COMPUTATIONAL FLUID DYNAMICS (Minor)

Module I:
Governing equations of fluid flow. Finite difference, finite volume, and finite element methods. Laplace equation. Diffusion equation or Wave Equation. Application of finite volume method to fluid flow problems.

Module II:
Pressure correction techniques: Gauss Siedel and Gauss Jordan. Introduction to multigridmethods. Boundary conditions, Structured and unstructured mesh. Introduction to CAD systems and different standards used for DATA exchange.

Module III:
Governing equations for turbulent flow, Rotating machinery, Combusting flow, Multiphase flow. Simple internal flows:T-Junction, Driven Cavity, Manifold, and Valves. External Flows: Flow over Ahmed Body, Car-Reacting Flow in a Gas Burner, and Multiphase Flow in an Air Lift Reactor.

Reference Books:
1. *An Introduction to Computational Fluid Dynamics: The Finite Volume Method, 2nd ed. by H Versteeg and W Malalasekra, Pearson.*
2. *Computational Fluid Dynamics: The Basics with Applications, J D Anderson, McGraw-Hill.*
3. *Fundamentals of Computational Fluid Dynamics, T K Sengupta, University Press.*
4. *Introduction to Computational Fluid Dynamics, P Niyogi, S K Chakrabratty, and M K Laha, Pearson.*