Department of Applied Mechanics

AML - 811 Advanced Computational Fluid Dynamics

Date 1/5/08 MAJOR EXAM (Semester II, 2007-2008)

Max Marks 100 Time 2hrs. (3.30Pm - 5.30Pm)

Note: Attempt all Questions

Q1. For TEACHT Computer Programme, Answer the following

(i) Write the General form of differential equation in terms of ϕ and specify 'ϕ' for mass conservation equation (2)

(ii) Write the steps for Control Volume formulation and the Discretized equation for $\frac{d}{dx}\left(k\frac{dT}{dx}\right)+S=0$ (4)

(iii) How is Flux expression modified to break relation between $\phi_p \sim \phi_n$ at the boundary (3)

Q2. For 'FASTEST' Computer Programme, Answer the following

(i) Write the steps of 'SIMPLE' Algorithm (3)

(ii) Pressure and Velocity corrections (7)

Q3. Explain One Way and two way co-ordinate with Examples. (5)

Q4. What are the four Basic rules for Control volume formulation and the guiding principles associated with this formulation (4)+(2)

Q5. Explain the concept of Source term Linearization with the example that $S = 4 - 5T^3$ (7)

Q6. Explain the concept of Over relaxation and Under relaxation (6)

PTO

Q7 What are the Practices followed for locating the control volume faces (4)

Q8. Write the expressions for $\frac{\partial f}{\partial x}$ and $\frac{\partial^2 f}{\partial x^2}$ if function $f(x)$ is available using Taylor Series ~~for~~ expansion for forward difference, Backward difference and central difference. (6)

Q9. List the drawbacks of exponential scheme and explain the Hybrid Scheme (6)

Q10. Write the equation for Turbulence kinetic energy and explain each term (7)

Q11. Discuss the k - ω Model in detail (10)

QUESTIONS 12 to 16 on a separate page.