A Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period:\_\_\_\_\_\_\_\_\_\_\_

Chapter 17 – Reading /Study Guide

**Section 17.1 – Electrical Potential**

1. The point in which molecules in the air are broken down into charged particles forming a state of matter called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ .
2. Define electrical potential energy:
3. Electrical potential energy is a component of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
4. Mechanical energy is equal to the sum of the following energies \_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Any time force is used to move an object \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is done on that object; therefore, whenever a charge moves \_\_\_\_\_\_\_\_\_\_\_\_\_ work is done on that charge.
6. Electric potential energy can be associated with a charge in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.
7. The SI unit for electric potential energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. The formula for electrical potential energy in a uniform electric field:
9. Explain how the gravitational potential energy and electrical potential energy is similar.
10. Define electric potential:
11. In an electric field as the magnitude of the charge increases, the magnitude of the associated electrical potential energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
12. Define potential difference:
13. Potential Difference Formula:
14. The SI unit for potential difference is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and is equivalent to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
15. Range of batteries is from \_\_\_\_\_\_\_\_\_\_\_\_\_\_for a small battery to about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ car battery.
16. Formula for Potential Difference in a Uniform Electric Field:
17. Displacement is \_\_\_\_\_ and is \_\_\_\_\_\_\_\_\_\_\_\_\_to the field and that motion perpendicular to the field does not change the electrical potential energy.
18. Formula for Potential difference between a point at infinity and a point near a charge:
19. The volt is name after \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
20. Common application for potential difference is in the operation of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
21. A battery is an energy storage device that provides a constant \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between to locations called terminals inside the battery.
22. Explain what it means in terms of potential difference to have a 1.5 V battery.

**Section 17.2 – Capacitance p. 602**

1. Define capacitor:
2. Draw a simple capacitor below (label the plates, distance, area of the plates)
3. Define capacitance:
4. Formula for capacitance:
5. The SI unit is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_which is equivalent to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Typical capacitors have the capacitance of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
7. Capacitance depends on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the capacitor.
8. Formula for Capacitance for a parallel plate capacitor in a vacuum:
9. Epsilon ε represents a constant called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. If a subscript zero follow the ε it refers to a vacuum and has a magnitude of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
10. The farad is name after \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
11. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_between a capacitor’s plate can change its capacitance.
12. A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is an insulating material, such as air, rubber, glass or waxed paper.
13. The capacitance \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_when a dielectric is inserted between the plates.
14. The effect of the dielectric is to reduce the strength of an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
15. When a capacitor discharges it is the opposite of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
16. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ done on a charge is a measure of the transfer of energy.
17. Formula for Electrical potential Energy stored in a charged capicator.

**Section 17.3 Current and Resistance**

1. Movement of electrical charges is known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Define Electric Current:
3. The direction of current I is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the movement of negative charges.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is defined in terms of positive charge movement.
5. What is an electrolyte?
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is the net velocity of the charge carriers.
7. Define drift Velocity:
8. Define resistance:
9. Formula for resistance:
10. The SI unit for resistance is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and is represented by the Greek letter \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
11. State Ohm’s Law:
12. Materials that have a constant resistance over a wide range of potential difference are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
13. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_is a semiconducting device that is non-ohmic.
14. The 4 factors that affect the material’s resistance are:
15. Describe what (GSR) is.
16. What is a potentiometer?
17. Materials with zero resistances are called\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
18. What is critical temperature:
19. What is the Meissner effect?

**Section 17.4 – Electric Power p. 618**

1. Batteries maintain a potential difference across their terminals by converting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to electrical potential energy.
2. There are two different types of current:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, charges only move one directional with negative charges moving from lower to higher electric potential.
4. In the US, alternating current oscillates 60 times every second creating a frequency of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Electric power is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of conversion to electrical energy.
6. Formula for electric power:
7. SI unit for power is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 1 W is equivalent to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
8. The u nit of energy used by electrical companies is\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
9. 1 kWH of energy is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Joules.
10. Why is decreasing current important to electric companies.