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**B TECH**  
**(SEM III) THEORY EXAMINATION 2017-18**  
**FLUID MECHANICS**

**Time: 3Hours****Max. Marks: 70****Note:** Attempt all Sections. Assume missing data, if any.**SECTION -A**

1. Attempt all question in brief. (2x7=14)
- a) Define the term Cohesion and Adhesion.
  - b) Explain gauge pressure, vacuum pressure and absolute pressure with suitable sketch.
  - c) Write the difference between Eulerian and Lagrangian approach.
  - d) Explain the Rotational and Irrotational flow.
  - e) Write short note on Pitot Static Tube.
  - f) What do you understand by shape Factor?
  - g) Explain the Drag and Lift.

**SECTION -B**

2. Attempt any **three** parts of the following : (7x3=21)
- (a) Liquid of specific gravity 1.0 flows through pipes A and B at positive pressure of 0.5 bar and 0.25 bar respectively. Pipe A is 1.6 m higher than B. what would be the difference in the level of U- tube manometer connected to A and B, having manometer liquid of specific gravity 13.6? Liquid level in the limb attached to A is lower than that in the order.
  - (b) Drive the continuity equation for steady Irrotational flows in Cartesian co-ordinate for incompressible fluids.
  - (c) What are the minor losses and major losses in a pipe flow?
  - (d) The velocity distribution in the boundary layer is given by,  

$$\frac{u}{U} = \sin \left[ \left( \frac{\pi y}{2\delta} \right) \right]$$
 Find Displacement thickness and Momentum thickness.
  - (e) Explain the Magnus effect with an example.

**SECTION -C**

3. Attempt any **one** part of the following: (7x1=7)
- a) Explain the condition of stability for floating body and immersed body with neat sketch.
  - b) A circular plate 6 m diameter is immersed in water in such a way that its greatest and least depth below the free surface of water is 4m and 2 m respectively. Determine the total pressure on one face of the plate and position of the centre of pressure.
4. Attempt any **one** part of the following: (7x1=7)
- a) Velocity field in fluid medium is given by:  

$$V = 10x^2yi + 15xyj + (25t - 3xy) k$$
 Find acceleration at (1, 2, -1)m and t = 0.5 sec.
  - b) A 500 mm diameter pipe carrying water at rate 0.5 m<sup>3</sup>/sec. branches into two pipes of 200 mm and 400 mm diameters. If the rate of flow of water through small diameter pipe is 0.2 m<sup>3</sup>/sec. Determine velocity of flow in each pipe.

5. Attempt any **one** part of the following:

(7x1=7)

- a) Write about Venturimeter. Derive the expression for rate of flow of fluid through Venturimeter.
- b) Find the discharge through a trapezoidal notch which is 1 m wide at the top and 0.4 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. Assume  $C_d$  for rectangular portion = 0.62 while for triangular portion = 0.60.

6. Attempt any **one** part of the following:

(7x1=7)

- a) Oil with density  $900 \text{ kg/m}^3$  and kinematic viscosity  $10^{-5} \text{ m}^2/\text{sec}$  is flowing over a plate of 3m long and 2 m wide with a velocity of 3 m/sec parallel to 3m side. Find the boundary layer thickness at the point of transition and at the end of plate.
- b) What do you mean by separation of boundary layer? Define with neat sketch.

7. Attempt any **one** part of the following:

(7x1=7)

- a) A square plate of side 2 m is moved in a stationary air of density  $1.2 \text{ kg/m}^3$  with a velocity of 50km/hr. If the coefficient of drag and lift are 0.2 and 0.8 respectively, determine the drag force, lift force, and resultant force.
- b) Find the form of equation for discharge  $Q$  through a sharp edged triangular notch; assuming  $Q$  depends upon the central angle  $\alpha$  of the notch, head  $H$ , gravitational acceleration  $g$ , and on the mass density  $\rho$ , viscosity  $\mu$ , and surface tension  $\sigma$  of the fluid.