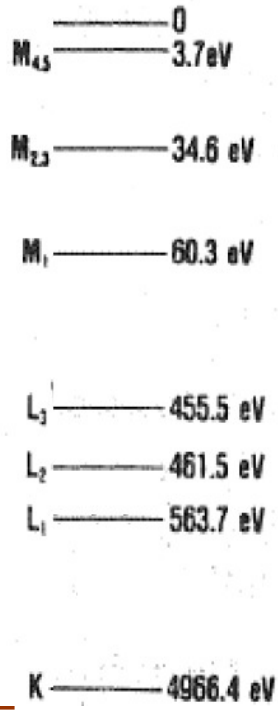
MASE 6402- MME 4501 –Physics Part- Exam Fall 2010 NAME_____

Problem 1 (10 points). Select True or false

1. Auger electrons cannot be produced in XPS measurements . . . . T_ F_
2. Photoelectrons cannot be produced in XRF measurements . . . . T_ F_
3. X-ray fluorescence cannot be produced in XPS measurements . . . . T_ F_
4. Auger emission can only be achieved in ultra high vacuum . . . . T_ F_
5. dN(E)/dE is used to study XPS spectra. . . . . T_ F_
6. Sample charging in never a problem in XPS. . . . . T_ F_
7. Elements with high atomic number (>50) most often produce KLL Auger electrons. . T_ F_
8. The background of XRF is composed mostly of secondary electrons. . . . T_ F_
9. The kinetic energy of Auger electrons depends on the energy of the electron beam. . T_ F_
10. Electron beams used in AES typically have energies between 1 and 2 keV. . . T_ F_

Problem 2 (10 points). An atom of titanium undergoes an Auger process when hit by an external electron of kinetic energy of 5030 eV. Describe a possible sequence of steps of the Auger process including the kinetic energies of all emitted particles and of all energy level transitions.



Problem 3 (10 points). The diagram shows the number of electrons as a function of their kinetic energy obtained in an XPS measurement of Pd metal performed with Mg Kα X-rays of energy 1253.6 eV. Neglecting any work function of the spectrometer, what can you say about the binding energies of the three major peaks shown?