

EASTERN UNIVERSITY, SRI LANKA
DEPARTMENT OF CHEMISTRY
FIRST SEMESTER EXAMINATION IN SCIENCE 2002/2003
FIRST SEMESTER - 2004 (PROPER)
EXCH101 PERIODICITY AND BONDING
EXTERNAL DEGREE



Answer all Questions

Time : 1 Hour

01) (Planck's const. = $6.6 \times 10^{-34} \text{ Js}$; $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$; Velocity of light = $3 \times 10^8 \text{ ms}^{-1}$;
Mass of electron = 9.1×10^{-31} ; Rydberg const. $R_H = 2.18 \times 10^{18} \text{ J}$)

- a) (i) What is the range of wave length in which visible region exist?
(ii) The wave length of the green light from a signal is 580nm. What is the frequency of this radiation?
- b) The work function of sodium is 2.5eV.
(i) In photo electric experiment, what condition must be satisfied to produce the photo-electrons?
(ii) Calculate the threshold frequency.
(iii) Calculate the maximum velocity of the photo-electrons produced when sodium is illuminated by the light of wave length $6 \times 10^{-8} \text{ m}$.
- c) (i) Write the expression for the energy of the Hydrogen atom.
(ii) Hence calculate the wave length of light that correspond s to the transition of the electron from the $n=4$ to $n=2$ state of the Hydrogen atom. Is the light absorbed or emitted?

- 02) a) State
(i) Pauli's exclusion principle
(ii) Hund's rule

b) Showing the x,y,z axes, draw the following orbitals

- (i) P_z
(ii) $d_{x^2-y^2}$
(iii) d_{xy}

c) Write the electronic configuration of oxygen atom (atomic number = 8). Give the quantum numbers n, l, m_l, m_s for each of the unpaired electrons in an oxygen atom.

d) Write down the molecular orbital electronic configuration of O_2^{2-} and NO.
In each case
(i) Calculate the bond order
(ii) Predict the magnetism.
