Reg. No. | | | | | | | | | | | | |

Question Paper Code : X10686

B.E./B.Tech. DEGREE EXAMINATIONS – NOV / DEC 2020 AND APRIL / MAY 2021

Seventh/Eighth Semester

Mechanical Engineering

ME8093 COMPUTATIONAL FLUID DYNAMICS

(Common to: Manufacturing Engineering / Aeronautical Engineering / Mechanical and Automation Engineering/Mechanical Engineering (SW))

(Regulation 2017)

Time: 3 Hours | Answer ALL Questions | Max. Marks: 100

PART- A (10 x 2 = 20 Marks)

1. Define control volume.
2. What are limitations of panel methods?
3. Distinguish between conservation and non-conservation forms of fluid flow.
4. Define grid point.
5. Define Convergence theorem.
6. Define Lax equivalence theorem.
7. Write the advantages of adaptive grid?
8. Define staggered grid approach?
9. Define finite element method?
10. Define Courant number?

PART- B (5 x 13 = 65 Marks)

11. a) Derive Navier-Stokes equation in conservation form. (13)

OR

b) Explain the behavior of PDE's on CFD. (13)

12. a) Write a note on explicit and implicit approaches and stability criteria. (13)

OR

b) Explain briefly about parabolic and hyperbolic equations. (13)

13. a) Write a note on central and upwind difference schemes for one dimensional steady convection, diffusion equation. (13)

OR

b) Explain hybrid law, power law and Quick schemes. (13)

14. a) Write a note on staggered grid and pressure velocity corrections. (13)

OR

b) Write and explain PISO algorithm. (13)

15. a) Explain briefly about the turbulence flow modeling. (13)

OR

b) Explain K-e model and RANS model. (13)

PART- C (1 x 15 = 15 Marks)

16. a) Derive the energy equation for a viscous flow in partial differential non-conservation form. (15)

OR

b) Define and develop expression for substantial derivatives. (15)