Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014

Subject code: 1721005 Date: 23-06-2014

Subject Name: Computational Fluid Dynamics

Time: 02:30 pm - 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)**	How is CFD being used as a research tool, a design tool, and an educational tool in academic fields, such as thermal fluids?	**07**
	(b)	Derive integral form of Navier-Stokes equation.	**07**
Q.2	**(a)**	Write a note ï ñGrid Generation in CFD Analysisò.	**07**
	(b)	Explain Finite Element Philosophy in brief.	**07**
		OR	
	(b)	Explain all types of the finite difference formulations for 1st Order partial derivatives and discuss the consistency, stability and convergence of the finite difference method.	**07**
Q.3	**(a)**	Write a note ï ñIsoperimetric elementsò.	**07**
	(b)	Explain following terms: (1) Convergence, (2) Discretization, (3) Consistency.	**07**
		OR	
Q.3	**(a)**	Explain simple algorithm for viscous incompressible flow.	**07**
	(b)	Derive integral form of Eulerôs equation of motion.	**07**
Q.4	**(a)**	Discuss validation of CFD models.	**07**
	(b)	Explain explicit and implicit finite difference scheme.	**07**
		OR	
Q.4	**(a)**	Write a Short note on approximation and simplification of governing equation.	**07**
	(b)	Discuss the basic rules for Semi Implicit method for Pressure Linked Equation method.	**07**
Q.5	**(a)**	Describe the K-ŮModel of turbulence flow modeling.	**07**
	(b)	Explain various reasons for occurrence of various types of errors found between computational results and experimental results.	**07**
		OR	
Q.5	**(a)**	Derive incompressible viscous flow equations for 2D system using Marker and Cell method .	**07**
	(b)	What is turbulence? Explain need of turbulence model with example.	**07**

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