Total No. of Questions : 6] **SEAT No. :**

P5991

[Total No. of Pages : 3

TE/Insem./Oct. - 105
T.E. (Civil)
FLUID MECHANICS - II
(2015 Pattern) (Semester - I)

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

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
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) Explain the following terms of an aerofoil with neat sketches: **[6]**

i) Chord length

ii) Angle of attack

iii) Span

iv) Aspect Ratio

v) Stall Condition

b) A hemispherical tank of diameter 4.1m contains water upto a height of 1.6m. An orifice of diameter 50mm is provided at the bottom. Find the time required by water

i) to fall from 1.6m to 1m and

ii) for completely emptying the tank.

Take Cd = 0.61. **[4]**

OR

P.T.O.

Q2) a) On a flat plate of 2m (length) × 1 m (width), experiments were conducted in a wind tunnel with a wind speed of 50km/h. The plate is kept at such an angle that the co-efficient of drag and lift are 0.18 and 0.9 respectively. Take density of air = 1.15 kg/m^3 **[6]**

Determine :

i) Drag force
ii) Lift force
iii) Resultant force, and
iv) Power exerted by the air stream on the plate.

b) Derive the expression for rise in pressure due to gradual closure of valve in rigid pipes. State also the assumption made for it. **[4]**

Q3) a) A rectangular channel of 5.1m wide carries water at a depth of 3.1m. The bed slope of the channel is 0.0031. Find the average velocity and discharge in the channel. Also state whether the flow is tranquil or shooting. Assume Chezy's C = 50. **[6]**

b) Explain in brief the following terms: **[4]**

i) Concept of first hydraulic exponent
ii) Specific Force Diagram

OR

Q4) a) Explain in brief with neat sketches "Channel Transitions in Open channel". **[4]**

b) Derive the energy equation with usual notations.. **[6]**

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

$$\frac{y_2}{y_1} = \frac{1}{2}\left[-1 + \sqrt{1 + 8\left[\frac{y_c}{y_1}\right]^3}\right]$$

b) A trapezoidal channel having the side slope of 2H:3V carries water at 0.41m^3/sec. If the bed slope of the channel is 1 in 2000, determine the optimum dimensions of the channel. Take Chezy's constant C = 60.**[5]**

OR

Q6) a) Derive the following momentum equation for hydraulic jump in rectangular channel. Also state the assumption made for it. **[5]**

$$\frac{2q^2}{g} = y_1.y_2\,(y_2 + y_1)$$

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