

GUJARAT TECHNOLOGICAL UNIVERSITY**B E Sem-VI Examination May 2011****Subject code: 160105****Subject Name: Computational Fluid Dynamics-II****Date: 23/05/2011****Time: 10.30 am – 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) Describe the flux vector splitting in general using the concept of linear algebra. **07**

(b) Explain the relation of the shock tube problem to the Godunov approach. **07**

Q.2 (a) Explain the Engquist and Osher's scheme for a scalar conservation law. **07**

(b) Explain in detail the concept of Flux difference splitting. **07**

OR

(b) Describe Osher's approximate Riemann solver. **07**

Q.3 (a) Explain in detail the multidimensional problems. **07**

(b) Explain the High Resolution scheme in detail. **07**

OR

Q.3 (a) Explain the subsonic isentropic nozzle flow. Also define the boundary and initial conditions for the same. **07**

(b) Draw the flow chart for a main program related to the supersonic flow over the flat plate. **07**

Q.4 (a) Get the roots of one dimensional unsteady flow using the method of Jacobians. **07**

(b) Apply the predictor corrector step for the equation $\frac{\partial U}{\partial t} = \frac{\partial F}{\partial x} + \frac{\partial G}{\partial y}$. **07**

OR

Q.4 (a) For a supersonic flow over the flat plate draw and explain the organization chart for structuring a computer code. **07**

(b) Explain the physical problem for the flow over the flat plate and setup the governing equations for the supersonic flow over the flat plate with appropriate flow conditions **07**

Q.5 (a) With a neat sketch derive the expression for the Prandtl Mayer function for an expansion wave. Also specify the assumptions you considered. **07**

(b) Explain the advantages of upwind scheme and the requirement of development of the approach from central schemes. **07**

OR

Q.5 (a) Describe flux splitting for unsteady one dimensional Euler equation. **07**

(b) Explain the Beam Warming approach. **07**
