**Circle the letter of the correct response(s).**

**See page 2 for formulas.**

1. A \_\_\_\_\_\_\_\_\_\_\_\_ detects insulation deterioration by measuring high resistance values under high test voltages.
   1. multimeter
   2. megohmeter
   3. ammeter
   4. continuity tester
2. Equipment designed to measure single-phase loads, such as appliances must be rated at least \_\_\_\_\_\_\_\_\_\_.
   1. CAT I
   2. CAT II
   3. CAT III
   4. CAT IV
3. An ammeter is used to measure \_\_\_\_\_\_\_\_\_\_.
   1. Voltage
   2. Current
   3. Resistance
   4. Power
   5. Insulation Resistance
4. When a breaker has been opened to remove energy from a circuit, the circuit will be safe to work on without testing for other energy sources.
   1. True
   2. False
5. Shields are provided on instrumentation control wiring to protect the wiring / signals from \_\_\_\_\_\_\_\_\_\_\_.
   1. moisture
   2. physical damage
   3. electrical interference / noise
   4. vibration
6. Typically, shielding in instrumentation circuits is grounded \_\_\_\_\_\_\_\_\_\_\_\_ .
   1. at both ends to eliminate noise.
   2. to a neutral return wire.
   3. at the source.
   4. at one end, to avoid a circulating flow of induced current.
7. A sine wave has a period (1 cycle) of 20 milliseconds. What is its frequency?
   1. 30 Hz
   2. 40 Hz
   3. 50 Hz
   4. 60 Hz
8. A multimeter used to measure AC voltage will readout \_\_\_\_\_\_\_\_\_\_.
   1. peak voltage
   2. RMS voltage
   3. average voltage
   4. voltage difference between max and min values
9. A Clamp-On Ammeter measures current by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. sensing the magnetic field generated by current passing through the wire.
   2. clamping on to the ends to two wires to complete a circuit and measure the current.
   3. determining the voltage in the cable and computing the current.
   4. measuring capacitance in the circuit.
10. If a conductor has a low resistance, it
    1. has a high conductivity.
    2. will conduct poorly.
    3. cannot be used for a service entrance.
    4. will make a poor ground connection.
11. Control and communication wiring most commonly uses \_\_\_\_\_\_\_\_\_\_\_\_ insulation.
    1. Silicone
    2. Rubber
    3. Nylon
    4. Polyethylene
12. A conductor’s ampacity is the \_\_\_\_\_\_\_\_\_\_\_\_.
    1. current it can carry under maximum load at 75° C.
    2. current it can carry without tripping a breaker.
    3. Peak current it can carry under ambient conditions.
    4. current it can carry continuously under conditions of use without exceeding its temperature rating.
13. In selecting a wire/power cable, an electrician must consider \_\_\_\_\_.
    1. ambient temperature
    2. termination point
    3. correct size
    4. all of the above
14. Select the AWG wire size below that has the least cross-sectional area, and therefore the least ampacity under the same ambient conditions.
    1. 16
    2. 12
    3. 10
    4. 8
15. To ensure safety when measuring unknown (low) voltages with a meter that has selectable ranges, you should first \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    1. measure the circuit resistance.
    2. measure the current.
    3. turn off the breaker
    4. test for higher voltages
16. A 120 V (*RMS*) AC source is connected to a 50Ω load: Find the power delivered. **Show work**.

**Match the tool with its common (electrical worker) usage: Place CAPITAL letter answers in boxes on right.**

|  |  |  |
| --- | --- | --- |
|  | Tighten box connectors, lock nuts, small couplings. |  |
|  | Bending and cutting wire and positioning small components. |  |
|  | Cutting cable, removing knockouts, twisting wire, deburring conduit. |  |
|  | Remove insulation from small-diameter wire. |  |
|  | Make circular cuts in walls. |  |
|  | Pull wires through conduit. |  |
|  | Cut holes in walls, floors, and ceilings to install boxes and conduit. |  |
|  | Drill into masonry, concrete, wood, metal. |  |
|  | Measure current in large cables. |  |
|  | Detect insulation deterioration. |  |
|  | Measure and observe electrical signals. |  |
|  | Test for a complete path for current to flow. |  |
|  | Apply heat shrink to electrical connections. |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| A | Continuity Tester | I | Voltage Tester | Q | Soldering Iron |
| B | Heat Gun | J | Oscilloscope | R | Hole Saw |
| C | Hammer Drill | K | Clamp-On Ammeter | S | Megohmeter |
| D | Hacksaw | L | Hand Conduit Bender | T | Reciprocating Saw |
| E | Cable Tie Gun | M | Ratcheting PVC Pipe Cutter | U | Pipe Vise |
| F | Fish Tape | N | Wire Crimper | V | Wire Stripper / Cutter |
| G | Pipe Wrench | O | Needle-Nose Pliers | W | Side-Cutting Pliers |
| H | Tongue-and-Groove Pliers | P | Slip-Joint Pliers | X | Locking Pliers |