Oct./TE/ Insem. - 155
T.E. (Civil)
FLUID MECHANICS-II
(2015 Course) (Semester-I) (301005)

Time : 1 Hour]

[Max. Marks :30

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use non programmable electronic pocket calculator is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) Derive the following expression for time of emptying a tank through an orifice at its bottom. **[6]**

$$T = \frac{2A\left[\sqrt{H_1} - \sqrt{H_2}\right]}{C_d a\sqrt{2g}}$$

b) Explain with neat sketch the term "Karman Vortex Trail". **[4]**

OR

Q2) a) A metallic ball of diameter 2mm drops in fluid of sp. gravity 0.96 and viscosity 16 Poise. The density of metallic ball is 12600 kg/m^3. find: **[6]**

i) The drag exerted by the fluid on metallic ball,

ii) The pressure drag and skin friction drag,

iii) The terminal velocity of ball in fluid.

b) Explain with neat sketch " Surge Tanks and their functions" **[4]**

P.T.O.

Q3) a) Derive the energy equation with usual notations for open channel flow. **[6]**

b) Calculate the critical depth and the corresponding specific energy for a discharge of 6 m³/sec in the following channels. **[4]**

   i) Rectangular Channel with width 2.1 m

   ii) Triangular Channel with z = 0.5

OR

Q4) a) Explain. **[6]**

   i) Various types of channel flows

   ii) Classification of Channels

b) Derive the expression for the following with consideration to steady but non-uniform is taking place in Rectangular Channel. **[4]**

   i) Critical depth

   ii) Minimum specific energy in terms of critical depth

Q5) a) Derive the following expression with usual notations for conjugate depths of a hydraulic jump occurring in a rectangular channel. **[5]**

$$y_2 = -\frac{y_1}{2} \pm \sqrt{\left(\frac{y_1}{2}\right)^2 + \frac{2q^2}{gy_1}}$$

b) A trapezoidal channel has to carry 143 m³/ minute of water is designed to have a minimum cross section. Find the bottom width and depth of flow if the bed slope is 1:1200, the slopes at 45° and Chezy's Coefficient is 55. **[5]**

OR

Q6) a) A hydraulic jump type of energy dissipater is designed to have energy loss of 8.6m, when the Froude's number upstream of the jump is 7.25 Find the sequent depths of flow and the rate of flow in such a case. What is the efficiency of the jump? **[5]**

b) Derive the conditions for most efficient rectangular channel section. **[5]**

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