Total No. of Questions : 6]

SEAT No. :

P5007

[Total No. of Pages : 2

T.E./Insem.-505

T.E. (Civil)

FLUID MECHANICS - II

(2012 Pattern)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) A spherical ball of diameter 5 mm and density 7800 kg/m^3 is falling in an oil of unknown viscosity. If the ball attains a terminal velocity of 60 mm/s, find the i) viscosity of oil, ii) drag force, iii) coefficient of drag. The density of oil is 850 kg/m^3. **[5]**

b) An orifice of cross sectional area ***a*** is fitted at the base of a tank of uniform area ***A***. Derive an expression for time required to lower the liquid surface from H_1 to H_2. The coefficient of discharge of the orifice is C_d. **[5]**

OR

Q2) a) Write a short note on - "drag on a flat plate". **[4]**

b) Water is flowing through an elastic pipe of diameter 30 cm, thickness 6 mm and length 2500 m with a velocity of 2.4 m/s. A valve is provided at the end of the pipe. If the valve is suddenly closed, find the rise in pressure. Assume the Poissoin's ratio as 0.25, the bulk modulus of water as 2.1×10^9 N/m^2 and the modulus of elastic of pipe material 2.1×10^9 N/m^2. **[3]**

c) Differentiate between bluff and streamlined body. **[3]**

P.T.O.

Q3) a) Derive an expression for discharge through triangular notch. Also state advantages of triangular notch over rectangular notch. **[5]**

b) A rectangular channel is 2.5 m wide and conveys a discharge of 2.75 m^3/s at a depth of 0.9 m. A contraction of width is proposed at a section in this channel. Calculate the water surface elevation in the contracted section when the width of the proposed contraction is 2.0 m. Neglect energy losses in the transition. **[5]**

OR

Q4) a) Derive continuity equation in open channel. Also write energy equation for open channel flow. **[5]**

b) A discharge of 10 m^3/s flows through a triangular channel having side slope 1 (V) : 1.5 (H). Determine critical depth and specific energy. **[2]**

c) Write characteristics of critical flow. **[3]**

Q5) a) Derive the relation between depth of flow and diameter of circular channel for most economical section for maximum discharge condition using Chezy's formula. **[5]**

b) For a hydraulic jump in a wide rectangular channel, the velocity and depth of flow before the jump are 10 m/s and 0.8 m, respectively. Determine the depth of flow after the jump and energy loss. **[5]**

OR

Q6) a) Derive relation between conjugate depths in hydraulic jump. **[5]**

b) A trapezoidal channel having the side slope of 2 horizontal to 3 vertical carries water at 0.4 m^3/s. If the bed slope of the channel is 1:2000, determine the dimensions of most economical channel section. Take Chezy's constant C = 60. **[5]**

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