GUJARAT TECHNOLOGICAL UNIVERSITY

3rd Semester Civil Engineering – PDDC

Subject Code & Name : X30604 - Advanced Fluid Mechanics

Assignment - 1 (Kinematics and Dynamics)

Date : 18-08-2014

Theory :

1. Describe various types of fluid flow.
2. Derive an equation of continuity for three dimensional flow.
3. Discuss velocity potential function and stream function and also state how they differ.
4. Derive & Explain Euler's Equation of motion.
5. Explain "Flow Net". Write its uses and limitations.

Examples :

1. A 25cm diameter pipe carries oil of sp.gravity 0.9 at a velocity of 3 m/s. At another section the diameter is 20 cm. find the velocity at this section and also find mass rate of flow of oil.

2. The velocity in x y and z directions are given by
   $u = 2x - yt$
   $v = y - zt$
   $w = x - 3z + t$
   Determine the acceleration and velocity at point (1, 1, 2) and t = 1.

3. In a two dimensional incompressible flow, the fluid velocity components are given by $U = x - 4y$ and $V = -y - 4x$. Show that velocity potential exists and determine its form. Find also the stream function.

4. Water is flowing through a pipe having dia 30 cm and 15 cm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 29.43 N/cm2 and the pressure at the upper end is 14.715 N/cm2. Determine the difference in datum head if the rate of flow through pipe is 50lit/s