

Code No: C7610**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.Tech I - Semester Examinations, March/April-2011****MODELING AND SIMULATION OF FLUID FLOWS****(AEROSPACE ENGINEERING)****Time: 3hours****Max. Marks: 60****Answer any five questions****All questions carry equal marks**

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- 1.a) Briefly discuss about mass conservation equation, momentum conservation equation and the energy conservation equation.
- b) Derive the Navier-Stokes equations of a motion for a fluid flow. [12]
- 2.a) Describe about boundary layer approximations including separation of boundary layer.
- b) Write a short note on various flow models. [12]
- 3.a) Discuss about parabolic and hyperbolic equations in detail.
- b) Differentiate between finite difference formulae and implicit finite difference formulae. [12]
- 4.a) What is meant by finite element method and finite volume method? Explain it.
- b) Discuss about finite element Galerkin method for a conservation law. [12]
- 5.a) Explain in detail about Von Neuman method for stability analysis.
- b) What is the spectral analysis of numerical errors? [12]
- 6.a) Discuss in detail about an advanced addition to the accuracy barrier.
- b) What is meant by monotonicity of numerical schemes? Explain about it. [12]
- 7.a) Briefly discuss about an analysis of the space-discretized systems.
- b) Mention the various iterative methods for the resolution of algebraic systems. Discuss it. [12]
- 8.a) Write a short note on potential flow model.
- b) Briefly explain about finite volume discretization of the Euler equations. [12]

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