Sardar Vallabhbhai National Institute of Technology, Surat
Mid-Exam-2025 (B. Tech IIIrd year, Vth Sem)
Department of Chemical Engineering
SUBJECT: DATA SCIENCE FOR CHEMICAL ENGINEERS (CH 374)

Roll No.   **Max. Marks: 30**

NOTE: Solve Any Three Questions

Q. 1: Write Short Notes on **1.** Computational Fluid Dynamics (CFD); **2.** Life Cycle Assessment (LCA)   **(10)**

Q. 2: A straight, uniform fin of length L=0.1 m is attached to a heated surface at temperature T_b=373 K. The fin is exposed to ambient air at T_∞=293 K and loses heat by convection along its surface.

The governing steady-state temperature distribution in the fin is: $\frac{d^2T}{dx^2} - m^2(T - T_\infty) = 0$

where: $m = \sqrt{\frac{hP}{kA}}$ **Analytical Solution:** $\theta(x) = \frac{\cosh(m(L-x))}{\cosh(mL)}$ $\theta(x) = \frac{T(x)-T_\infty}{T_b-T_\infty}$

Convection coefficient (h)=100 W/m^{2}K; Cross-sectional area (A)=1×10^{-4} m^2; perimeter (P) = 0.02 m; Thermal conductivity of two materials: (k_1) = 200 W/m.K, (k_2) = 400 W/m.K

Write a **Python program** to **compute and plot** temperature profiles T(x) along the fin for both materials with labels, legend and two curves showing temperature distribution for both the material.   **(10)**

Q. 3: Explain in detail: Solution of Boundary Value Problems of 2nd order ordinary differential equation using SCILAB & Python   **(10)**

Q 4: Develop and Explain Algorithm for Newton Forward/Backward & Langrange's Method of interpolation in SCILAB   **(10)**

Sardar Vallabhbhai National Institute of Technology, Surat

Mid-Exam-2025 (B. Tech IInd year, IIIrd Sem)

Department of Chemical Engineering
SUBJECT: INTRODUCTION TO MACROMOLECULES (CH 252)

Roll No.   **Max. Marks: 30**

NOTE: Solve Any Three Questions

Q 1: Explain in detail: Step Growth polymerization & Chain Growth polymerization   **(10)**
Q 2: Explain in detail: Visco-elasticity and its models & Significance   **(10)**
Q 3: Explain in detail: Atomic Force Microscopy (AFM) & Dynamic Light Scattering Equipment (DLS)   **(10)**
Q 4: Explain in detail: Flory-Huggins Theory   **(10)**