**PHY 301: QUANTUM MECHANICS I (40 Marks)**

1. Discuss how Neil Bohr tried to explain why atoms don’t collapse into the nucleus of the atom **(3 Marks)**
2. Describe black body radiation. **(2 Marks)**
3. Give a reason why Compton shift is not observed for visible light **(2 Marks)**
4. With a reason, mention which orbital has a higher ionization energy; one with n=3 or n=2? **(2 Marks)**
5. Suppose that all you know about a certain electron is that its principal quantum number is 3. Find the possible values for the other four quantum numbers **(6 Marks)**
6. Five transparent plastic containers below were filled with different water colors of paint. The volume each is 50 ml. The temperature of the water is 20° C. They are all then placed in the sunlight for 15 minutes. The temperature is then retaken for each container.

Clear White Black Red Yellow

Required:

Answer the following question based on the experiment above.

1. Arrange the containers in order from the warmest to the coolest based on your understanding of the interaction of sunlight and the containers. **(2 Marks)**
2. Using the terms, reflect, absorb, and transmit explain why you arranged the containers in the way you did. **(8 Marks)**
3. Draw a well labelled diagram of a Photocell used to study Photoelectric Effect **(5 Marks)**
4. Give five evidences that can be drawn from the photoelectric effect experiment about the behavior of light **(5 Marks)**
5. In reference to canonically conjugate pairs, state the principle of Heisenberg uncertainty. **(5 Marks)**