

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2150104****Date: 03/06/2019****Subject Name: Computational Fluid Dynamics II****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

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

- Q.1** (a) What are the various boundary conditions? **03**
(b) Explain (1) Symmetry & (2) Periodic boundary conditions. **04**
(c) Explain steps involved in solving finite volume method for one dimensional steady state diffusion problem. **07**
- Q.2** (a) What is the full form of SIMPLE, SEIMPL-R & PISO? **03**
(b) Explain Staggered Grid. **04**
(c) Explain SIMPLE algorithm in detail. **07**
- OR**
- (c) Compare SIMPLE, SIMPLE-R and SIMPLE-C. **07**
- Q.3** (a) Why pressure velocity coupling is required in the solution of Incompressible flow problems. **03**
(b) What is TDMA? Explain in detail. **04**
(c) Explain PISO algorithm in detail. **07**
- OR**
- Q.3** (a) Why under-relaxation is required in SIMPLE? **03**
(b) State the need of Upwind scheme over the central difference scheme. **04**
(c) Write a note on Beam and Warming method. **07**
- Q.4** (a) Draw 2D grid used for discretization problem and also write general discretized equation for interior nodes. **03**
(b) Solve FVM for steady one dimensional convection and diffusion problem. **04**
(c) What are the general properties of discretization schemes? **07**
- OR**
- Q.4** (a) How Finite Volume Method Works? Explain in brief. **03**
(b) Explain Crank-Nicolson Scheme for the FVM for unsteady heat conduction problem. **04**
(c) Explain how central differencing schemes works? **07**
- Q.5** (a) Explain supersonic viscous flow over the flat plate. **03**
(b) Explain different boundary conditions for supersonic viscous flow over the flat plate. **04**
(c) Explain flow chart for Mac-Cormack subroutine. **07**
- OR**
- Q.5** (a) How multidimensionality does make the solution more difficult? **03**
(b) Explain 2nd order upwind schemes. **04**
(c) Write a note on High Resolution schemes. **07**
