PRN:		Course Code :	AER4702

Final Year B. **Tech** End Semester Examination Summer 2024

COMPUTATIONAL FLUID DYNAMICS

Day and Date: 24 MAY 2024, Friday Max Marks: **100**

Time : 10:30 to 1:30 Duration: **03** hrs

Instructions: All questions are compulsory.

Q.1		**Attempt the following**	Marks	Bloom's Level	CO
	a)	Explain the features of Crank-Nicolson scheme.	08	03	CO1
	b)	Derive an equation for conservation of mass in fluid dynamics.	08	03	CO1
		OR			
	b)	Explain the Dimensionless Numbers in detail.	08	02	CO1
Q.2		**Attempt the following**			
	a)	Derive the continuity equation in terms of partial differential equation for three-dimension, steady incomparable flow	08	02	CO2
	b)	Explain the term vortex flow and find the velocity potential function and stream function.	08	03	CO2
		OR			
	b)	Comment on the Doublet flow with stream function. Also write down the significance of the Doublet flow.	08	03	CO2
Q.3		**Attempt any two from the following**			
	a)	Explain Delaunay-Voronoi Method with example.	08	03	CO3
	b)	Compare FDM, FEM and FVM and write the Taylor's series of expansion.	08	03	CO3
	c)	Write down the discretization of Continuity equation.	08	02	CO3
Q.4		**Attempt any two from the following**			
	a)	Classify discretization techniques in detail.	08	03	C04
	b)	Explain first order forward difference method and backward difference method.	08	03	C04
	c)	Write down the discretization of Momentum equation.	08	03	C04

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Q.5		**Attempt any Two of the following**			
	a)	State the advantages of FEM over the FDM.	09	03	CO5
	b)	State the general procedure to solve the problem using finite element method.	09	02	CO5
	c)	Write down the boundary condition for momentum equation.	09	03	CO5
Q.6		**Attempt any Two of the following**			
	a)	How to discretize the domain for overlapping control volumes using FVM.	09	03	CO5
	b)	Describe Cell-Centered Formulation using FVM.	09	02	CO5
	c)	Explain Reynolds,Spatial,Time Averaging in Turbulence Modelling.	09	02	CO5

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