CEE 3311 FLUID MECHANICS

TUTORIAL SHEET

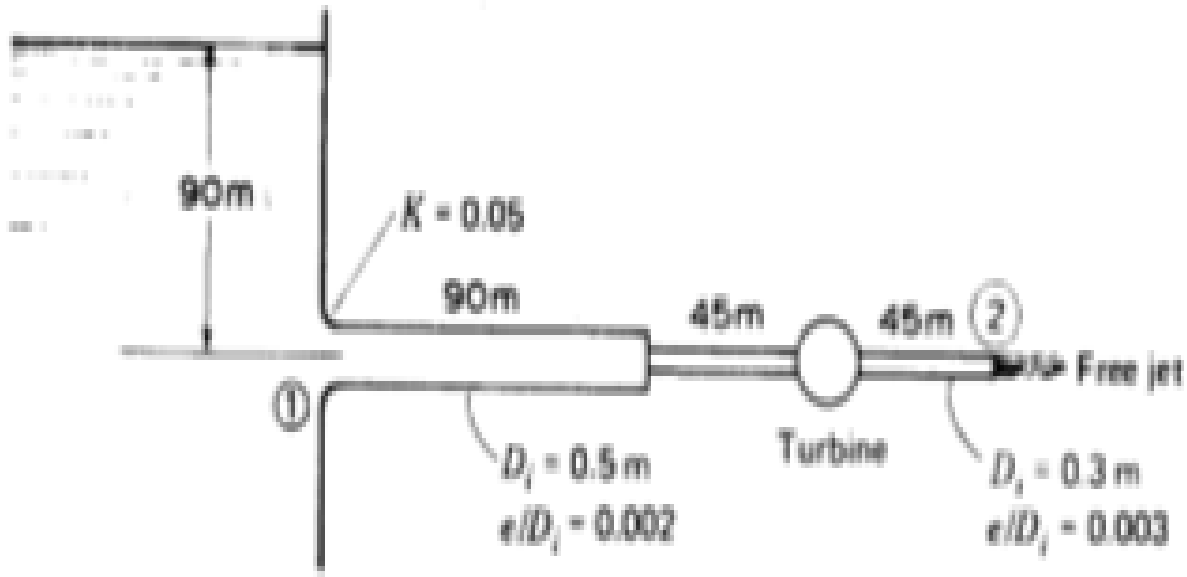
Q1. A flat plate 2mx2m moves at 40km/hr in stationary air of density 1.25kg/m3. If the coefficient of drag and lift are 0.2 and 0.8 respectively, find the lift force, the drag force, the resultant force and the power required to keep the plate in motion.

Q2. Is the continuity equation for steady, incompressible flow satisfied if the following velocity components are involved?

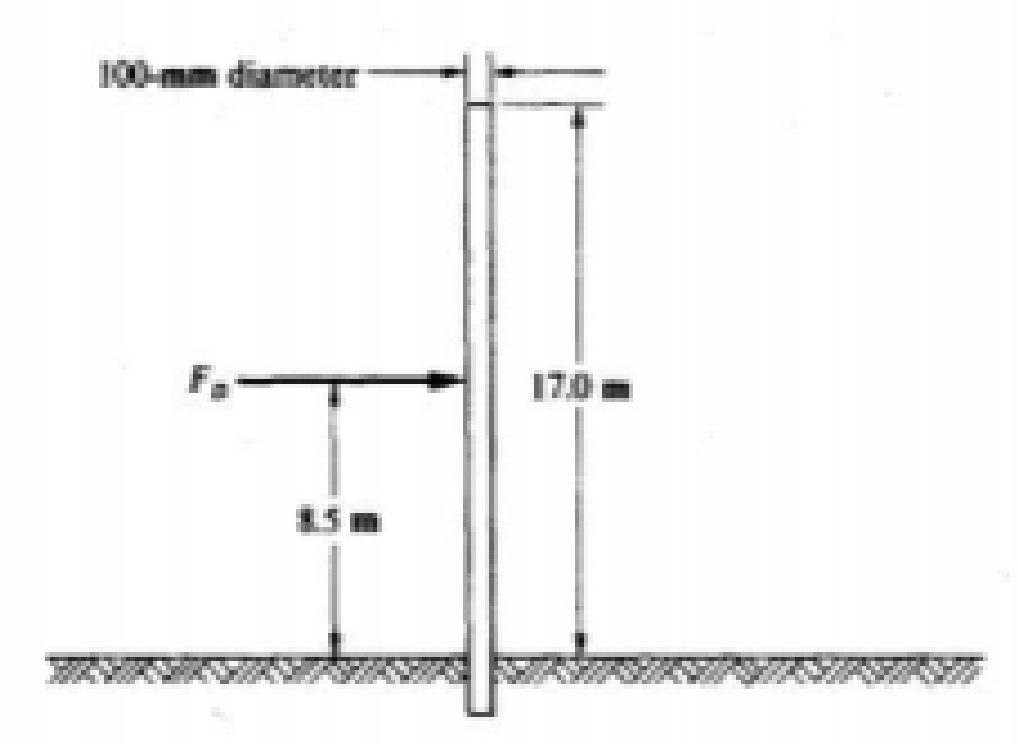
$U = 2X^2-XY+Z^2$ $V = X^2-4XY+Z^2$ $W = -2XY-YZ+Y^2$

