

Code No: **RT41212****R13****Set No. 1****IV B.Tech I Semester Supplementary Examinations, February - 2019****COMPUTATIONAL FLUID DYNAMICS****(Common to Aeronautical Engineering and Automobile Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any THREE questions from Part-B************PART-A (22 Marks)**

1. a) Explain physical modeling defects. [3]
- b) Write the complete Navier-Stokes equations in conservation form. [4]
- c) What process causes viscosity? [4]
- d) What is a boundary layer? [4]
- e) What is the necessity of strong and weak formulations in boundary value problems? [4]
- f) List out differences between finite volume and finite difference methods. [3]

PART-B (3x16 = 48 Marks)

2. a) Enumerate the methods to evaluate matrix inverse for the solution of simultaneous algebraic equations? Distinguish between them. [8]
- b) Explain the term consistency in numerical schemes and in detail explain the behavior of errors and analyze them. [8]
3. a) Write the governing equations used in CFD in generic form. [8]
- b) Explain the direct method for matrix inverse? Briefly explain partial pivoting used in direct method. [8]
4. Define Vorticity. How the pressure gradient term is eliminated from the momentum equations using Vorticity – Stream Function method? What are the disadvantages of this method in determination flow field? [16]
5. a) Explain explicit Lax-Wendroff scheme of time dependent methods. [8]
- b) Write the discretization equation for finite differences. [8]
6. a) Explain the both Steady Boundary Layer Flows and Parabolized Viscous Flows. [8]
- b) Derive the parabolic equation for unsteady thermal conduction. [8]
7. Discuss the properties of discretization schemes and explain upwind discretization applied to FVM. [16]