct Contact
   c. RJ-45
   d. RJ-31

10. Every EST should consider industry certification to __________.
    a. offer verification of their skills
    b. differentiate their firm from the competition
    c. provide a value-added service to their firm
    d. all of the above

11. __________ occurs when two or more components have different ground connections & current flows on the shields between the equipment.
    a. ground leak
    b. ground loop
    c. crosstalk
    d. EMI

12. Damage to cables, or cables & connections exposed to water, may cause __________, resulting in noise entering the signal path, causing hiss, crosstalk, hum in audio, & flickering & reduced output in video.
    a. EMI
    b. ground leak
    c. crosstalk
    d. RFI
13. When terminating UTP cable pairs, the maximum each pair can be untwisted is __________.
   a. None
   b. ½ inch
   c. 1 inch
   d. does not matter

14. Cables are marked with a designation suffix showing where the cable may be used. A cable marked with “P” is designed to be used in __________.
   a. general purpose settings
   b. risers or between floors
   c. commercial properties
   d. plenum spaces, above ceilings & below floors

15. The minimum bend radius for RG-6 coaxial cable is __________.
   a. 1 inch
   b. 2 inches
   c. 3 inches
   d. 4 inches

16. Signal performance over wire can be impacted by __________. (Select all that apply)
   a. Crosstalk
   b. Attenuation
   c. Resistance
   d. termination

17. To reduce interference within a Cat 5 twisted pair cable the pairs are all twisted in the same direction.
   a. True
   b. False

**IP Networking**

18. Electronic Static Discharge, ESD, is the ________________.
   a. loss of a signal as it moves away from its source
   b. interference of a signal with other electronic devices, such as fluorescent lights
   c. deterioration of network signal due to static electricity in low humidity environments
   d. transfer of static electricity from you to components, potentially causing serious damage to equipment

19. The role of a switch on a home network is to __________.
   a. isolate the home network from the Internet
   b. allow the home network to connect to other home networks
   c. allow the home network to be viewed from the Internet
   d. provide the physical connection between the router & other network devices

20. The class of IP addresses called ________ has only 254 hosts per network & is used for most home networks.
   a. Class A
   b. Class B
   c. Class C
   d. Class D
21. A typical router has ____ IP address(es) & ___________________.
   a. One, is used to connect to the LAN
   b. One, is used to connect to the Internet
   c. Two, one is for the Web & one is for the Internet
   d. Two, one shows privately on the LAN & the other shows publicly on the Internet

22. To configure the router to only accept LAN traffic from the firewall, set up the router to _______.
   a. only accept traffic from the NetBIOS name of the firewall
   b. only accept traffic from the MAC address of the firewall
   c. physically connect to the firewall with a crossover cable
   d. none of the above

23. When creating a DHCP server in the router for a client’s home network, use a private IP Address range.
   ____________ is considered a private IP address range.
   a. 132.5.1.1-10
   b. 120.2.1.1-10
   c. 192.168.0.1-10
   d. 11.11.11.11-21

24. __________ is a valid IP address.
   a. google.com
   b. 198.2.64.12.3
   c. 192.259.0.1
   d. 192.168.0.2
   e. All of the above

25. A domain name server assigns a name to a MAC address.
   a. True
   b. False

26. The benefit(s) of NAT include ____________.
   a. Enabling the use of more internal IP addresses
   b. Providing security by hiding internal IP addresses
   c. Allowing the entire home network to use only one external IP address
   d. A & B
   e. All of the above

27. The operating frequency of the IEEE 802.11b Wi-Fi version is _______.
   a. 100 MHz
   b. 600 MHz
   c. 900 MHz
   d. 1000 MHz
   e. 2.4 GHz

28. When wiring a network in a residence, follow the _______ wiring standard.
   a. POTS
   b. T568A
   c. T568B
   d. T568P
29. A computer in each bedroom, a printer in the home office, IP security cameras, & a media server in the living room can best be described as a:
   a. WAN  
   b. **LAN**  
   c. MAN  
   d. None of the above

