

**B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering) /
B.Tech. (Aerospace Engineering)**

Term-End Examination

00903

December, 2018

ET-201(A) : MECHANICS OF FLUIDS

Time : 3 hours

Maximum Marks : 70

*Note : Attempt any **seven** questions. Assume any missing data. Use of non-programmable calculator is permitted.*

1. (a) What is Centre of Buoyancy ? Discuss the concept of stability of floating bodies in fluid. 5

- (b) What would be the fraction of an iceberg above the free surface in the ocean, if the density of ice = 920 kg/m^3 and density of sea water = 1030 kg/m^3 ? 5

2. (a) Define the following : 4
- (i) Density
 - (ii) Cavitation
 - (iii) Surface tension
 - (iv) Water hammer
- (b) Differentiate between the following : 6
- (i) Laminar and Turbulent flows
 - (ii) Steady and Unsteady flows
3. (a) What do you understand by Pathline and Streakline ? Derive equation of continuity. 7
- (b) Define the following for a fluid element in motion : 3
- (i) Translation
 - (ii) Rotation
 - (iii) Angular deformation
4. (a) What is π -theorem ? Write down the significance of the π -theorem. 5
- (b) Derive the expression of Euler's number as a function of the Froude and Reynolds numbers. 5

5. (a) Write the applications of the following : 4
(i) Energy equation
(ii) Linear-momentum equation
(b) Derive Euler's equation in streamline coordinates. 6
6. (a) What do you understand by Piezometric Head ? Explain the working of a pitot tube. 5
(b) Derive the expression $Q_a = KH^{5/2}$ for triangular notch. 5
7. Derive the Navier-Stokes equation. Discuss its application. 10
8. Explain the following : $2 \times 5 = 10$
(a) Velocity variation with time at a given section
(b) Boundary layer phenomenon
9. Define the following : $5 \times 2 = 10$
(a) Geometric similarity
(b) Dynamic similarity
(c) Form drag
(d) Surge tank
(e) Magnus effect