Code: 13A01303 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2016

FLUID MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 70

PART - A

(Compulsory Question)

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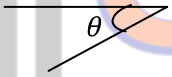
1 Answer the following: (10 X 02 = 20 Marks)

(a) How the viscosity varies with temperature for liquids and gases?

(b) Give the formulae for total pressure force and centre of pressure for a body which is immersed in liquid at an inclination of θ as shown below.



(c) Define meta centre.

(d) Express the velocity component u & v in terms of ϕ.

(e) What is energy correction factor?

(f) Give any two differences between venturimeter & orifice meter.

(g) State whether reentrant mouth piece is internal mouth piece or external month piece. Also give its shape.

(h) Give any two advantages of a triangular weir over a rectangular weir.

(i) HGL may raise or fall in the direction of flow where as TEL always fall. Justify the statement.

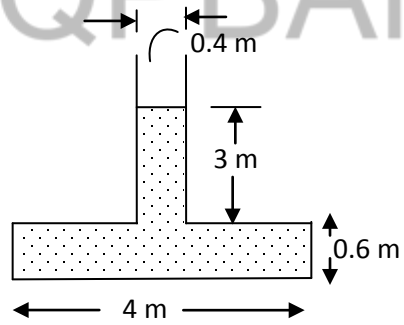
(j) State the equation for velocity and shear stress distribution for a case of steady laminar flow in a circular pipe.

PART - B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 (a) Following figure shows a tank full of water. Find: (i) Total pressure on the bottom of tank. (ii) Weight of water in the tank and hydrostatic paradox between the results. Take width of tank as 2 m.



(b) What are Newtonian and non-Newtonian fluids?

OR

3 A flat plate 0.1 m^2 area is pulled at 30 cm/s relative to another plate located at a distance of 0.01 cm from it, the fluid separating them being water with μ as 0.001 Ns/m^2. Find the force required to maintain the velocity.

UNIT - II

4 Find the density of a metallic body which floats at the interface of mercury of specific gravity 13.6 and water such that 40% of its volume is sub-merged in mercury and 60% in water.

OR

5 The velocity vector in a fluid flow is given $V = 4x^3i - 10x^2yj + 2tk$. Find the velocity and acceleration of a fluid particle at (2, 1, 3) at time t = 1.

Contd. in page 2

UNIT - III

6 A pipe 5 m long is inclined at an angle of 15° with the horizontal. The smaller section of the pipe which is at a lower level is of 80 mm diameter and the larger section of the pipe is of 240 mm diameter. Find the difference of pressures between the two sections if the pipe is uniformly tapering and the velocity of water at the smaller section is 1 m/s.

OR

7 What is venturimeter? How it works? Also derive the expression of rate of flow of a venturimeter.

UNIT - IV

8 A reservoir discharges through a sluice 0.915 m wide by 1.22 m deep. The top of the opening is 0.61 m below the water level in the reservoir and the downstream water level is below the bottom of the opening. Calculate the discharge through the opening if C_d = 0.60 and percentage error if the opening is treated as a small orifice.

OR

9 What is a notch? Also give the classification of notches.

UNIT - V

10 Two pipes each 300 m long are available for connecting to a reservoir from which a flow of 0.085 m^3/s is required. If the diameter of the two pipes are 0.30 and 0.15 m respectively, determine the ratio of the head lost when the pipes are connected in series to the head lost and when they are connected in parallel. Neglect minor loss.

OR

11 (a) Explain Reynold's experiment.

(b) 0.02 liters of a liquid (G = 0.9) flow in 40 seconds through a pipe 0.25 m long and 1.5 mm diameter emerging from the bottom of a tank holding the liquid maintained at a constant level of 0.35 m above the outlet end of the pipe discharging freely. Compute the dynamic viscosity of the liquid.

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