30. Use a ______ connector on a Cat 5e Ethernet network cable.
   a. RJ-11  
   b. **RJ-45**  
   c. XLR  
   d. BNC

31. The color pairs in Cat 5e cable are______, ______, ______ & ______.
   a. blue, red, yellow, green  
   b. brown, green, orange, red  
   c. green, orange, yellow, blue  
   d. **orange, brown, green, blue**

32. A MAC address is the physical or hardware address of a network device & is assigned by the _________.
   a. manufacturer  
   b. modem  
   c. network device  
   d. router

33. Port numbers are used to send & receive data. Web browsing uses port _____ & sending email uses port _____.
   a. 20, 80  
   b. 25, 80  
   c. 80, 20  
   d. **80, 25**

34. Use a __________ to protect against intruders external to the network.
   a. Firewall  
   b. Proxy Server  
   c. Switch  
   d. MAC

35. Wireless signals from a WAP can be stopped from traveling outside the home by __________.
   a. distance configuration in WAP setup  
   b. installing WAP reflectors around the outside of the home  
   c. A & B  
   d. None of the above

36. When connecting to a wireless network, the SSID is required. This is obtained by __________.
   a. entering the WEP key in the WAP  
   b. entering the pass phrase in the WAP  
   c. **listening to the WAP broadcast**  
   d. request settings from the router
37. DNS (Domain Name Service) automatically assigns unique IP addresses to network devices when they are turned on & connected to a network.
   a. True
   b. False

38. The maximum length of a complete network segment built with 10BaseT Cat-5e cable should not exceed _____.
   a. 10 meters
   b. 85 meters
   c. 100 meters
   d. 100 feet

39. The assignment of IP addresses to devices is typically handled by the _______ process.
   a. DNS
   b. DHCP
   c. NAT
   d. MAC

40. When discussing networking technologies, the “10” in the term “10BaseT” stands for the __________.
   a. number of conductors used in the cable
   b. data rate in megabytes per second
   c. data rate in megabits per second
   d. diameter of the cable

41. The amount of time it takes a VoIP packet to reach its destination is known as __________.
   a. latency
   b. jitter specification
   c. codec
   d. QOS, Quality of Service

42. A three jack video system is commonly called _______?
   a. VGA video
   b. S-Video
   c. Composite Video
   d. Component Video

**Audio / Video**

43. A surround sound system with channels: Left, Center, Right, Subwoofer, Left-rear, & Right-rear, is called _______.
   a. Dolby Digital
   b. 5.1
   c. 6.0
   d. 6.1

44. The coaxial cables used for antennas & distributing video signals typically have _______ impedance.
   a. 53 ohms
   b. 300 ohms
   c. 90 ohms
   d. 75 ohms
45. When turning on the audio system the amplifier shuts down, this problem could be caused by _________.
   a. an open wire to the speaker
   b. a shorted speaker
   c. the system is muted
   d. a disconnected input

46. If one speaker is out of phase with the other, it will______________.
   a. have no effect on the system or sound
   b. damage the speaker(s)
   c. damage the amplifier
   d. work but will have no depth of field

47. If there are horizontal bars moving up or down through a monitor connected by composite video, most likely the video cable is __________.
   a. shorted
   b. too close to electrical wiring
   c. too long
   d. kink in it

48. Subwoofers are used to reproduce low frequency sound which is __________.
   a. deep
   b. non-directional
   c. directional
   d. sonic

49. In a multi-room audio system a ‘zone’ is an area or group of rooms that __________.
   a. functions as an independent source of music
   b. receives audio from the system
   c. distributes video to the system
   d. All of the above

50. Sound is measured in ________.
   a. mL
   b. Ω
   c. dB
   d. W

51. Amplifier power is expressed in watts, & the sound generated by speakers is measured in decibels (dB).
   a. True
   b. False

