Total number of printed pages:2

UG/3rd/UCE302

2021

FLUID MECHANICS

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Write the definition, formula and use of the dimensionless numbers.	10
	b)	Write on the basis of dimensional analysis suitable parameters to present the thrust developed by a propeller. Assume that the thrust P depends upon the angular velocity 'ω ', speed of advance 'V', diameter 'D', dynamic viscosity 'μ', mass density 'ρ', elasticity of the fluid medium which can be denoted by the speed of sound in the medium 'C'.	10
2	a)	Derive the Bernoulli's equation. List out the assumptions made.	10
	b)	Derive the discharge equation for Venturimeter and Orificemeter	10
3		What are the different types of pressures in fluid mechanics? Explain with figures, the different types of pressure measuring instruments.	20
4		Write short notes on: a) Classification of fluid flow b) Classification of fluids	4 x 5 =20

c) Similitude

d) Pitot Tube

5 a) The stream function for a 2D flow is given by $\psi = 2xy$, calculate the velocity at the point P(2,3). Find the velocity potential function Φ. 10

b) Write the definition of stream line, path line, streak line, stream function and velocity potential. 10

6 a) Derive the 3D continuity equation in cartesian co-ordinates. 10

b) The velocity vector in a fluid flow is given by 10

$V = 4x^3\,i - 10x^2y\,j + 2t\,k$

Find the velocity and acceleration at (2, 2, 3) at time = 2 units