# **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 Tb=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:

where: **Analytical Solution:**

Convection coefficient (h)=100 W/m2K; Cross-sectional area (A)=1×10−4 m2;perimeter (P) = 0.02 m; Thermal conductivity of two materials: (k1) = 200 W/m.K, (k2) = 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)**

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**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)**

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