

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VI • EXAMINATION – SUMMER • 2014**

**Subject Code: 160105****Date: 26-05-2014****Subject Name: Computational Fluid Dynamics II****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) Write a step wise procedure to apply the finite difference equation for the flate plate. **07**  
 (b) Explain the organization of Navior Stokes equation code for the supersonic viscid flow over the flate plate. **07**
- Q.2** (a) Consider a convergent divergent nozzle is having area ratio  $\frac{A_e}{A_t} = 5.95, \frac{p_e}{p_{01}} = 0.6784$  **07**  
 and the normal shock is generated in the divergent section of the nozzle . Calculate the precise location at which the shock occurs, Mach no behind the shock and stagnation pressure ratio behind and before the shock occurs , mach no behind the shock and stagnation pressure ratio behind and before the shock.  
 (b) Differentiate between the expansion and compression shockwaves. Discuss how expansion waves are generated. **07**
- OR
- (b) Explain physical problem for Prandtl Meyer expansion wave. **07**
- Q.3** (a) Explain the concept of lagging coefficient method in the Beam Warming Method. **07**  
 (b) Explain purely subsonic flow through the CD nozzle. Also explain the boundary conditions for the same. **07**
- OR
- Q.3** (a) Explain Approximate factorization in multidimensional problem.. **07**  
 (b) Draw a neat sketch, explain how to set up a problem for flow through nozzle with shock into the divergent section. **07**
- Q.4** (a) Describe in detail the second order upwind scheme. **07**  
 (b) State the various forms of discontinuities and write a note on flux difference splitting. **07**
- OR
- Q.4** (a) Discuss the causes of development of the upwind method specify the advantages and disadvantages of the schemes. **07**  
 (b) Describe the isentropic flow in the absence of the discontinuities. **07**
- Q.5** (a) Write a note on High Resolution scheme. **07**  
 (b) Describe Osher's approximate Riemann solver **07**
- OR
- Q.5** (a) Discuss the concept of flux limiters. **07**  
 (b) Explain the flux vector splitting approach. **07**

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