

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2022****Subject Code:2150104****Date:21-01-2023****Subject Name:Computational Fluid Dynamics II****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

	<b>MARKS</b>
<b>Q.1</b> (a) What is Symmetry boundary Condition? Explain With example.	<b>03</b>
(b) Explain Staggered grid.	<b>04</b>
(c) Explain different Inlet & Outlet boundary conditions.	<b>07</b>
<b>Q.2</b> (a) Why pressure velocity coupling is required for the solution of incompressible flow problems?	<b>03</b>
(b) Compare SIMPLE with SIMPLE-R.	<b>04</b>
(c) Make use of Staggered and explain SIMPLE algorithm.	<b>07</b>
<b>OR</b>	
(c) Write a note on PISO algorithm.	<b>07</b>
<b>Q.3</b> (a) How SIMPLE does differ from SIMPLE-C?	<b>03</b>
(b) Show that multidimensionality and non-linearity makes the solution of governing equations more complicated.	<b>04</b>
(c) What is TDMA? Where it is applied? Explain.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Compare Central difference method with upwind schemes.	<b>03</b>
(b) State the disadvantages of 1 <sup>st</sup> order upwind schemes and explain 2 <sup>nd</sup> order upwind scheme.	<b>04</b>
(c) Explain Beam and Warming Technique.	<b>07</b>
<b>Q.4</b> (a) Explain the central differencing scheme.	<b>03</b>
(b) Discuss Flux vector splitting.	<b>04</b>
(c) Explain High Resolution Schemes.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) What is TVD scheme?	<b>03</b>
(b) Explain Crank Nicholson scheme.	<b>04</b>
(c) Explain finite volume method for 2-D diffusion problems.	<b>07</b>
<b>Q.5</b> (a) Write abbreviation of SIMPLE, SIMPLE-R & PISO.	<b>03</b>
(b) Apply different boundary conditions to solve supersonic flow over a flat plate.	<b>04</b>
(c) Explain finite volume method for 1-D convection diffusion problems.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) Explain the physical behavior of supersonic flow over a flat plate.	<b>03</b>
(b) How step size are calculated in space and time while solving supersonic flow over a flat plate.	<b>04</b>
(c) Explain flowchart for MacCormack Subroutine for supersonic flow over a flat plate.	<b>07</b>

\*\*\*\*\*