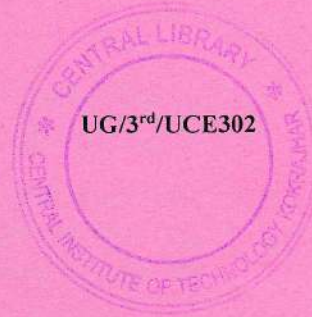


Total number of printed pages:2



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: 4 x 5 =20
 - a) Classification of fluid flow
 - b) Classification of fluids

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 $V = 4x^3 i - 10x^2y j + 2t k$ 10
Find the velocity and acceleration at (2, 2, 3) at time = 2 units

