

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – SUMMER • 2015

Subject Code: 150104**Date: 07/05/2015****Subject Name: Computational Fluid Dynamics - I****Time: 02:30 pm TO 05:00 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) What do you mean by Computational Fluid Dynamics? Give advantages and applications of CFD. **07**
(b) Write and explain different steps involved in CFD process with appropriate example. **07**
- Q.2** (a) Enlist the different methods to classify quasi-linear PDE. Explain Cramer's Rule in detail. **07**
(b) Apply hyperbolic equations method to solve unsteady inviscid flow **07**
- OR**
- (b) Write a short note on physical boundary conditions for viscous and inviscid fluid flow. **07**
- Q.3** (a) Discuss Explicit and Implicit approach for discretization techniques **07**
(b) Define substantial derivative and partial derivative and describe relation between them. **07**
- OR**
- Q.3** (a) Explain finite difference for second order mixed derivative **07**
(b) Explain discretization error and rounding off error and discuss its significance in numerical solution. **07**
- Q.4** (a) Explain in detail Lax-wendroff scheme **07**
(b) Explain Navier Stoke's model to solve CFD problem. **07**
- OR**
- Q.4** (a) Describe Mac Cormack multi step method. **07**
(b) Describe concept of Compressed Grid generation with suitable example **07**
- Q.5** (a) Derive the finite volume method for convection diffusion equation **07**
(b) Draw and Explain the subsonic – supersonic flow through convergent divergent nozzle and also show the variation in properties along the length of nozzle. **07**
- OR**
- Q.5** (a) Explain the Rich Mayer method for numerical approach to solve CFD problem. **07**
(b) Explain the concept of characteristic lines and method of characteristics used to solve flow through nozzle. **07**
