Name: Enrolment No:	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April – May, 22

Course: Incompressible Aerodynamics **Semester: IV**
Program: M.Tech CFD **Time 03 hrs.**
Course Code: ASEG 7035P **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q1.	In low-speed, incompressible flow, the following experimental data are obtained for an airfoil section at an angle of attack of 4°: $c_l = 0.8$ and $c_{m,c/4} = -0.088$. Calculate the location of the center of pressure.	4	CO1
Q2.	Discuss the differences between aerodynamic center and centre of pressure.	4	CO2
Q3.	Show that stream function and potential function are perpendicular to each other	4	CO3
Q4.	Define vorticity, circulation and angular velocity.	4	CO4
Q5.	Discuss about the pitot static tube working principle.	4	CO5
	SECTION B		
Q6.	Derive the drag coefficient for flat plate using coefficient of pressure.	10	CO1
Q7	Using substantial derivative, derive the continuity equation, also discuss the assumptions	10	CO2
Q8	Discuss doublet flow and derive the expression of stream function for the same.	10	CO2
Q9	Derive momentum equation for x and y direction of fluid flow.	10	CO5
	SECTION-C		
Q 10	Derive stream function for uniform, source and sink flow. Superimpose these elementary flow to model flow over Rankine oval and hence find out following for the resulting flow: i. Radial and tangential velocities ii. Location of stagnation point iii. Equation of streamline passing through stagnation point. **OR** Generate mathematical model for lifting flow over circular cylinder by superimposing elementary flows. Find out following for the resulting flow: i. Stream function and velocity potential function ii. Radial and tangential velocities iii. Location of stagnation point	20	CO3
Q 11	Derive the energy equation for a moving fluid element. Derive integral and PDE form both.	20	CO4