

Review Sheet – Electric Circuits

Name: KEY

Per: _____

1. Read chapters 19 and 20
2. **Terms to know:** circuit, cell, battery, drift speed, conduction electrons, voltage drop, potential difference, schematic, variable resistor, short circuit, open circuit, ammeter, voltmeter, capacity, emf, series circuit, parallel circuit, fuse, circuit breaker, equivalent resistance, junction.

3. **Define:** *resistance* Ratio of applied voltage across material to current through it.
4. State:

- a) Kirchhoff's First Law (Junction Rule):

In a closed loop, total voltage rises = total voltage drops

- b) Kirchhoff's Second Law (Loop Rule):

At a junction, total current in = total current out

5. State Ohm's Law.

For a range of voltages (and at a const. temp) current is proportional to voltage.

6. What is the difference between a primary cell and a secondary cell?

*primary cell: non-rechargeable
secondary cell: rechargeable*

- a) What is the difference between *direct current* and *alternating current*?

D.C. - current flows in 1 dir. only

A.C. - current flows in a changing direction

- b) What is the difference between *electron flow* and *conventional current*?

electron flow - from \ominus to \oplus

conventional current - from \oplus to \ominus

- c) What is the source of DC?

cells, battery, solar p.v. cell

- d) What is the source of AC?

Ac generator, power plant

8. What is the definition of one ampere of current (short form)?

Defined in terms of Force per unit length between parallel, current-carrying wires

- a) If a circuit has a one amp current flowing through it, how many coulombs of charge pass a given point in one second?

one!

- b) How many electrons pass that point in one second?

$$1\text{c} \times \frac{1\text{e.c.}}{1.6 \times 10^{-19}} = \underline{6.25 \times 10^{18} \text{e.c.}}$$

10. What is the drift speed formula? $I = nAvq$

11. a) What is the cause of resistance in a wire?

collisions between conduction electrons + lattice ions.

b) What four factors affect the resistance of a wire? How do they affect it?

- Resistivity (proportional)
- Length (proportional)
- Area (inverse)

Temp (usually lower temp)
lower Res...

c) What type of wire is the best conductor (least resistance)?

short, fat, cold...

d) What type of wire has the most resistance?

Long, hot, skinny...

12. What is the difference between an Ohmic device and a non-Ohmic device? Give an example of each.

*Ohmic - resistance ~ constant as V/I change (resistor)
Non-ohmic - resistance changes as I goes up (filament bulb)*

13. a) What are the formulas for mechanical power?

$$P = \frac{W}{t} = \frac{F \cdot d}{t} = F \cdot v$$

b) What are the formulas for electrical power?

$$P = IV = I^2 R = \frac{V^2}{R}$$

14. Be able to sketch graphs for power, resistance and current. ✓

15. Be able to read and draw schematic diagrams for simple circuits, including meters, as well as series and parallel circuits, and combination circuits. ✓

16. a) How is an ammeter connected into a circuit?

series

b) How much internal resistance does an ideal ammeter have?

none

c) How is a voltmeter connected into a circuit?

parallel

d) How much internal resistance does an ideal voltmeter have?

infinite

17. What are some common uses of variable resistors?

volume knob, light dimmer

18. A kilowatt-hour is a unit of : power energy current voltage resistance time

Quantity	Variable	Unit Name	Unit Symbol	Formulas
Resistance	R	OHm	$\{\Omega\}$	$R = V/I$
Potential Difference	V or \mathcal{E}	(potential drop, voltage) <u>volt</u> (E.M.F.)	$[V]$ $[J/C]$	$V = IR$ $V = \frac{E}{q}$
Charge	q or Q	coulomb	$[C]$	
Current	I	Ampere	$[A]$ $[C/s]$	$I = \frac{\Delta Q}{\Delta t}$
Energy	E or W	J Joule	$[J]$	$E = P \cdot t = V \cdot C$
Power	P	Watt	$[W]$ $[J/s]$	$P = IV = I^2 R = \frac{V^2}{R}$
Resistivity	ρ	ohm-meter	$[\Omega \cdot m]$	$R = \rho L/A$
Length	L	meter	$[m]$	↓
Cross-sectional Area	A	meter sgr.	$[m^2]$	