Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, May 2025

Programme Name: M. Tech (Chemical) **Semester : II**
Course Name : Multiphase Flow **Time : 03 hrs**
Course Code : CHPD7026P **Max. Marks : 100**
Nos. of page(s) : 1
Instructions: *The question paper consists of three sections. Answer all the questions.*
Note: ***Assume suitable data wherever necessary***

Section – A (Answer all questions)

S. No.		Marks	CO
1.	Describe the various types of multiphase flows typically found in engineering applications and explain the key differences between multiphase and single-phase flow.	**5**	**CO2**
2.	List out different models to analyze the two-phase flow.	**5**	**CO1**
3.	Briefly describe the major steps involved in a CFD simulation process	**5**	**CO1**
4.	Explain volume of fluid model.	**5**	**CO2**
	Section – B (Answer all questions)		
5.	Explain hybrid differencing scheme.	**10**	**CO2**
6.	Discuss in detail the various flow patterns encountered in a gas-liquid two phase flow through horizontal and vertical pipelines.	**10**	**CO1**
7.	Explain the physical significance of the drift flux model in two-phase flow and how does it differ from the homogeneous flow model. Derive equations for the model.	**10**	**CO4**
8.	Derive the first order accurate forward difference, backward finite difference and second order central difference approximation for the second derivative with respect 'X' using Taylor's series expansion.	**10**	**CO3**
	Section – C (Answer all questions)		
9.	Consider the problem of source-free heat conduction in an insulated rod whose ends are maintained at constant temperatures of 100 ^{o}C and 500 ^{o}C. Calculate the steady state temperature distribution in the rod with k=1000 W/mK, Cross-sectional area = 10×10^{-3} m^2 and length = 0.5m.	**20**	**CO3**
10.	Analyze Eulerian – Eulerian model and Eulerian – Lagrangian model for multiphase flow.	**20**	**CO5**