University of Calcutta
The Bhawanipur Education Society College
Online B.Sc. Practical Examination -2021 (Under CBCS system)
Subject-CEMA SEM-IV, Paper-CC-9P

Full Marks -30   **Time – 2 hours**

[Use A4 page for writing answers. Write Roll number and Registration number in each page and Submit the scanned practical answer scripts for paper CC9P in Google Form link https://forms.gle/ftM3HdeLFaz6agwm8]

The figures in the margin indicate full marks.

All calculations can be done using calculator.

Experiment: Kinetic study of inversion of cane sugar using a Polarimeter

1. Write down the theory covering the following points-
    (a) Inversion of optical rotation for sucrose on hydrolysis.
    (b) Order of the reaction in the given experimental condition. Nature of catalyst and dependence of rate constant on the catalyst concentration.
    (c) Deduction of working formula starting from the basic integrated rate equation, with explanation of the terms that appear.   8

2. The following angle of rotation data were measured at different time for the above experiment using 30% (w/v) cane sugar solution and HCl solution at 30^0C.

Set-I		Set-II	
Time(min)	**Angle of rotation (θ)**	**Time(min)**	**Angle of rotation (θ)**
1:22	17	3:30	17
3:40	16.28	10:45	16.57
5:35	16.08	15:18	16.24
7:41	15.54	19:15	15.67
10:10	14.9	24:45	15.33
13:21	14.04	29:41	14.75
15:05	13.56	-	-
17:15	12.82	-	-
20:45	11.66	-	-
23:48	11.01	-	-

Given: θ_∞ = - 4.8 (for both the sets)

(a) Make proper table using above data and calculate required data for both the sets.   8

(b) Using the following least square equation for slope calculate the rate constants of the reaction for both of set-I and set-II :

$$\text{Slope } (m) = \frac{(\Sigma_i(x_i - x_{avg}) * (y_i - y_{avg}))}{(\Sigma_i(x_i - x_{avg})^2}$$

(Consider 10 data points for set-I and 6 data points for set-II including (0, 0) point to calculate the slopes.)

x_{avg} is the average of 10 x-values (Δt (sec)) for set-I and 6 x values (Δt (sec)) for set-II

y_{avg} is the average of 10 y-values [$\log((\theta_1 - \theta_\infty)/(\theta_n - \theta_\infty))$] for set-I and 6 y values [$\log((\theta_1 - \theta_\infty)/(\theta_n - \theta_\infty))$] for set-II.

(c) Calculate the ratio of the rate constants of the two sets.   14

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