



Eastern University, Sri Lanka

External Degree

Third year Second semester Examination in Science (Repeat) - 2016

April/ May 2016

EXTCH 304 Quantum Chemistry, Industrial Chemistry and Metallurgy

Answer all questions

Time: 01 Hour

- 1) (a) (i) Write the general expression for a particle of mass 'm' moving in a cubical box of length 'a' and identify all the terms in it.
- (ii) Find the energy of an electron in a rectangular box of dimensions 1×10^{-13} cm, 1.5×10^{-13} cm and 2×10^{-13} cm. (30 marks)
- (b) The wave function ' ψ ' of the particle is given by $\left(\frac{2}{a}\right)^{1/2} \sin\left(\frac{\pi x}{a}\right)$. Determine the probability of the particle which restricted to move in a one - dimensional box of length 'a' is found to be the distance between 0 and $a/2$. (35 marks)
- (c) 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)
