Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3170109 Date: 26/06/2023

Subject Name: Advance Computational Fluid Dynamics

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.**

			MARKS
Q.1	**(a)**	Define Computational Fluid Dynamics in technical words.	**03**
	(b)	Write an application of CFD and Define Compressible flow.	**04**
	(c)	Explain Finite Volume method with appropriate sketch.	**07**
Q.2	**(a)**	Differentiate Uniform grid and Non-Uniform grid.	**03**
	(b)	Enlist the factors affecting of grid transformation.	**04**
	(c)	Write a note on explicit and implicit methods with derivations.	**07**
		OR	
	(c)	What is Bowyer Algorithm? Explain in brief	**07**
Q.3	**(a)**	Explain turbulent flow characteristics.	**03**
	(b)	What is periodic or cyclic boundary condition?	**04**
	(c)	Explain briefly "Inlet and Outlet Boundary Condition".	**07**
		OR	
Q.3	**(a)**	What is Density based solver?	**03**
	(b)	What is Pressure based solver?	**04**
	(c)	How Does CFD code Work? Explain in brief.	**07**
Q.4	**(a)**	What is turbulence flow?	**03**
	(b)	Discuss on mixing length model.	**04**
	(c)	Advantages over Delalunay and Advancing front unstructured grid generation technique.	**07**
		OR	
Q.4	**(a)**	What is DNS?	**03**
	(b)	Discuss "κ-ω model".	**04**
	(c)	Discuss "effect of turbulent fluctuations on properties of mean flow".	**07**
Q.5	**(a)**	What is the procedure to solve problem in CFD? Write a step.	**03**
	(b)	Discuss on vorticity transport equation.	**04**
	(c)	Derive Reynolds average Navier stokes (RANS) equation.	**07**
		OR	
Q.5	**(a)**	What is the purpose of Large eddy Simulation (LES)?	**03**
	(b)	What is SST? Why it's required in CFD?	**04**
	(c)	Write a note on "The κ-ε model".	**07**

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