JC Bose University of Science and Technology, YMCA, Faridabad, Haryana
Fluid Mechanics and Fluid Machines (PCC-ME-303/21) Sessional Exam-1st Oct 2024
B.Tech Mechanical Engineering 3rd Semester

Max Marks-30 Time-01.30 hr

Note: Assume suitable missing data.

Q1. Discuss different types of fluids.

If the equation of a velocity profile over a plate is $v = 2y^{2/3}$; in which v is the velocity in m/s at a distance of y metres above the plate, determine the shear stress at y = 0 and y = 0.075m. Given $\mu = 8.35$ poise. (CO1) (10)

Q2. Derive hydrostatic law from the cartesian form of Euler's equation.

A conical tube is fixed vertically with its smaller end upwards. The velocity of flow down the tube is 4.5 m/s at the upper end and 1.5 m/s at the lower end. The tube is 1.5 m long and the pressure head at the upper end is 3.1 m of the liquid. The loss in the tube expressed as a head is:

$$\frac{0.3(V_1 - V_2)^2}{2g}$$

where V_1 and V_2 are the velocities at the upper and lower ends respectively. What is the pressure head at the lower end? (CO2) (10)

Q3. Derive Hagen Poisuielle's law.

A pipeline 0.225 m in diameter and 1580 m long has a slope of 1 in 200 for the first 790 m and 1 in 100 for the next 790 m. The pressure at the upper end of the pipeline is 107.91 kPa and at the lower end is 53.955 kPa. Taking f = 0.032 determine the discharge through the pipe. (CO3) (10)