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B.Sc. Engg. CSE 2nd Semester

09 August 2018 (Morning)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **SUMMER SEMESTER, 2017-2018**

DURATION: 1 Hour 30 Minutes **FULL MARKS: 75**

Chem 4241: Chemistry

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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1. a) Derive the integrated rate equation for a second order reaction $2A \rightarrow P$ and prove that the half life for a second order reaction. 7+3

   b) The data of a second order reaction is plotted $1/[A]_t$ against time and the plot is a straight line with a positive slope. If the intercept is $3x10^{3}mol^{-1}lit$ and the slope is $2x10^{-2}mol^{-1}lit.sec^{-1}$, calculate the initial concentration and half-life of the reaction. 8

   c) Discuss any two methods for the determination of order of a reaction. 7

2. a) Define and classify solution. Name the units of concentration and define Molarity (M) and Normality (N) with example. 2+2+5

   b) What is critical solution temperature (CST)? Draw and explain the CST diagram for the Phenol-water system. What is the application of this diagram? 2+6

   c) 20gm NaCl is dissolved in 100ml water. Find out the molarity(M) and molality(m) of the solution. The density of the solution = 1.06gm/cc. 8

3. a) Write Henry's law and show the effect of temperature and pressure on the dissolution of gases in liquid. 8

   b) Show through mathematical derivation that the solubility of solids in liquids is generally endothermic in nature and that the curve of solubility against temperature is exponential. 8

   c) Define osmosis, osmotic pressure and reverse osmosis. Mention their uses. State Vant Hoff laws of osmotic pressure and deduce an equation to establish the relationship between molecular weight of a solute and osmotic pressure. 9

4. a) Define energy of activation (Ea) and show its application through diagram. 6

   b) The relationship between temperature and the rate constant (k) is exponential. Prove this statement through derivation of an equation. Give application of this equation. 12

   c) Define vapour pressure above a liquid and also the boiling point of a liquid. What is the characteristic of an ideal solution? State Raoult's law. 7