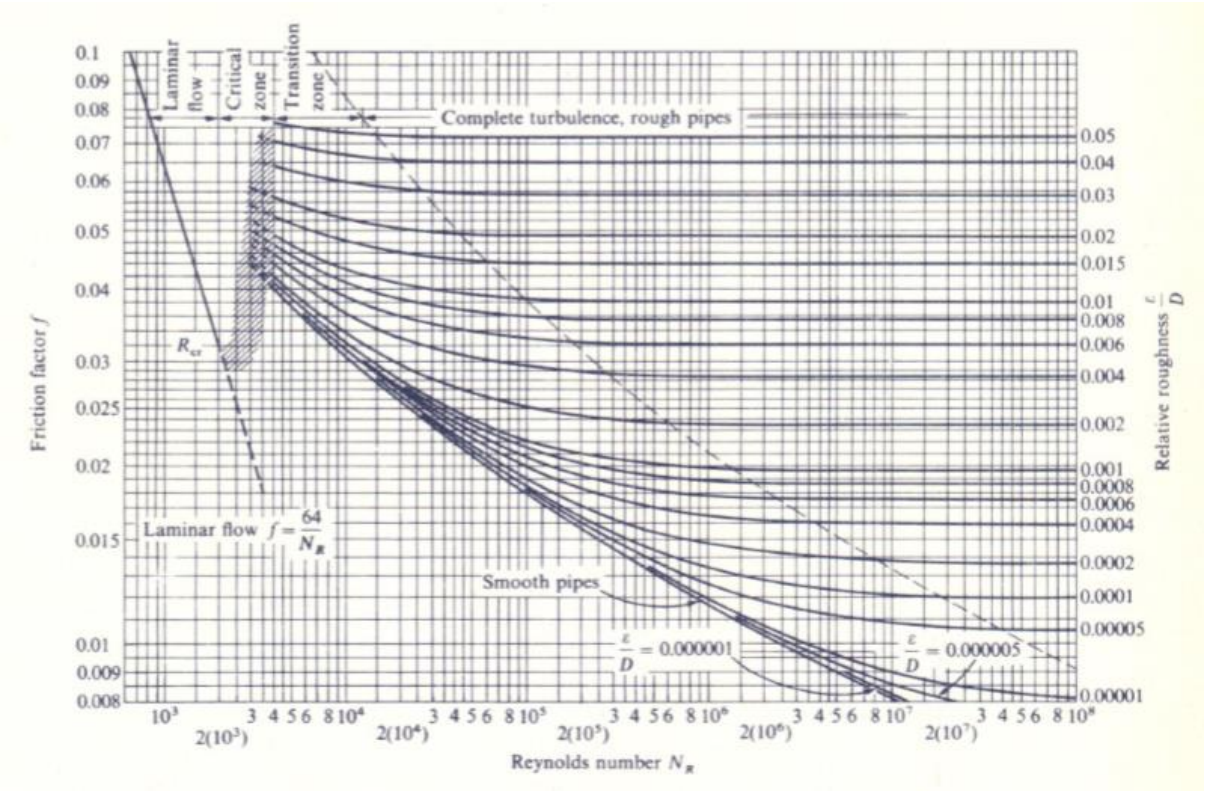
Q3. A 10m pipe with f = 0.0215 is required to carry fluid of kinematic viscosity $0.000019519m^2/s$ at the rate of $0.2267m^3/s$. If the head loss is to be 0.004. What is the diameter of this pipe, velocity and Reynolds number?

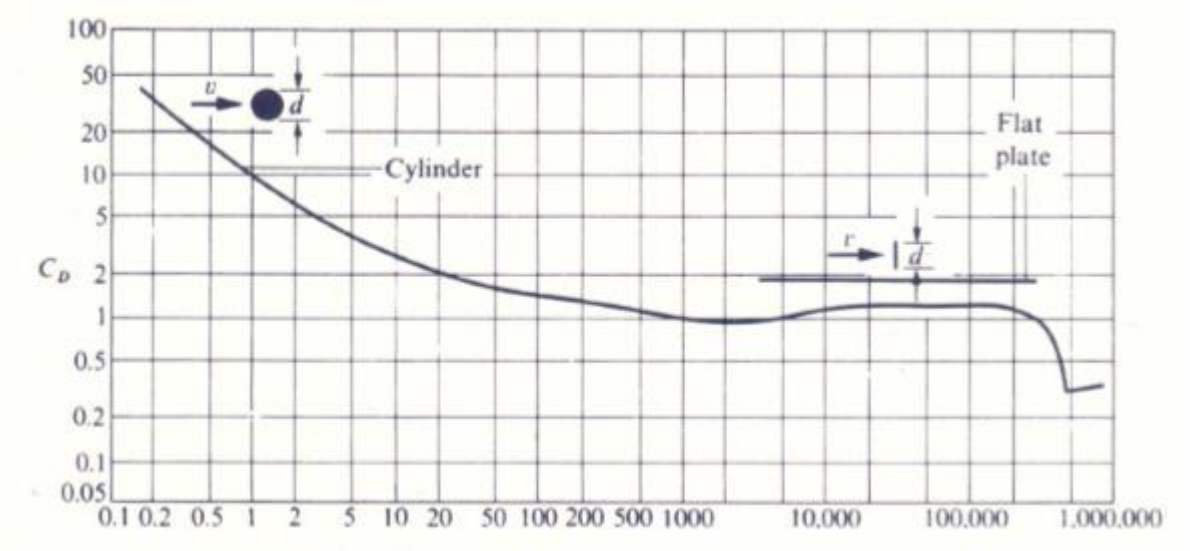
Q4. Plot the hydraulic grade line and the energy grade line for the pipe shown in the figure below. The turbine develops 45KW, the water is at 5°C.



Q5. The pole in the diagram below is a cylinder 100mm in diameter. Wind is blowing against it with a velocity of 15 m/s, and air temperature is 30°C, find the bending moment about the base at the ground level. Neglect end effects.







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