



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) = 6.63×10^{-34} Js, Velocity of light (C) = 3×10^8 ms⁻¹, $m_e = 9.11 \times 10^{-31}$ kg
 $\epsilon_0 = 8.854 \times 10^{-12}$ C²N²m⁻², $e = 1.602 \times 10^{-19}$ 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 O₂ 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) CCl₄
 - ii) PCl₅(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)
