$\qquad$
[Total No. of Pages :2

## Oct./TE/ Insem. - 155 <br> T.E (Civil)

## FLUID MECHANICS-II

 (2015 Course) (Semester-I) (301005)
## Time : 1 Hour]

[Max. Marks :30

## Instructions to the candidates:

1) Solve Q.1or 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 piogrammable electronic pocket calculator is allowed.
5) Assume suitable data, if necessary.

Q1) a) $\searrow$ Derive the following expressionfor time of emptying a tank through an orifice at its bottom.

$$
T=\frac{2 A\left[\sqrt{H_{1}}-\sqrt{H_{2}}\right]}{C_{d} a \sqrt{2 g}}
$$

b) Explain with neat sketch the term "Karman Vortex Trail".

## OR

Q2) a) A metallic ball of díameter 2 mm drops in fluid of sp gravityo 0.96 and viscosity 16 Poise. The density of metallic ball is $12600 \mathrm{~kg} \mathrm{~mm}^{3}$. 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 flyid.
b) Explain with neat sketch "Surge Tanks and their functions"

Q3) a) Derive the energy equation with usuafnotations for open channel flow.[6]
b) Calculate the critical depth and the corresponding specific energy for a discharge of $6 \mathrm{~m}^{3} / \mathrm{sec}$ in the following channels.
i) Rectangular Channel with width 2.1 m
ii) Triangular Channehwith $\mathrm{z}=0.5$

## OR

Q4) a) Explain.
i) Yarious 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.
i) Critical depth
ii) Minimum specific energy in terms of ceritical depth

Q5) a) Derive the following expression with usual iotations for conjugate depths of a hydraulic jump occurringin a rectangular channel.

$$
y_{2}=-\frac{y_{1}}{2} \pm \sqrt{\left(\frac{y_{1}}{2}\right)^{2}+\frac{2 q^{2}}{\hat{g} y_{1}}}
$$

b) A trapezoidal channe has to carry $143 \mathrm{~m}^{3} /$ minute of water is designed to have a minimum cross section. Find the bottom width and depth of flowif the bed slope is $1: 1200$, the slopes at $45^{\circ}$ and Chezy's Coefficient is 35 .

OR
Q6) a) A hydraulic jump type of energy dissipater is designed to have energy loss of 8.6 m , 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?
b) Derive the conditions for most efficientrectangalar channel section. [5]

