EASTERN UNIVERSITY, SRI LANKA

FIRST SEMESTER FIRST EXAMINATION IN SCIENCE

2009/2010 (JUNE – JULY 2011)

CH 101: PERIODICITY AND BONDING
(Proper & Repeat)

Answer all questions

Time Allowed: One hour

Plank's constant (h)=6.63x10^{-34} Js, Velocity of light (C) = 3x10^{8} ms^{-1}, m_e= 9.11 x 10^{-31} kg
ε_0= 8.854 x 10^{12} C^{2}N^{2}m^{-2}, e = 1.602 x 10^{-19} c

1. a. What is Planck's quantum theory?

(30 marks)

b. Derive an equation for the Bohr radius of the hydrogen atom. Calculate its radius.

(30 marks)

c. Calculate the energy of the states of the hydrogen atom with n= 3 and n=4. Calculate the wave length of a photon emitted by the atom when an electron makes a transition between these states.

(40 marks)

2. a. Draw the molecular orbital diagram for O_2 and CO molecules and determine the following properties of these two molecules.
   i) Molecular orbital configurations
   ii) Bond order
   iii) Magnetic character

(30 marks)

b. Predict the shapes of the following molecules using VSEPR theory.
   i) CCl_4 ii) PCl_5

(20 marks)

Contd.

c. Explain the following with an example in each case.

i) Quantum numbers

ii) Pauli exclusion principle

(40 marks)

d. What are the orbitals associated with the principal quantum number $n = 3$?

(10 marks)