52. As the length of a wire run increases, __________ also increases.
   a. Resistance
   b. Wattage
   c. Interference
   d. frequency response
53. In a whole house audio system with four rooms of stereo speakers driven with only a single amplifier at the head-end ______ volume controls must be used.
   a. impedance matching
   b. standard
   c. non-impedance matching
   d. switching

54. If you measure the sound from a speaker to be 87dB at 50 Watts, to get 90dB from the speaker you will need ______ watts.
   a. 25
   b. 50
   c. 100
   d. 200

55. As resistance increases, impedance increases.
   a. True
   b. False

56. The standard screen aspect ratio for HDTV is ________.
   a. 4:3
   b. 1:1
   c. 16:9
   d. None of the above

57. Video displays using __________ scanning to ‘paint’ images on the screen can produce a better image than __________ scanning at the same resolution.
   a. SDTV, EDTV
   b. progressive, interlaced
   c. EDTV, HDTV
   d. interlace, progressive

58. Plasma displays typically offer a wider viewing angle than LCD displays.
   a. True
   b. False

59. A video output format that usually uses 3 RCA connectors is called ________ & is a(an) ________ signal.
   a. component, analog
   b. composite, analog
   c. s-video, analog
   d. component, digital

60. Digital video signals can be sent over ________ video outputs.
   a. composite
   b. component
   c. HDMI
   d. RGBHV
61. A 15 pin D-Sub connector is typically used to output __________ signals from computers to video displays.
   a. VGA
   b. HDMI
   c. DVI
   d. A & B

62. The most basic video signal is __________.
   a. component video
   b. S-VHS
   c. DVI video
   d. composite video

**Home Theater**

63. Which remote control technology does not require the remote to be pointed at the device it is operating?
   a. Infrared
   b. TCP/IP
   c. RF
   d. Both B & C above

64. The purpose of an Real Time Analyzer, RTA, is to:
   a. Measure color temperature
   b. Determine the distortion on an audio frequency
   c. **Determine loudness at specific frequencies**
   d. None of the above

65. IR Leakage occurs when:
   a. IR wires are not insulated properly
   b. Too much power is applied to the IR blaster
   c. **More than one component sees the IR blaster**
   d. An IR blaster is cracked

66. An SPL Meter would most likely be used during the ___________ stage.
   a. pre-wire
   b. **calibration**
   c. installation
   d. trim-out

67. Video signals are many. The one to use for the best image is ___________.
   a. Component video
   b. **HDMI video**
   c. Composite video
   d. S-Video
68. If the room has high ambient light you would NOT want to use _____.
   a. rear projection
   b. front projection
   c. PDP direct view
   d. LCD direct view

69. The “p” in 1080p stands for progressive scanning.
   a. True
   b. False

70. A UPS protects home theater components from __________.
   a. lightning strikes
   b. programming changes by the user
   c. memory loss during a power outage
   d. voltage spikes

71. The amount of wattage required for an amplifier in a home theater is a function of the __________.
   a. efficiency of the speakers
   b. distance from the speaker to the listener
   c. desired volume level at the listener
   d. all of the above

72. To deal with the heat generated by home theater equipment __________.
   a. use portable fans to circulate the room air
   b. turn off the equipment when not in use
   c. keep the room temperature low
   d. build in ventilation for the equipment

73. Video calibration typically covers
   a. contrast (white level) & brightness (black level)
   b. sharpness
   c. color hue, saturation & temperature
   d. all of the above

74. When aligning a projector, the ___________ option will help make the image perfectly square.
   a. lens shift
   b. zoom
   c. keystone
   d. focus

75. To increase the volume by 3db you must ______ the wattage.
   a. double
   b. triple
   c. half
   d. none of the above
Security & Surveillance

76. A contact that has no continuity when not activated is said to be ________________.
   a. normally closed (NC)
   b. normally open (NO)
   c. Defective
   d. An EOL device

77. Series wired contact sensors use __________ contacts.
   a. multiple
   b. normally closed
   c. normally open
   d. tripped

78. A security system uses a __________ jack to seize the phone line in an alarm situation.
   a. RJ-31X
   b. RG-31
   c. RJ-45
   d. RG-59

