**Basic Electricity and Electronics**

**Module Two Quiz Key**

1. What type of particle orbits the nucleus of an atom?
   1. Proton
   2. Neutron
   3. **Electron**
   4. Hole
2. Orbits are grouped into energy bands known as \_\_\_\_\_\_\_?
   1. Electrons
   2. Atoms
   3. Ions
   4. **Shells**
3. Which electrons contribute to chemical reactions and bonding?
   1. **Valence electrons**
   2. Free electrons
   3. Semiconductor electrons
   4. Intrinsic electrons
4. The process of adding impurities to pure semiconductor material is called

\_\_\_\_\_\_\_\_\_?

* 1. **Doping**
  2. Hole current
  3. Recombination
  4. Conduction

1. Recombination is when:
   * 1. A crystal is formed
     2. A valence electron becomes a conduction electron
     3. A positive and a negative ion bond together
     4. **An electron falls into a hole**
2. We create an N-type semiconductor by adding \_\_\_\_\_\_\_\_\_\_\_?
   * 1. Trivalent atoms
     2. P-type atoms
     3. **Pentavalent atoms**
     4. Holes
3. The term “bias” means:
   1. The ratio of majority carriers to minority carriers
   2. The amount of current through the pn junction
   3. **A DC voltage applied to control the operation of a device**
   4. The teacher’s grading scale
4. The majority carriers in P-type semiconductor material are \_\_\_\_\_\_\_\_?
   1. Electrons
   2. **Holes**
   3. Silicon
   4. Crystals
5. The N region of a diode is called the \_\_\_\_\_\_\_\_?
   1. **Cathode**
   2. Anode
   3. Diode
   4. Depletion region
6. When an atom gains or loses a valence electron, the atom becomes \_\_\_\_\_\_\_\_?
   1. Covalent
   2. Neutral
   3. A crystal
   4. **An ion**
7. Atoms within a crystal are held together by
   1. Atomic glue
   2. Subatomic particles
   3. **Covalent bonds**
   4. Forces of attraction
8. How many PN junctions are there in a Bipolar Junction Transistor?
   * 1. One
     2. **Two**
     3. Three
     4. Four
9. Which PN junction is forward biased in an operating transistor circuit?
   1. The base-collector junction
   2. The collector-emitter junction
   3. **The base-emitter junction**
   4. The gate-collector junction
10. The base region in a transistor is:
    1. Thin and lightly doped
    2. **Thin and heavily doped**
    3. Thick and lightly doped
    4. Thick and heavily doped
11. Which of the following is used to illustrate the output for all possible combinations of inputs?
    1. NAND gate
    2. Boolean equation
    3. Timing diagram
    4. **Truth table**
12. What can be used to mathematically illustrate the functional operation of a logic gate?
    1. Logic probe
    2. **Boolean equation**
    3. Truth table
    4. Timing diagram
13. A binary digit is called a:
    1. **Bit**
    2. Byte
    3. Word
    4. Number system
14. How many binary bits does it take to represent a 2-digit hexadecimal number:
    1. 2
    2. 4
    3. **8**
    4. 16
15. What code is used to represent letters, symbols, and numbers?
    * 1. Binary Coded Decimal
      2. Hexadecimal
      3. **ASCII**
      4. Digital
16. Which number system has ten possible values?
    * 1. ASCII
      2. **Decimal**
      3. Binary
      4. Hexadecimal
17. The length of time from one pulse to another is called the:
    * 1. Frequency
      2. **Period**
      3. Timing diagram
      4. Hertz
18. Which of the following devices is used most often in a TTL circuit?
    1. Diode
    2. **Transistor**
    3. Relay
    4. CMOS
19. Convert the decimal number **131** to binary.

**010000011**

1. Convert the binary number **11010101** to decimal.

**213**

1. Convert the binary number **11001001** to hexadecimal.

**C9**

1. Convert the decimal number **758** to hexadecimal.

Convert to binary: **001011110110**

Group 4 bits each: **0010 1111 0110** **= 2F6h**

27. Convert the hexadecimal number **B6A** to decimal.

Convert to binary: 1100 0110 1010

* + 2048+1024+64+32+8+2 = **3178**

1. Explain the difference between digital and analog.

Digital has steps represented by whole numbers converted to binary. Analog has infinite values represented by a smooth and continuous Curve.

29. Give the truth table for an inverter.

A X

1. 1
2. 0

30. Give the truth table for an OR gate.

A B Q

0 0 0

0 1 1

1 0 1

1 1 1

31. Give the truth table for an AND gate.

A B Q

0 0 0

0 1 0

1 0 0

1 1 1

32. Give the truth table for two input (A and B) addition.

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | Σ | Co |
| 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |

33. Describe an ohmmeter test of a diode.

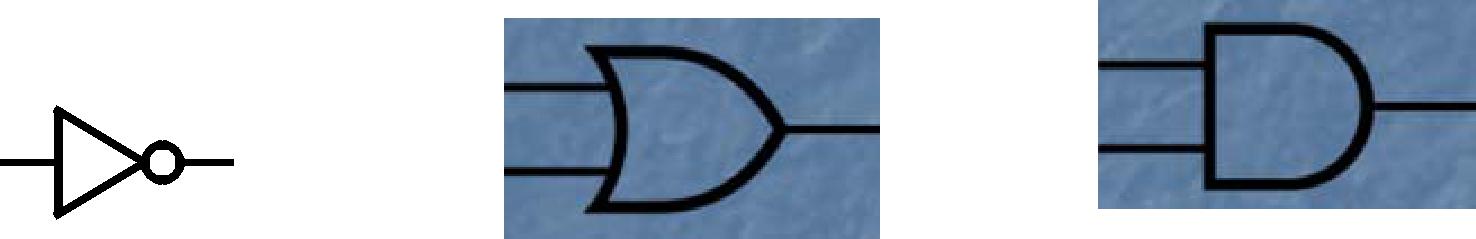
Take two tests with opposite meter polarity across the diode. One polarity should read low resistance (or .7V), the other polarity should read infinite resistance. Read once, reverse the leads, read again.

1. Draw the schematic symbol on an NPN transistor, label the leads, and indicate the proper polarities for operation.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Collectror (+) (large | |  |
|  |  |  |  | pos) | |  |
| Base |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |
| (+) |  |  |  |  |  |  |
| (smal |  | |  | Emitter (neg, or |  |  |
| l pos) |  | |  | ground) |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |



35. Draw the schematic symbols for the inverter, the OR gate, and the AND gate.



36. What is a covalent bond?

Where electrons are shared between two atoms.

37. Describe a hole.

A space in a covalent bond where a shared electron should be.

38. Describe the characteristics of the depletion layer.

A charged region depleted of both types of current carrying particles (electrons and holes).

39. What does the phrase “totem pole” in a circuit mean?

Two transistors in a series array, the emitter of the top connected to the collector of the bottom.

40. What is the definition of digital logic?

Where a circuit or a system follows a defined set of rules. You get the exact same output based on a defined input every time.