PVP 14

Code: CE3T6

II B.Tech - I Semester–Regular/Supplementary Examinations – November 2017

FLUID MECHANICS
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11 x 2 = 22 M

1. a) Define Specific gravity and viscosity.
   b) Define different types of pressures along with a sketch showing the relationship between pressures.
   c) Define Centre of Pressure and explain the terms associated.
   d) Differentiate between laminar & turbulent flows.
   e) State Navier-Stokes equation.
   f) Give the assumptions of Bernoulli's equation.
   g) Mention any two characteristics of turbulent flow.
   h) State the reasons for minor losses in pipes.
   i) List out the measuring devices whose working is based on Bernoulli's equation.
   j) Define nappe and crest.
   k) Classify weirs based on the shape of opening.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 3 x 16 = 48 M

2. a) Distinguish between manometers and mechanical gauges. What are different types of mechanical gauges? 6 M

   b) A differential manometer is connected to two pipes whose centres are at 3 m difference in height. Higher level pipe is carrying liquid of specific gravity of 0.9 at a pressure of 1.8 bar and another pipe is carrying liquid at specific gravity of 1.5 at a pressure of 1 bar. The centre of pipe carrying low pressure liquid is 2 m above the higher level of the mercury in the manometer. Find out the difference in mercury level in the manometer in cm. 10 M

3. a) Derive the expression for 3 Dimensional continuity equation. 6 M

   b) An annular plate 3 m external diameter and 1.5 m internal diameter is immersed in water with its greatest and lowest depths below water surface as 4 m and 1.2 m respectively. Determine the total pressure and the position of the center of pressure on one face of the plate. 10 M

4. a) For the velocity profile for laminar boundary layer $u/U=3/2(y/\delta)-1/2(y/\delta)^3$. Determine the boundary layer

thickness and shear stress in terms of Reynolds number. 10 M

b) Write the Prandtl's boundary layer equations and state their significance. 6 M

5. a) Discuss in detail about the variation of friction factor with Reynolds number. 6 M

b) A reservoir discharges water into the atmosphere through a compound horizontal pipe line ABC. The compound pipe consists of two pipes as noted below. A is junction point with the reservoir. AB : Diameter = 10cm , length =25m, f = 0.02 BC : Diameter = 12cm , length = 35m, f= 0.02. The water level in the tank is 10m above the centre line of the pipe. Calculate the discharge considering all the minor losses. 10 M

6. a) Derive the expression for discharge through a triangle notch. 6 M

b) A 150 mm x 75 mm Venturimeter with Cd = 0.98 is to be replaced by an orifice meter having a value of Cd = 0.6. If both the meters are to give the same differential mercury manometer reading for a discharge of 100 lps and the inlet diameter remains 150 mm, what should be the diameter of orifice? 10 M