Seat No.: _____ Enrolment No._____

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**

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