

Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VII EXAMINATION – WINTER 2025

Subject Code:3170109

Date:20-11-2025

Subject Name:Advance Computational Fluid Dynamics

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

| | | MARKS |
|-----|--|-------|
| Q.1 | (a) Define CFD? Why it is widely used as a research tool now days? | 03 |
| | (b) Explain the steps for CFD Pre-processing and Post Processing. | 04 |
| | (c) Derive an energy equation in non-conservation form. | 07 |
| Q.2 | (a) Difference between Structured and Unstructured grid. | 03 |
| | (b) Define Multi block structured grid generation. | 04 |
| | (c) Write a note on Experimental, Theoretical and Numerical approach in CFD. | 07 |
| | OR | |
| | (c) Difference between FVM, FDM and FEM. | 07 |
| Q.3 | (a) Explain adaptive grid. | 03 |
| | (b) Explain algebraic methods in grid formation. | 04 |
| | (c) Explain in detail about Elliptic, Parabolic and Hyperbolic partial differential equations. | 07 |
| | OR | |
| Q.3 | (a) Explain inlet and outlet boundary condition. | 03 |
| | (b) Explain in brief about Bowyer Algorithm. | 04 |
| | (c) Explain Delalunay triangulation method for unstructured grid generation. | 07 |
| Q.4 | (a) Write a short note on important features of Turbulent flow. | 03 |
| | (b) Explain Dirichlet boundary condition with suitable example. | 04 |
| | (c) Explain in detail about the different boundary conditions applied to fluid flow domain. | 07 |
| | OR | |
| Q.4 | (a) What do you mean by Mixing length model? | 03 |
| | (b) Explain in brief Homogeneous turbulence and isotropic turbulence. | 04 |
| | (c) Explain K- ϵ model and RANS model. | 07 |
| Q.5 | (a) Write a note on the turbulence flow modeling. | 03 |
| | (b) Differentiate between explicit and implicit approach. | 04 |
| | (c) What is the step wise procedure for solving pressure based CFD problem? | 07 |
| | OR | |
| Q.5 | (a) How does CFD code works? | 03 |
| | (b) Explain importance of Eddy viscosity model. | 04 |
| | (c) Derive vorticity transport equation. | 07 |
