Physics 1C Spring 2010
Quiz3A
Name_____
h= 6.6x10^{-34} Js, m$_e$ =9.1x10^{-31} kg, e = 1.6x10^{-19} C, c=3.00x10^8 m/s, eV = 1.6x10^{-19} J,

Rhydberg constant = 1.097x10^7 m^{-1}

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) In an x-ray source, electrons accelerated through a potential of 3000 V are incident on a metal   1) _____
   surface. The shortest wavelength x-ray emitted by the source has a wavelength of _____.
   A) 0.93 nm   B) 0.075 nm   C) 0.41 nm   D) 0.62 nm

2) A laser light beam with an wavelength of 450 nm is used to kill a mosquito. If the energy needed   2) _____
   to do this is 0.20 J how many photons are necessary.
   A) 3x10^{15} B) 5x10^{17} C) 2x10^{10} D) 8x10^{20}

3) You are designing a semiconductor diode laser with a short wavelength to read more information   3) _____
   from a dvd. To do this you need a semiconductor with _____,
   A) a small band gap   B) a large size
   C) a small size   D) a large band gap.

4) An electron in an atom that is in the n=3 state can be in _____ states with different   4) _____
   quantum numbers.
   A) 28   B) 18   C) 6   D) 10

5) In an p-type semiconductor impurity atoms are added to introduce _____ charge carriers in   5) _____
   the _____ band.
   A) positive, conduction   B) positive, valence
   C) negative, valence   D) negative, conduction

6) Electrons in an electron microscope are accelerated across a voltage V so that their de Broglie   6) _____
   wavelength is equal to 0.03 nm. What is the value of V.
   A) 560 V   B) 850 V   C) 3200 V   D) 1700 V

7) In the emmission spectrum of the hydrogen atom the wavelength of the highest energy transition   7) _____
   ending up in the n=3 state is _____.
   A) 580 nm   B) 960 nm   C) 820 nm   D) 1250 nm

8) The energy of a photon of visible light is closest to _____.   8) _____
   A) 10^6 eV   B) 10^{-3} eV   C) 1 eV   D) 10^3 eV

9) The spectrum of blackbody radiation has the following properties. The total intensity _____   9) _____
   with temperature and the peak wavelength _____ with temperature.
   A) decreases, increases   B) increases, increases
   C) decreases, decreases   D) increases, decreases

10) A metal with a work function of 3.0 eV is illuminated with light having a wavelength of 200 nm.   10) _____
    The maximum kinetic energy of the photo-electrons produced is _____.
    A) 3.2 eV   B) 5.4 eV   C) 6.2 eV   D) 1.7 eV

1) C
2) B
3) D
4) B
5) B
6) D
7) C
8) C
9) D
10) A