

- (5) 1. In turbulent flow, the streamlines criss-cross each other in a chaotic manner. Yes or No? Why?
- (5) 2. In a fluid, flow is always in the direction of the pressure gradient. Yes or No? Why?
- (5) 3. If a fluid is incompressible, we must have $\rho = \text{constant}$. ($\rho = \text{density}$). Yes or No? Why?
- (5) 4. When $\vec{V} = \nabla\phi$, the fluid must behave as incompressible. Yes or No? Why?
- (5) 5. Show the dimensions of
- ① potential function, ϕ
 - ② vorticity
 - ③ dynamic viscosity
- (5) 6. All laminar flows have zero vorticity. Yes or No? Why?
- (5) 7. It is a well-known fact that one can float more easily in a salt water than in fresh. Should one also be able to swim faster in salt water?
- (5) 8. Is the motion of the atmosphere always turbulent? By what visual means readily at hand may such motion be observed?
- (5) 9. A wave travels through a long channel of otherwise still water. Is the free surface a stream line? Why?

- (5) 10. Distinguish between local and convective acceleration.
- (5) 11. What is the difference between mass and weight? Which is measured by a beam balance and which by a spring balance.
- (10) 12. Design a Pitot tube for measuring the flow velocity.
- (5) 13. Why can fluid weight have no influence upon the flow pattern if the fluid is fully confined by fixed boundaries.
- (5) 14. Does the viscosity of (1) liquids, and (2) gases, increase or decrease with temperature?
- (5) 15. Explain the d'Alembert's paradox.
- (5) 16. Is $\nabla \cdot \vec{u} = 0$ valid for a unsteady flow? Why?
- (5) 17. Is $\nabla \cdot \vec{u} = 0$ valid for a nonhomogeneous flow? Why?
- (5) 18. Consider an area, A , under hydrostatic pressure, the center of pressure must always be below the centroid of A . Yes or No? Why?
- (5) 19. Explain how certain insects are able to walk on the surface of water. Draw a force diagram to support your statement.