Code: 9A01304

R09

B.Tech II Year I Semester (R09) Supplementary Examinations June 2016

FLUID MECHANICS

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Explain how an inverted U tube manometer is used to measure pressures.

(b) A differential manometer connected at the two points A and B in a pipe containing an oil of specific gravity 0.9 shows a difference in mercury levels as 150 mm. Find the difference in pressures at the two points.

2 (a) Derive the expression for total pressure and centre of pressure for horizontal plane surface.

(b) Explain about total pressure and centre of pressure.

3 (a) Derive the continuity equation for one dimensional flow of an incompressible fluid.

(b) The flow field of a fluid is given by $V= xyi + 2yzj – (yz + z^2)k$. Show that it represents a possible three dimensional steady incompressible continuous flow.

4 (a) What are the applications of Bernoulli's equation?

(b) A vertical venture meter carries a liquid of specific gravity 0.8 and has inlet and throat diameters of 150 mm and 75 mm respectively. The pressure connection at the throat is 150 mm above that at the inlet. If the actual rate of flow is 40 lit/s and the coefficient of discharge is 0.96, calculate the pressure difference between the inlet and throat in N/m^2.

5 Find the thickness of the boundary layer at the trailing edge of smooth plate of length 4 m and a width 1.5 m, when the plate is moving with a velocity of 4 m/s in stationary air. Take kinematic viscosity of air as 1.5×10^{-5} m^2/s.

6 Using Hagen-Poiseuille equation derive an expression for the head loss in a pipe of diameter D and length L in terms of Reynolds number and velocity head.

7 Determine the difference in the elevation between the water surfaces in the two tanks which are connected by horizontal pipe of diameter 400 mm and length 500 m. The rate of flow of water through the pipe is 200 liters/s. Consider all losses and take the value of f = 0.009.

8 Find the discharge over a rectangular weir of length 100 m, the head of water over the weir is 1.5 m. The velocity approach is given as 0.5 m/s. Take $C_d = 0.60$

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