1. Conductors have how many valence electrons in thier atoms?
   (a) Three to four
   (b) Five to seven
   (c) Eight
   (d) One or two
2. Examples of semiconductor materials are:
   (a) Copper and iron
   (b) Silicon and germanium
   (c) Arsenic and gallium
   (d) Hydrogen and oxygen
3. P-type and N-type materials are made by:
   (a) Adding electrons directly to the semiconductor.
   (b) Removing electrons directly from the semiconductor.
   (c) Doping the semiconductor with a substance that has five or three valence electrons.
   (d) Running a current through the semiconductor.
4. A PN junction is what kind of electronic device?
   (a) Diode
   (b) Rectifier
   (c) OR gate
   (d) SCR
5. _____ is the process of turning _____.
   (a) Commutation, voltage into current
   (b) Rectification, AC into DC
   (c) Rectification, DC into AC
   (d) Inversion, capacitance into inductance
6. Bridge rectificers are the most common type of rectifiers used in electronic circuits.
   (a) True
   (b) False
7. Peak inverse voltage (PIV) is
   (a) The reverse bias at which breakover occurs.
   (b) The forward bias at which the diode conducts.
   (c) The voltage required for a diode to operate.
   (d) The ratio of heat to amps characteristic.
8. The polarity of a diode can be confirmed by:
   (a) Using a voltmeter
   (b) Using an ohmmeter
   (c) Using an ammeter
   (d) Using a caliper
9. LEDs emit light by which process?
   (a) Photosynthesis
   (b) Electroluminescence
   (c) Entropy
   (d) Combustion
10. Calculate the required resistance of a current limiting resistor needed for a LED operated at 15mA with a 12V DC source.
    (a) 600 Ω
    (b) 800 Ω
    (c) 5 Ω
    (d) 90 Ω
11. Transistors are made by
    (a) Joining three layers of semiconductor materials.
    (b) Joining two layers of semiconductor materials.
    (c) Joining four layers of semiconductor materials.
    (d) Joining a capacitor and inductor in series.
12. FET devices are use in applications requiring low-imedance input and/or high power consumption.
    (a) True
    (b) False
13. Phase controls is used by SCRs to
    (a) Vary the timing of a switch.
    (b) Align the phases of current and voltage.
    (c) Vary the amount of power delivered to a load.
    (d) Ensure lights on a circuit all turn on at the same time.
14. Diacs can be thought of as AC switches and Triacs can be used in phase control applications.

(a) True

(b) False

15. PC (Printed Circuit Boards) use _____ instead of wires to electrically connect components.

(a) tin foil bonded strips glued to the board

(b) chemically etched copper circuits

(c) gold solder lines layed onto the board

(d) None of the above.

16. PC (Printed Circuit Boards) use _____ instead of wires to electrically connect components.

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17. An integrated circuit (IC) is

(a) a hermetically sealed case contaiing a tiny wafer of semiconductor material.

(b) a PNPN connection.

(c) an operationl amplifier.

(d) a device that uses optical transmission paths to transfer a signal.

18. A major advantage of microprocessors is its ability to provide very precise control.

(a) True

(b) False

19. Exmaples of safe ESD working practices include:

(a) Working in a carpeted area, using zip-lock bags

(b) Working in an area with tape, cardboard and plastic boxes.

(c) Using a ESD grounding strap, grounded work surface and ESD bags

(d) Using radios, and non-ESD devices in the same work area.

20. Op amps have which qualities?

(a) High input impedance, low output impedance, low gain.

(b) Low input impedance, high output impedance, low gain.

(c) Low input impedance, low output impedance, high gain.

(d) High input impedance, low output imedance, high gain.

21. Which gate gives a 0 only when both inputs are 1?

(a) XAND

(b) XOR

(c) NAND

(d) OR

22. Which gate gives a 1 only when both inputs are 0?

(a) NAND

(b) NOR

(c) AND

(d) OR