HONOR SUBJECT

PME7D011 COMPUTATIONAL FLUID DYNAMICS 4-0-0

MODULE-I (10 HRS.)

1. Basics of Computational Fluid Dynamics (CFD)- Introduction to One dimensional computation: Finite difference methods (FDM)-Finite element method(FEM)-Finite volume method(FVM). Solution of Discretised Equations:
2. The tri-diagonal matrix algorithm (Thomas Algorithm for one dimensional case) The Finite Volume Method for Diffusion Problems-Introduction -Finite volume method for one-dimensional steady state diffusion -Worked examples: one-dimensional steady state diffusion

MODULE-II (12 HRS.)

1. The Finite Volume Method for Convection-Diffusion Problems – Introduction - Steady one-dimensional convection and diffusion –
2. The central differencing scheme - Assessment of the central differencing scheme for convection-diffusion problems - The upwind differencing scheme - Assessment of the upwind differencing scheme - The hybrid differencing scheme - Assessment of the hybrid differencing scheme - The power-law scheme - Higher order differencing schemes for convection-diffusion problems - Quadratic upwind differencing scheme: the QUICK scheme.

MODULE-III (08 HRS.)

1. The Finite Volume Method for Unsteady Flows - Introduction - One-dimensional unsteady heat conduction - Explicit scheme - Crank-Nicolson scheme - The fully implicit scheme - Illustrative examples

MODULE-IV (08 HRS)

1. Implicit method for two- and three-dimensional problems - Discretisation of transient convection-diffusion equation - Worked example of transient convection-diffusion using QUICK differencing.

TEXT BOOK

1. Versteeg, H. K. , Malalasekera W , An Introduction to Computational Fluid Dynamics-The Finite Volume Method, Longman Scientific & Technical.
2. Patenkar V. Subas, Numerical Heat Transfer & Fluid Flow, Taylor & Francis
3. Muralidhar, K. and Sundararajan, T., Computational Fluid Flow and Heat Transfer, Norosa Publishing House, N. Delhi.

REFERENCE BOOKS

1. Ozisik, M. N. , Finite Difference Method, CRC Press.
2. Anderson, D. A. Jr, Computational Fluid Mechanics and Heat Transfer, McGraw-Hill