GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016

Subject Code: 160105   **Date: 24/10/2016**
Subject Name: Computational Fluid Dynamics -II
Time: 10:30 AM 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)**	Why transformation is needed? Obtain equations of first derivative with respect to x,y & t to be transformed into derivatives with respect to ξ, η and τ.	**07**
	(b)	Explain the development of upwind scheme. Explain the same for first order wave equation. Also state the disadvantages of upwind scheme.	**07**
Q.2	**(a)**	Write a short note on beam warming method.	**07**
	(b)	Explain the organization of Navior Stokes equation code for the supersonic viscid flow over the flat plate	**07**
		OR	
	(b)	Draw the flow chart for the main program for the flow over the flat plate.	**07**
Q.3	**(a)**	Discuss the calculation of step size in space and time for flow over flat plate.	**07**
	(b)	Explain Godunov approach.	**07**
		OR	
Q.3	**(a)**	Discuss the causes of development of the upwind method specify the advantages and disadvantages of the schemes.	**07**
	(b)	Explain TVD and flux limiters in brief	**07**
Q.4	**(a)**	Write a short note on Abbet's boundary conditions for the Prandtl Mayer expansion waves.	**07**
	(b)	Get the roots of one dimensional, unsteady inviscid flow using the methods of Jacobians	**07**
		OR	
Q.4	**(a)**	Explain the main transformation and inverse transformation of partial differential equations	**07**
Q.4	**(b)**	Write the generic form for Euler's equation for a steady, two dimensional expansion waves and transform each term of Euler's set in terms of flux terms F_1, F_2, F_3 & F_4	**07**
Q.5	**(a)**	Explain the procedure to apply the shock capturing method in a subsonic, supersonic flow through the convergent divergent nozzle.	**07**
	(b)	Explain in detail applications of CFD solvers.	**07**
		OR	
Q.5	**(a)**	Explain in detail the common boundary conditions applied to the fluid flow problems.	**07**
	(b)	Draw the flow chart for shear stress calculation for a supersonic viscous flow over a flat plate at zero incidences	**07**

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