Aero

PRN:		Course Code:	UAE302

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

Fluid Mechanics

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

Time: 10.30 to 1.30 PM Duration: **03** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Derive the expression for the capillary raise when it is inserted in mercury tank.	08	3	CO1
	b)	Define fluid mechanics and illustrate the surface tension with unit	08	2	CO1
		OR			
	b)	Define capillarity, fluid , density, specific gravity.	08	2	CO1
Q.2		**Attempt the following**			
	a)	Derive the expression for discharge through orifice Meter	08	3	CO2
	b)	Derive the expression for continuity equation for in three dimensional differential forms	08	3	CO2
		OR			
	b)	Classify and explain types of flows.	08	2	CO2
Q.3		**Attempt any two from the following**			
	a)	Derive the expression for the velocity distribution when viscous fluid is flowing through circular pipe.	08	2	CO2
	b)	Derive the expression for Chezy's formula from initial condition.	08	2	CO2
	c)	Enlist minor losses occurring when fluid is flowing through pipe and illustrate each with formula.	08	3	CO2
Q.4		**Attempt any two from the following**			
	a)	Derive an expression for momentum thickness of boundary layer.	08	3	CO3
	b)	Using Pi theorem, for velocity through a circular orifice is H is head causing flow, D is diameter of orifice, ρ is the density and μ, is viscosity, g is acceleration due to gravity. Derive the expression for Velicity.	08	3	CO3
	c)	Illustrate boundary layer separation and its control.	08	3	CO3
Q.5		**Attempt any Two of the following**			
	a)	Define Drag and Lift and explain different types of drags	09	3	CO4
	b)	A kite 0.4 m x 0.4 m weighing 4 N assumes an angle of 12^0 to the horizontal. The string attached to it makes an angle of 45^0 to the horizontal. The pull on the string is 25 N when the wind is flowing at a speed of 30 km/hour. Find the corresponding coefficient of drag and lift. Density of air is 1.25 kg/m^3	09	3	CO4

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	c)	A flat plate 3m x 3m moves at 50 km/ hour in stationary air of density 1.15 kg/m^3. If the coefficient of drag and lift are 0.10 and 0.85 respectively, determine i. lift force ii. Drag force iii. The resultant force iv. The power required to keep the plate in motion?	09	3	CO4
Q.6		**Attempt any Two of the following**			
	a)	Define for hydraulic turbine. 1. Hydraulic Efficiency 2. Mechanical Efficiency 3. Volumetric Efficiency 4. Overall Efficiency	09	3	CO5
	b)	A Pelton wheel has a mean bucket speed of 20 meters per second with a jet of water flowing at the rate of 900 liters/s under a head of 35 meters. The buckets deflect the jet through an angle of 1430. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume co-efficient of velocity as 0.98.	09	3	CO5
	c)	Define Hydraulic machines and elaborate classification of hydraulic turbines in detail with examples	09	3	CO5

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