CE-6451 Fluid Mechanics and Machinery

Important 13Mark Questions

Unit I

1. With basic assumptions derive the Bernoulli's equation from the Euler's Equation.
2. If the velocity distribution of a fluid over a plate is given by u = $ay^2 + by + c$ with the vertex 0.2 m from the plate, where the velocity is 1.2 m/s. Calculate the velocity gradients and shear stresses at the distance of 0 m, 0.1 m and 0.2 m from the plate, if the velocity of the fluid is 0.85 Ns/m^2

Unit II

1. Derive the expression for shear stress and velocity distribution for the flow through circular pipe and using that derive the Hagen Poiseuille formula.
2. A pipe line of 0.6 m diameter is 1.5 km long. To increase the discharge, another line of the same diameter is introduced parallel to the first in the second half of the length. Neglecting minor losses, Find the increase in discharge if Darey's friction factor is 0.04. The head at inlet is 300 mm.

Unit III

1. Using Buckingham π method of dimensional analysis obtain an expression for the drag force R on a partially submerged body moving with a relative velocity V in a fluid; the other variables being the linear dimension L, height of surface roughness K, fluid density d and gravitational acceleration g.
2. Explain similitude with types of similarities.

Unit IV

1. Derive the expression for pressure head due to acceleration in the suction and delivery pipes of the reciprocating pimps.
2. Explain the working principle with the main parts centrifugal pump.

Unit V

1. Explain the working of Kaplan turbine. Construct its velocity triangles.
2. Draw inlet and outlet velocity triangles for a Pelton turbine and indicate the direction of various velocity components. Also obtain an expression for the work done per second by water on the runner of the Pelton wheel.