Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3170109 Date: 22-05-2024

Subject Name: Advance Computational Fluid Dynamics

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is turbulence modeling in CFD?	**03**
	(b)	Name some common applications of turbulence modeling in engineering simulations.	**04**
	(c)	Explain why turbulence modeling is necessary in CFD simulations.	**07**
Q.2	**(a)**	Define CFD.	**03**
	(b)	Write Types of Solver. Explain any one in short.	**04**
	(c)	Describe the difference between RANS (Reynolds-Averaged Navier-Stokes) and LES (Large Eddy Simulation) turbulence models.	**07**
		OR	
	(c)	Apply LES modeling to simulate turbulent flow in a complex geometry or high-Reynolds-number flow.	**07**
Q.3	**(a)**	Write a step to solve problem in CFD.	**03**
	(b)	Explain Explicit method.	**04**
	(c)	Evaluate the accuracy of a CFD solution using a turbulence model compared to experimental data or higher-fidelity simulation results.	**07**
		OR	
Q.3	**(a)**	Define Inlet Boundary Condition.	**03**
	(b)	Explain Implicit method.	**04**
	(c)	Design a CFD simulation setup to investigate the effectiveness of different turbulence models in predicting flow separation over an airfoil.	**07**
Q.4	**(a)**	Define Outlet Boundary Condition	**03**
	(b)	Explain Multi block structured grid.	**04**
	(c)	Explain in brief Delalunay triangulation.	**07**
		OR	
Q.4	**(a)**	Define SST model.	**03**
	(b)	Shortly explain κ-ε model.	**04**
	(c)	Write a note on constant pressure boundary condition, symmetry boundary condition	**07**
Q.5	**(a)**	How Does CFD code Work?	**03**
	(b)	Explain mixing length model.	**04**
	(c)	Explain Reynold stress equation models.	**07**
		OR	
Q.5	**(a)**	Define symmetry boundary condition.	**03**
	(b)	Define periodic boundary condition.	**04**
	(c)	Explain κ-ω model.	**07**

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