EASTERN UNIVERSITY, SRI LANKA
FIRST EXAMINATION IN SCIENCE (PROPER) – 2004/2005 (JUNE 2008)
FIRST SEMESTER – EXTERNAL DEGREE
EXTCH 101 PERIODICITY AND BONDING

Time: 01 hour

Planks constant 6.6262×10^{-34} Js, mass of electron 9.1091×10^{-31} kg, charge of electron 1.602×10^{-19} C, permitivity of vacuum 8.854×10^{-12} $kg^{-1}m^{-3}A^2$

1) a) Briefly explain the following
   i) Hybridization (using sp hybridization as an example)
   ii) Hydrogen bond

(40 marks)

b) i) Write down the expression for the radius of an orbit and identify all the terms in it.

(05 marks)

ii) Calculate the radius of the second Bohr orbital for hydrogen.

(10 marks)

iii) Use this radius to calculate the velocity of an electron in this orbit

(15 marks)

c) Draw the Born-Haber cycle for the formation of an ionic compound MX_2, where M = alkali earth metal and X= halogen
Hence write down an expression for the heat of formation of MX_2 in terms of other energy levels.

(30 marks)

2) a) State
   i) Hess law
   ii) Heisenberg uncertainty principle

(30 marks)

b) Draw the molecular orbital energy level diagram for NO and show that it is paramagnetic.

(26 marks)

c) i) What do you understand by Valence Shell Electron Pair Repulsion (VSEPR) theory?

(8 marks)

ii) Predict the shape of the following molecules using Valence Shell Electron Pair Repulsion theory.

I) BO_3^- II) I_3^- III) XeO_2F_2

(36 marks)

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