79. To maximize contrast, it is recommended to use a(an) __________ camera.
   a. Color
   b. Black & white
   c. Infrared
   d. UV

80. A camera that can only track horizontal movement is known as a __________ camera.
   a. IP
   b. PTZ
   c. Pan
   d. stationary

81. The minimum light level a camera can capture a clear image is expressed in the __________ rating in
   the camera specifications.
   a. watts
   b. lumens
   c. PTZ
   d. lux

82. In areas where light is not sufficient for surveillance cameras, __________ are used.
   a. IR illuminators
   b. color cameras
   c. spot lights
   d. PTZ cameras
83. A home control system uses Ethernet to communicate between the controller & 10 remote devices. To communicate to all remote devices, the controller must have _____ Ethernet ports.
   a. 1
   b. 2
   c. 3
   d. 5
   e. 10

84. The process of having a series of commands operate from a single button press is known as
   a. Auto program
   b. Scene
   c. Macro
   d. Step-by-step

85. The total wattage of all the devices connected to a lighting control device is typically known as the _______.
   a. total load
   b. lighting budget
   c. circuit size
   d. control current

86. A single HVAC system that uses two thermostats & maintains independent temperatures in two areas is called a ________ system.
   a. split
   b. two-zone
   c. dual-thermo
   d. duplex

87. HomePlug devices communicate using _______.
   a. power lines
   b. phone lines
   c. RF
   d. phono plugs

88. A homeowner is considering using Bluetooth-enabled devices for various functions. ________ is the maximum recommended distance for a Bluetooth device to communicate reliably.
   a. 12 feet
   b. 30 feet
   c. 75 feet
   d. 150 feet

89. In a home control system, use the___________ feature to turn lights on & off based on a specific time of day.
   a. solar motion sensor
   b. astronomical timer
   c. photo sensor
   d. clock timer
90. __________ is the best type of user interface for a home control system.
   a. Keypad
   b. Computer
   c. Remote control
   d. Let the homeowner decide

91. A lighting control system can control __________.
   a. individual lamps
   b. lighting scenes
   c. window treatments
   d. All of the above

92. An HVAC thermostat needs __________ volts traveling on the __________ color wire to operate.
   a. 24, yellow
   b. 24, red
   c. 48, yellow
   d. 48, red

93. Power surges can come from __________. Select all that apply
   a. power fluctuations from the power company
   b. high power use devices in the home
   c. wireless transmitters
   d. master controller

94. When power is lost, a(n) __________ is used to keep constant power for critical equipment.
   a. HVAC
   b. UPS
   c. KSU
   d. PTZ

Troubleshooting Methodology & Documentation

95. An Uninterruptible Power Supply ____________________.
   a. switches from AC to battery power when it detects an AC power line fault
   b. provides AC power through an inverter, powered by batteries, that are charged from the AC line
   c. switches to an alternate AC power circuit when it detects a disturbance on the current AC power circuit
   d. Starts an AC power generator when it detects an AC power line fault

96. OSHA is an acronym for _________________.
   a. Organization for Safe Home Appliances
   b. Occupational Safety & Health Administration
   c. Organization of Shared Home Appliances
   d. Organization for Safety in Home Applications
97. NEC is an acronym for ________________.  
   a. National Electrical Code  
   b. Nominal Electrical Current  
   c. National Electronics Certification  
   d. Network Enhanced Channel  
   e. Normally Exposed Conductor

98. MSDS is an acronym for ________________.  
   a. Material Safety Data Sheet  
   b. Manufacturers Summary of Data Speeds  
   c. Manufacturers Supply Depot Summary  
   d. Massively Serial Data Stream

99. A surge from a lightning strike can enter a home through _______.  
   a. cable service feed  
   b. electrical service feed  
   c. outdoor speakers  
   d. All of the above

100. If two computers both have the same IP address, they will _______________.  
    a. be able to communicate with each other  
    b. not be able to communicate with each other  
    c. communicate with each other but not the Internet  
    d. None of the above