Chem 4434 Exam 1 (100 points)

This is a closed book exam
Good luck!!!

1. How many radial nodes in 2p and 3p orbitals? (5 points)

2. Using Cartesian (x, y, z) system of coordinates sketch p_x and d_{z2} atomic orbitals. (5 points)

3. Why first ionization energy for fluorine atom (1681 kJ/mol) is larger than first ionization energy for lithium atom (513 kJ/mol)? (5 points)

4. Give the Lewis structures, find coordination and steric numbers, and using VSERP model predict the shape of the following molecules (is present, indicated the formal charge for the atoms): XeF_4, CH_4, CO_2, PCl_6^- (24 points)

5. Give the molecular orbital diagram and determine the bond order for the following molecules: NO, C_2 (30 points)

6. What is the total number of σ and π bonds in C_2H_4 molecule? (6 points)

7. What is the difference between monoclinic and triclinic crystal systems? (5 points)

8. Provide fractional coordinates diagram for face-centered cubic cell. (5 points)

9. Describe how the conductivity in **metallic conductor** will change with increase of the temperature. (5 points)

10. Explain briefly the conductivity mechanism in intrinsic semiconductor. (10 points)