GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170109   **Date:08-12-2023**

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)**	Distinguish between incompressible and compressible flows.	**03**
	(b)	Explain in brief about CFD and its application.	**04**
	(c)	Explain the steps for CFD Pre-porcessing and Post Processing.	**07**
Q.2	**(a)**	Define Multi block structured grid generation.	**03**
	(b)	Explain in brief about Unstructured Grid generation.	**04**
	(c)	Explain in detail about finite difference and finite volume method.	**07**
		OR	
	(c)	Explain in detail about Elliptic, Parabolic and Hyperbolic partial differential equations.	**07**
Q.3	**(a)**	Enlist the factors affecting the grid.	**03**
	(b)	Explain in brief about Bowyer Algorithm.	**04**
	(c)	Discuss an implicit and Explicit approach.	**07**
		OR	
Q.3	**(a)**	What is Adaptive grid?	**03**
	(b)	Explain in brief about the difference between Structured and Unstructured grid.	**04**
	(c)	Explain in detail about the different boundary conditions applied to fluid flow domain.	**07**
Q.4	**(a)**	What is turbulence flow?	**03**
	(b)	Explain in brief about characteristics and important features of turbulent flow.	**04**
	(c)	Derive Reynolds average Navier stokes (RANS) equation.	**07**
		OR	
Q.4	**(a)**	What do you mean by Mixing length model?	**03**
	(b)	Discuss advantages and disadvantages of k-ε turbulent model.	**04**
	(c)	Discuss in detail about the necessity of turbulence modeling.	**07**
Q.5	**(a)**	How does CFD code works?	**03**
	(b)	Explain in brief Homogeneous turbulence and isotropic turbulence.	**04**
	(c)	Explain Pressure based solver and Density based solver.	**07**
		OR	
Q.5	**(a)**	Explain in brief about basics of Reynolds stress model (RSM).	**03**
	(b)	Discuss about importance of Eddy viscosity model in CFD field.	**04**
	(c)	Explain in detail about Structure of CFD code.	**07**

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