Seat No.: _____ Enrolment No.

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

****