**B.Tech. 3rd Semester (Civil Engg.) F Scheme
Examination, December–2016
FLUID MECHANICS–I
Paper–CE–205–F**

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : Attempt any *five* questions.

1. (a) Find the total pressure and position of center of pressure on a triangular plate of base 2m and height 3m which is immersed in water in such a way that the plan of the plate makes an angle of 60° with the free surface of the water. The base of the plate is parallel to the water surface and at a depth of 2.5 m from water surface.

   (b) Write short notes on determination of compressibility. Newtonian and Non Newtonian fluids.   **20**

2. Define and distinguish between stream line, path line and streak line. What is meaning of flow net ? Can flow be used very near to boundary ?   **20**

3. Derive the Bernoulli's Equation along a stream line giving its assumption made. List out its engineering applications.   **20**

4. Write short notes on important dimensionless numbers and their significance geometric, kinematic and dynamic similarity. 20

5. A laminar flow is taking place in a pipe of diameter of 200 mm. The maximum velocity is 1.5 m/s. Find the mean velocity and radius at which this occur. Also calculate the velocity at 4 cm from the wall of pipe. 20

6. An oil of specific gravity 0.8 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 25 cm. calculate the discharge of oil through the horizontal venturimeter. Take $C_d = 0.98$. 20

7. For the velocity profile for laminar boundary layer

$$\frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^2$$

Determine the boundary layer thickness, shear stress, drag force and coefficient of drag in terms of Reynolds number. 20

8. Write short notes on
   (a) Prandtl mixing length hypothesis
   (b) Hydraulically smooth and rough pipes. 20

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