Printed Pages: 02   **Sub Code: RCE303**

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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 Eulerianand 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,
       $$\frac{u}{U} = \sin\left[\left(\frac{\pi}{2}\frac{y}{\delta}\right)\right]$$
       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^{2}yi + 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^3/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^3/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 kg/m^3 and kinematic viscosity 10^{-5} m^2/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 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 α of the notch, head H, gravitational acceleration **g,** and on the mass density ρ, viscosity μ, and surface tension σ of the fluid.