



KERALA AGRICULTURAL UNIVERSITY
B. Tech. (Agrl. Engg.) 2022 & Previous Admissions
II Semester Final Examination – September 2023

Iden.1202

Fluid Mechanics and Open Channel Hydraulics (2+1)

Marks: 50
Time: 2 hours

- I Fill in the blanks (10x1=10)**
1. Fluid is a substance that cannot be subjected to.....
 2. Practical fluid possess.....
 3. Density of water is maximum at.....
 4. The unit of surface tension is.....
 5. Viscosity of water in comparison to mercury is.....
 6. Falling drop of water becomes spheres due to property of.....
 7. Euler dimensionless number relates.....
 8. The two important forces for floating bodies are.....
 9. Uniform flow occurs when the flow passes.....
 10. Flow will become turbulent in a pipe at Reynolds number of.....
- II Write short notes on ANY FIVE of the following (5x2=10)**
1. What is vena contracta?
 2. What do you mean by local and convective acceleration in fluid flow?
 3. List any four differences between laminar and turbulent flow.
 4. What is the physical significance of continuity equation in differential and integral form?
 5. A fluid is flowing at a constant volume flow rate of Q through a divergent pipe of diameter D_1 and D_2 and length L . Assuming velocity to be uniform and axial at any section, Calculate acceleration at inlet of the pipe.
 6. A source with volumetric flow rate $0.2 \text{ m}^3/\text{s}$ and vortex with strength of $1 \text{ m}^2/\text{s}$ are located at the origin. Determine the equation of velocity potential function and stream function.
 7. A cylindrical body of cross sectional area A , height H and density ρ_s , is immersed to a depth h to a liquid of density ρ and tied to the bottom with a string. Find out the tension in the string.
- III Answer ANY FIVE of the following (5x4=20)**
1. An agitator of diameter D requires power P , to rotate at constant speed N in a liquid of density ρ and viscosity μ . Find an expression for power using non dimensional analysis.
 2. Derive an expression for velocity profile in parallel plate flow using momentum equations.
 3. A soap bubble of diameter D_1 coalesces with another bubble of diameter D_2 to form a single bubble D_3 with the same amount of air. For an isothermal process, express D_3 as a function of D_1 , D_2 , p_{atm} , and surface tension Y .
 4. Discuss in details working principle of centrifugal pump.
 5. Discuss in detail working principle of Venturimeter and orifice meter.
 6. Derive an expression for continuity equation in cylindrical coordinates.
 7. What is difference between streamline and streakline?
- IV Write an essay on ANY ONE of the following (1x10=10)**
1. Explain the concept of surface tension.
 2. What are characteristics of turbulent flow?
