Seat	
No.	

S.Y.B. Tech. (Civil Engineering) (Semester - III)
Examination, November - 2019
ECS-CV304 : FLUID MECHANICS - I
Sub. Code: 73200

Day and Date : Saturday, 30 - 11 - 2019   **Total Marks : 70**
Time : 10.00 a.m. to 12.30 p.m.

Instructions :   1)   Q.No.4 and Q.No.8 are compulsory.
                     2)   Solve any 2 from each section out of remaining.

SECTION-I

Q1) a)   Define ideal fluid & explain the following properties of real fluid. Give their SI units.   [5]
  i)   Viscosity   ii)   Bulk modus of elasticity

   b)   A square metal plate 1.5m×1.5m 1.5mm thick weighing 50 N is to be lifted through a vertical gap of 25mm of infinite extent. The plate is kept at the centre of gap. Oil is filled in the gap has sp. gravity 0.95 and viscosity 2.5 N s/m^2. If the the plate is lifted at a constant speed of 0.1m/ s, find the force required.   [5]

Q2) a)   A vertical rectangular gate 2m×2m is subjected to water pressure on one side, the water surface being at top of gate. The gate is hinged at bottom and is held by a horizontal chain at the top.
       Calculate the tension in chain.   [5]

   b)   Determination of metacentric height by analytical and experimental method.   [5]

Q3) a)   Define following type of flows and give their practical examples.   [5]
  i)   Steady-Uniform,   ii)   Unsteady-Nonunifrom
  iii) Laminar   iv)   Rotational
  v)   One Dimensional

   b)   A stream function is given by $\Psi = 4XY$. Whether the flow is possible? Find potential function Φ, velocity and acceleratin at (1,2).   [5]

P.T.O.

Q4) Write short notes on Any 3. [15]

    a)   Surface tension and capillarity.

    b)   Total pressure on curved surface submerged in liquid.

    c)   Stability of floating and submerged objects.

    d)   Flow net : construction and uses.

SECTION-II

Q5) a)   Explain following measuring devices. Draw and sketch [5]

        i)   Venturimeter   ii)   Pitot Tube

    b)   A circular tank of diameter 4m contains water upto a height of 6m. The tank is provided with an orifice of diameter 0.75m at the bottom. Find the time taken by water

        i)   to fall from 6m to 2m and

        ii)   for completely emptying the tank. Take $C_d = 0.6$ [5]

Q6) a)   A lubricating oil of viscosity of 1 poise and specific gravity 0.9 is pumped through a 30mm diameter pipe. [6]

        If the pressure drop per meter length of pipe is 20 kN/m²., determine:

        i)   flow rate in LPS

        ii)   Reynolds number flow

        iii)   Power required per 50m, length of pipe to maintain flow.

    b)   Explain hydrodynamics smooth and rough pipes. [4]

Q7) a)   What do you mean by compound pipe and equivalent pipe? [5]

        Pipes of diameters 50cm, 40cm, 30cm of lengths 1800,1200 and 600 are connected in series.

        What would be the diameter of equivalent pipe for the same total length.

    b)   Two reservoirs having difference in elevation of water surface as 15m are connected by a siphon pipe of diameter 200 mm and length 400m. The summit is 3 m above the upper reservoir water level and pipe length upto summit is 120m. If 4f value is 0.08, determine the discharge through pipe and pressure at summit. [5]

Q8) Write short notes on any 3. [15]

    a)   Derivation of Bernoulli's theorem and its assumptions

    b)   Moody's chart and nomographs

    c)   Water hammer

    d)   Prandtle's mixing length theory

    e)   HGL TEL: application to 2 reservoir connected bo a pipe

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