Example Questions for Quiz 5 – Solutions
Chapter 7, Sections 7.4-7.6 and Chapters 8

Here are some questions that are similar to what will be on Quiz 5.
The quiz will have a total of 20 points selected from these possibilities.
You may use your equation and symbol sheets as well as your Periodic Table of Elements.

In the photoelectric effect, light of a particular frequency *f* is sent at a metal plate inside of an evacuated chamber and electrons are sometimes emitted from the plate. When they are, their energy is measured. Circle the letter of the correct completion of each of the following sentences:

Fill in the blanks in the following paragraph using words chosen from the following list:
electron, **electrons**, **photon**, **photons**, **frequency**, **proportional**, **inversely proportional**

1. (9 points) Einstein's explanation of the photoelectric effect was that light came in chunks called **_photons__**, each with an energy **__proportional__** to the light **__frequency__**, and that the number of electrons was equal to the number of **__photons___**. Greater light intensity simply meant that there were more **__photons__** and therefore more **__electrons__** were emitted. The electron energies were given by the **__photon__** energies minus an energy required to escape from the metal. That escape energy varied depending on the metal and its surface details and caused there to be a threshold light **__frequency__** below which no **__electrons__** were emitted.

2. (2 points) A radio wave is formed by large numbers of very weak, coherent **_photons__** that act together to produce an electric field strong enough to move the electrons in an antenna.

3. (2 points) Einstein's Special Theory of Relativity is based on the postulates that the measured speed of **___light___** and the end result of (**all**, ~~electromagnetic~~, ~~mechanical~~) physics experiments do not depend on the speed of a passing observer.

4. (4 points) Einstein's Special Theory of Relativity concludes that **___time___** and **__length__** measurements give different values for observers moving at different speeds.

5. (4 points) Einstein's General Theory of Relativity concludes that mass causes space to distort in a way that explains **__gravity__** and predicts the existence of **__black___** **___hole___** objects in the universe.

6. (1 points) The Global Positioning System depends on the predictions of both Einstein's Special and General Theories of Relativity being correct. (**true**, ~~false~~)

7. (2 points) A typical atom has a size of about
(~~2 μm, 200 nm, 20 nm, 2 nm~~, **200 pm**, ~~20 pm, 2 pm, 200 fm, 20 fm, 2 fm~~) Circle one.

8. (2 points) A typical atomic nucleus has a size of about
(~~5 μm, 500 nm, 50 nm, 5 nm, 500 pm, 50 pm, 5 pm, 500 fm, 50 fm~~**, 5 fm**) Circle one.

9. (4 points) Atoms are composed of a small **__nucleus__** surrounded by an **__electron__** cloud.

10. (2 points) The percentage of atomic mass from electrons is about

(~~50%, 5%, 0.5%~~, **0.05%**, ~~0.005%~~) Circle one.

11. (4 points) Except for $^{1}_{1}H_{0}$, all nuclei are composed of both **__protons__** which have a positive charge and **_neutrons_** which have no charge.

12. (4 points) Without **_neutrons_**, nuclei with more than one **_proton__** would fly apart.

13. (1 points) All hydrogen atoms have the same mass. (~~true~~, **false**)

14. (4 points) In our Periodic Table of Elements, the number in the upper-left corner of each element block is called the **_atomic_ _number_** of the element and equals the number of **__protons/electrons__** in the atom.

15. (2 points) In our Periodic Table of Elements, the number just below name of the element is the average **_atomic__ __weight__** of that element as found in nature.

16. (2 points) The "Period" number shown at the left of each row in our Periodic Table of Elements, is the number of the outermost energy **__shell__** for the elements in that row.

17. (1 points) The elements in a particular (**column**, ~~row~~) of the Periodic Table of Elements have similar chemical properties.

18. (4 points) The elements in the right-most column of the periodic table have **_filled/full/complete_** outermost shells and are called the **__noble__** gases.

19. (1 points) The elements in column 17 of the Periodic Table of Elements are called the halogens and are highly reactive because they want to (**take**, ~~give~~) an electron in a chemical reaction.

20. (1 points) The elements in column 1 of the Periodic Table of Elements are called the alkali metals and are highly reactive because they want to (~~take~~, **give**) an electron in a chemical reaction.

21. (2 points) Metal elements tend to be closer to the (**lower-left**, ~~upper-left, lower-right, upper right~~) parts of the Periodic Table of Elements.

22. (2 points) Insulators tend to be closer to the (~~lower-left, upper-left, lower-right~~, **upper right**) parts of the Periodic Table of Elements.

23. (2 points) The element **__silicon___** is the basis for most semiconductor devices.

24. (2 points) The element **__carbon__** is the basis for all life on the earth.

25. (1 points) There are only 114 elements shown in our Periodic Table of Elements, but astronomers have found others when searching the universe. (~~true~~, **false**)

26. (2 point) The atomic number of sodium shown in our Periodic Table of Elements is ___**11**____.

27. (2 point) The atomic weight of sodium shown in our Periodic Table of Elements is _**22.989770**_.

28. (2 point) Using our Periodic Table of Elements, write the name of a radioactive element __**radon**/**radium/uranium/**__.

29. (4 points) A neutral atom has the same number of __**protons**__ as _**electrons**_.

30. (1 points) A positive ion of an atom has one (~~more~~, **fewer**) electrons than the neutral atom.

31. (1 points) A negative ion of an atom has one (**more**, ~~fewer~~) electrons than the neutral atom.