Code: R7210106

R7

B.Tech II Year I Semester (R07) Supplementary Examinations, May 2013
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) Explain Pascal's law.
  (b) Explain any four properties of fluids.

2 (a) Define centre of pressure and derive the equation to find out the force exerted on a submerged plane surface when it is in vertical position.
  (b) A vertical rectangular gate 6 m high and 4 m wide has water on one side to a depth of 3 m and a liquid of G = 0.85 to a depth of 2 m on the other side. Find total pressure exerted on each side of the gate and resultant hydrostatic pressure both in magnitude and point of application with respect to the bottom.

3 (a) Give the classification of flows.
  (b) A 25 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 12 cm respectively. If the average velocity in the 25 cm diameter pipe is 3.5 m/s, find the discharge in this pipe. Also determine the velocity in 12 cm pipe, if the average velocity in 20 cm diameter pipe is 2 m/s. Sketch the configuration.

4 A 30 cm diameter pipe carries water under a head of 20 m with a velocity of 3.5 m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of the resultant force on the bend.

5 (a) Give the definitions for displacement thickness, momentum thickness and energy thickness.
  (b) When can boundary layer separation occurs and how can it be controlled?

6 A flow of 420 lpm of oil (G = 0.91) and viscosity = 1.24 poise is pumped through a pipeline 75 mm diameter having a length of 62 m and whose outlet is 3 m higher than its inlet. Estimate the power required for the pump if its efficiency is 60%.

7 (a) What is equivalent pipe and derive Dupuit's equation?
  (b) Three pipes of length 840 m, 520 m and 420 m and of diameters 510 mm, 410 mm and 310 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1750 m. Find the diameter of the single pipe.

8 A 30 cm ×15 cm venturimeter is provided in a vertical pipe line carrying oil of G = 0.9, the flow being upwards. The difference in elevation of the throat section and entrance section of the venturimeter is 30 cm. The differential U-tube mercury manometer shows a gauge deflection of 25 cm, find the discharge of oil and the pressure difference between the entrance section and the throat section. Take C_d as 0.98 and 'G' of mercury as 13.6.

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