Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Aerospace Engg.) (2012 Batch) (Sem.–6)

COMPUTATIONAL FLUID DYNAMICS

Subject Code : ASPE-309

M.Code : 72454

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q1 Answer briefly :

a) Parallel Processors

b) Finite Difference

c) Time marching

d) Viscous flow

e) Flux variables

f) Time accurate solution

g) Stretched Grid

h) Boundary fitted Grid

i) Explicit solution

j) Contour plot

SECTION-B

Q2. Explain various terms in the Navier-Stokes equation (Momentum Equation) given below:

$$\frac{\partial(\rho u)}{\partial t}+\nabla.\rho uV=\left[-\frac{\partial p}{\partial x}+\frac{\partial}{\partial x}\tau_{xx}+\frac{\partial}{\partial y}\tau_{yx}+\frac{\partial}{\partial z}\tau_{zx}\right]+\rho f_x$$

$$\frac{\partial(\rho v)}{\partial t}+\nabla.\rho vV=\left[-\frac{\partial p}{\partial y}+\frac{\partial}{\partial x}\tau_{xy}+\frac{\partial}{\partial y}\tau_{yy}+\frac{\partial}{\partial z}\tau_{zy}\right]+\rho f_y$$

$$\frac{\partial(\rho w)}{\partial t}+\nabla.\rho wV=\left[-\frac{\partial p}{\partial z}+\frac{\partial}{\partial x}\tau_{xz}+\frac{\partial}{\partial y}\tau_{yz}+\frac{\partial}{\partial z}\tau_{zz}\right]+\rho f_z$$

Q3. Explain artificial viscosity.

Q4. Explain shock fitting and shock capturing methods

Q5. Explain ADI implicit solution technique.

Q6. Write the generic form of the governing equations and explain various terms involved.

SECTION-C

Q7. Explain the process to set up a numerical solution of an unsteady inviscid flow using suitable time marching technique.

Q8. Explain general transformation of the Laplace equation from physical space to computational space for generating a curvilinear grid.

Q9. Write short notes on the followings :

a) Classifications of governing partial differential equations

b) CFL criteria

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.