

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER 2013****Subject Code: 150104****Date: 20-05-2013****Subject Name: Computational Fluid Dynamics I****Time: 10:30 pm 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.

- Q.1** (a) Discuss the classification of quasilinear partial differential equations. **07**
(b) Discuss the eigen value method. **07**

- Q.2** (a) Explain in brief the momentum equation. **07**
(b) Discuss the model of an infinitesimally small fluid element moving with the flow. **07**

OR

- (b) Discuss the impact on physical and computational fluid dynamics for hyperbolic equation. **07**

- Q.3** (a) Briefly discuss shock capturing methods. **07**
(b) Define adiabatic wall temperature. Also explain physical boundary conditions for a viscous flow. **07**

OR

- Q.3** (a) Explain mathematical formulation of finite differences. **07**
(b) Discuss the concept of one-sided difference in detail. **07**

- Q.4** (a) Draw and explain the formulation of explicit finite difference module. **07**
(b) Explain discretization error and round off error and discuss its significance in numerical solutions. **07**

OR

- Q.4** (a) Explain Lax Wendroff scheme and explain the concepts of consistency and stability. **07**
(b) Write the basic requirement of computational fluid dynamics. **07**

- Q.5** (a) Discuss the finite volume method for one dimensional steady state equation. **07**
(b) Explain the substantial derivative and partial derivative also describe the relation between the two. **07**

OR

- Q.5** (a) Discuss computational fluid dynamics as a research tool. **07**
(b) Explain the concept of grid generation in detail. **07**
