

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1721005

Date: 12/07/2012

Subject Name: Computational Fluid Dynamics

Time: 10:30 am – 13:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

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|-----|-----|--|----|
| Q.1 | (a) | State the various governing laws and equations on the basis of which CFD analysis is carried out | 07 |
| | (b) | Derive Integral form of energy conservation equation along z-direction | 07 |
| Q.2 | (a) | Explain Different types of boundary conditions? | 07 |
| | (b) | Explain the various reasons for occurrence of various types of errors found between CFD results and experimental results | 07 |
| | | OR | |
| | (b) | Discuss the k-ε model in turbulence flow modeling | 07 |
| Q.3 | (a) | Discuss the difference between Finite element method and finite volume method | 07 |
| | (b) | Explain significance of stiffness matrix and isoperimetric elements while using the finite element philosophy | 07 |
| | | OR | |
| Q.3 | (a) | Explain the various reasons for occurrence of various types of errors found between CFD results and experimental results | 07 |
| | (b) | Discuss the advantages and limitations of computational fluid dynamics | 07 |
| Q.4 | (a) | Explain the algorithm for formulation of problem for 1D steady state heat conduction in CFD analysis | 07 |
| | (b) | | 07 |
| | | OR | |
| Q.4 | (a) | Explain for viscous incompressible flow MAC algorithm | 07 |
| Q.4 | (b) | Explain Advection phenomenon in flow | 07 |
| Q.5 | (a) | Derive two dimensional scalar transport equation | 07 |
| | (b) | Explain different discretization techniques used in CFD | 07 |
| | | OR | |
| Q.5 | (a) | Derive differential form of general equation of heat conduction in Cartesian co-ordinates | 07 |
| | (b) | State and explain advantages and limitations of finite volume method | 07 |
