

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2018****Subject Code:2140107****Date:01/12/2018****Subject Name:Computational fluid dynamics I****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.

**MARKS**

<b>Q.1</b>	(a) What are the needs for problem solving with CFD?	<b>03</b>
	(b) What are the different fluid flow models? Brief them.	<b>04</b>
	(c) Explain the steps for CFD Preprocessing and Post Processing.	<b>07</b>
<b>Q.2</b>	(a) Which are the models of fluid flow?	<b>03</b>
	(b) Derive the expression for substantial derivative.	<b>04</b>
	(c) Derive energy equation in nonconservation form.	<b>07</b>
<b>OR</b>		
	(c) Derive generic form of governing equations.	<b>07</b>
<b>Q.3</b>	(a) Explain the need to discretize the domain.	<b>03</b>
	(b) Differentiate FDM and FEM.	<b>04</b>
	(c) Discuss Relaxation technique in detail.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Give a brief on FVM.	<b>03</b>
	(b) Enlist the factors affecting the grid.	<b>04</b>
	(c) Derive 1 <sup>st</sup> order derivatives of forward difference, backward difference and central difference schemes.	<b>07</b>
<b>Q.4</b>	(a) Explain the need of mathematical behavior of governing equations in the field of Aerodynamics.	<b>03</b>
	(b) Discuss unstructured grid.	<b>04</b>
	(c) With an example explain the way to know flow behavior using Eigen method.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) Discuss an implicit approach.	<b>03</b>
	(b) Discuss an explicit approach.	<b>04</b>
	(c) Discuss FVM for 1-D diffusion problem.	<b>07</b>
<b>Q.5</b>	(a) What is grid transformation? Why it is required?	<b>03</b>
	(b) Write a note on stretched grids.	<b>04</b>
	(c) Write a note on relaxation technique.	<b>07</b>
<b>OR</b>		
<b>Q.5</b>	(a) Explain the different boundary conditions applied to fluid flow domain.	<b>03</b>
	(b) Discuss ADI scheme.	<b>04</b>
	(c) Discuss Mac-Cormack technique.	<b>07</b>

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