Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI EXAMINATION – WINTER 2015

Subject Code:160105 Date:10/12/ 2015

Subject Name: Computational Fluid Dynamics-II

Time:2:30pm to 5:00pm 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)**	Why Linearization of the equations required? Explain The Beam and Warming Method.	**07**
	(b)	Consider 1-D unsteady subsonic-supersonic flow through C-D nozzle. Convert the basic equations in conservation form with non-dimensional variables.	**07**
Q.2	**(a)**	Write a short note on Structured and Unstructured mesh. Also list factors affecting the grid.	**07**
	(b)	What is Grid Transformation? Why it is needed? Explain with example.	**07**
		OR	
	(b)	Discuss the setup of Boundary and Initial conditions for pure subsonic flow through C-D nozzle.	**07**
Q.3	**(a)**	Write a short note on Stretched Grids with example.	**07**
	(b)	Write a short note on Boundary Fitted Coordinate systems with example.	**07**
		OR	
Q.3	**(a)**	Derive the flux terms of governing equations for Numerical Solution of Prandtl-Mayer expansion flow field.	**07**
	(b)	Transform the governing equations of Prandtl-Mayer expansion flow field from (x,y) coordinate system to (ξ,η) coordinate system.	**07**
Q.4	**(a)**	Why development of Upwind Scheme was needed? Explain first order upwind scheme in detail.	**07**
	(b)	State disadvantages of 1st Order Upwind Scheme. Explain Flux Vector Splitting	**07**
		OR	
Q.4	**(a)**	Consider general unsteady, three dimensional flow. Develop the Jacobian matrices and their Eigen values by method of Jacobians.	**07**
	(b)	Setup the Normal shock into the divergent section of C-D nozzle by the method of Shock Capturing.	**07**
Q.5	**(a)**	Write a short note on Multidimensional Problem.	**07**
	(b)	Write a short note on High Resolution Schemes.	**07**
		OR	
Q.5	**(a)**	Write a short note on The Godunov Approach with the help of the shock tube problem.	**07**
	(b)	Discuss the initial and boundary conditions for two dimensional unsteady, supersonic, viscous flow over the flat plate.	**07**

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