Code No: RR210106

II B.Tech I Semester(RR) Supplementary Examinations, May/June 2010
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Differentiate between "cohesion" and " adhesion"

   (b) Determine the absolute pressure and the gauge pressure that would exist within

      i. a spherical droplet of water 5mm in diameter.
      ii. a jet of water 5mm in diameter. Surface tension of water at the prevalent temperature is 0.0736 N/m and the barometer reading stands at 750 mm of mercy. Take sp. Gravity of mercury as 13.55. [8+8]

2. A Trapezoidal plate of parallel sides and 2a and height h is immersed vertically in water with one of the side of lengths as horizontal and topmost. The top edge is at a depth h below the water surface. Determine the total force on one side of the plate and the location of the center of pressure. [16]

3. In a circular pipe the velocity varies as $v = v_m \left(1 - \frac{r^2}{R^2}\right)$ where v is the velocity at a radial distance r from the axis of the pipe and V_m is the maximum flow at the axis. Find the ratio of average velocity in the pipe to maximum velocity. [16]

4. (a) A turbine is set 40 m below the water level of a reservoir and is fed by 60 cm diameter pipe. If short pipe of 45 cm diameter discharges water from the turbine to atmosphere, neglecting friction, estimate the power extracted by the turbine when the discharge is 0.8 m^3/s.

   (b) Describe that each term in the Bernoulis equation represents the energy per unit weight. [8+8]

5. (a) Differentiate between

      i. Stream line body and bluff body
      ii. Friction drag and pressure drag.

   (b) A kite 60cm x 60cm weighing 2.943 N assumes an angle of 10° to the horizontal. If the pull on the string is 29.43N when the wind is flowing at a speed of 40 km/hr. Find the corresponding coefficient of drag and lift. Density of air is given as 1.25 kg/m^3. [8+8]

6. (a) Describe Reynold's experiment with a neat sketch. What are the outcomes of Reynolds experiment.

   (b) A crude oil of viscosity 0.97 poise and relative density 0.9 is flowing through a horizontal circular pipe of diameter 10cm and of length 10m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. [8+8]

7. If two pipes of diameter D and d and equal length L are arranged in parallel the loss of head for a flow of Q is h. If the same pipes are arranged in series the loss of head for the same flow Q is H. If d= 0.5D find the percentage of total flow through each pipe when placed in parallel and the ratio (H/h). Neglect minor losses and assume' f ' to be constant. [16]

8. (a) Show that a capolletti weir can be treated as equivalent to suppressed rectangular weir.

   (b) Water flows through a rectangular channel 1m wide and 0.5 m deep and then over a sharp crested Cipolletti weir of crest length 0.6 m. If the water level in the channel is 0.225 m above the weir crest find the discharge over the weir, if velocity of approach is neglected and find the discharge if it is considered. Take $c_d = 0.6$. [8+8]

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