PRN:		Course Code:	AER4702

Final Year **B. Tech** End Semester Examination Winter 2023

Computational Fluid Dynamics

Day and Date: Thursday, 30/11/2023 Max Marks: **100**

Time: 2.00 to 5.00 PM Duration: **03** hrs

Instructions: All questions are compulsory.

		Marks	Bloom's Level	CO
Q.1	**Attempt the following**			
a)	Explain the basic equations of fluid dynamics.	08	L1	4702.1
b)	How a lift could possibly be exerted on a circular cylinder. Write the expression for drag and lift on a cylinder in an inviscid, Incompressible flow.	08	L1	4702.1
	OR			
b)	Derive the Euler's equation for an inviscid flow with no body forces	08	L1	4702.1
Q.2	**Attempt the following**			
a)	Obtain the velocity potential and stream function for a two-dimensional source flow.	08	L2	4702.2
b)	What is control volume? Write the integral and derivative forms for 1. Conservation of mass 2. Conservation of energy.	08	L2	4702.2
	OR			
b)	Explain the term vortex flow and find the velocity potential function and stream function.	08	L2	4702.2
Q.3	**Attempt any two from the following**			
a)	Comment on the methods of quality improvement of the Grid generation.	08	L2	4702.3
b)	Differentiate between structured grid and unstructured grid using suitable example.	08	L3	4702.3
c)	Compare Explicit and Implicit approaches of CFD.	08	L3	4702.3
Q.4	**Attempt any two from the following**			
a)	Write a note on the finite difference method used in CFD analysis.	08	L3	4702.4
b)	Write a short note on Skewness quality of a mesh.	08	L3	4702.4
c)	Explain explicit and implicit discretization techniques in detail.	08	L3	4702.4
Q.5	**Attempt any Two of the following**			
a)	Explain the difference between FEM and FDM with suitable example.	09	L4	4702.5

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b)	Write down the steps involved in the finite element method.	09	L4	4702.5
c)	Explain the strong and weak formulation of a boundary value problem.	09	L4	4702.5

Q.6 **Attempt any Two of the following**

a)	Describe Runge-Kutta Time Stepping.	09	L4	4702.5
b)	Write a note on the finite volume method used in CFD analysis.	09	L4	4702.5
c)	Differentiate between finite volume method and finite element method with suitable example.	09	L4	4702.5

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