



Eastern University, Sri Lanka

External Degree

Third year Second semester Examination in Science - 2004/2005

January/ March 2011

EXTCH 304 Quantum Chemistry, Industrial Chemistry and Metallurgy

Answer all questions

Time: 01 Hour

- 1) (a) (i) What is the concept of particle in a one dimensional box? (10 marks)
- (ii) What is Schrödinger wave equation in such case? (05 marks)
- (iii) How can this equation be solved for ψ and E ? (20 marks)
- (iv) Calculate the expected ground state energy of a Hydrogen atom electron assumed to be present in a three dimensional cubical box of length 0.1 nm if the ground state energy of the electron in a one dimensional box of length 0.3 nm is 4 eV. (30 marks)
- (b) The molecules $H_2C = CH - (CH = CH)_3 - CH = CH_2$ can be considered as successively longer one - dimensional box for electrons. If it is assume each $C - C$ and $C = C$ bond lengths to be 1.5 \AA and the end $C - H$ bond are neglected, what is the wavelength of absorption of the lowest transition? (35 marks)
2. (a) Outline the raw materials used in the production of Portland cement and discuss the dry process of manufacture of Portland cement indicating the important steps. (60 Marks)
- (b) Briefly describe the glass forming process. (40 Marks)