Cien.2103   Fluid Mechanics (2+1)   Marks: 50
                                                                         Time: 2 hours

I   **Fill in the blanks**   (10x1=10)
   1. The flow of fluid along curvilinear or curved path is known as _____.
   2. The pitot static tube measures _____.
   3. Venturi relation is one of applications of _____.
   4. If density of fluid is not constant, it is said to be _____.
   5. Navier-Stokes equation is useful in the analysis of _____ flow.

      State True or False
   6. For a completely immersed body, the metacentric height is always zero.
   7. Equation of motion for vortex flow does take into account shear force
   8. In case of any orifice, velocity always remains constant and hence discharge can be calculated.
   9. The principle of orifice meter is same as that of Venturimeter.
  10. In unsteady flow, the flow parameters change with respect to position.

II   **Write Short notes on any FIVE of the following**   (5x2=10)
   1. Define momentum thickness.
   2. Define model law or similarity law.
   3. What are the factors influencing the frictional loss in pipe flow?
   4. What is stream lined body?
   5. What do mean by the single column manometers?
   6. Differentiate between forced vortex and free vortex flow.
   7. What is meant by fluidization?

III   **Answer any FIVE of the following.**   (5x4=20)
   1. Why formation of wake behind a body causes drag?
   2. Determine the intensity of shear of an oil having viscosity = 1 poise. The oil is used for lubricating the clearance between a shaft of diameter 10 cm and its journal bearing. The clearance is 1.5 mm and the shaft rotates at 150 r.p.m.
   3. Explain the different efficiency ratings of a centrifugal pump.
   4. Explain how the boundary layer thickness is defined in different ways.
   5. Define Mach number and explain its significance.
   6. Discuss the limitations of Bernoulli's equation.
   7. The velocity distribution over a plate is given by $U = (3/4) Y - Y^2$ where U is the velocity in m/s and at the depth Y in m above the plate. Determine the shear stress at a distance of 0.15m from the top of plate. Assume dynamic viscosity of the fluid is taken as 0.85 Ns/m^2.

IV   **Write an essay on any ONE of the following**   (1x10=10)
   1. Explain the working of centrifugal pump with neat sketch.
   2. A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12.0 Nm is required to rotate the inner cylinder at 100 r.p.m., determine the viscosity of the fluid.
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