

Code No: R164103A

R16

Set No. 1

IV B.Tech I Semester Regular Examinations, October/November - 2019

COMPUTATIONAL FLUID DYNAMICS

(Common to Mechanical Engineering, Automobile Engineering and Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any FOUR questions from Part-B

PART-A(14 Marks)

1. a) Define floating point arithmetic. [3]
b) Identify the various physical parameters and their units present in the Navier-stokes equation. [2]
c) What is a poise? How can you define 1 poise? [3]
d) Draw 2D grid used for discretization problem and also write general discretized equation for interior nodes. [2]
e) Explain 2nd order upwind schemes. [2]
f) Define interpolation and write at least one interpolation function. [2]

PART-B(4x14 = 56 Marks)

2. Explain the term consistency in numerical schemes and in detail explain the behavior of errors and analyze them. [14]
3. a) Derive the Navier-stokes equation for a fluid flow and write the significance of special and expanded forms of Navier stokes solution. [7]
b) Explain the direct method for matrix inverse? Briefly explain partial pivoting used in direct method. [7]
4. a) Write the governing equations used in CFD in generic form. [7]
b) What are the disadvantages of this method in determination flow field? [7]
5. Distinguish the terms consistency and stability with reference to modeling of fluid flow and explain the consistency of fluid flow using explicit methods. [14]
6. a) State disadvantages of 1st Order Upwind Scheme. Explain Flux Vector Splitting. [7]
b) Explain how central differencing schemes works? [7]
7. a) Explain steps involved in solving finite volume method for one dimensional steady state diffusion problem. [7]
b) What are the four basic rules for discretization using Finite Volume Method? [7]

