

CE 8302 Fluid Mechanics
Important 13mark questions

Unit I

1. List the various devices used to measure fluid pressure and explain any two of the manometer with neat sketch.
2. Describe the following properties of the fluid with the values of water at standard temperature and pressure: (1) Mass density, (2) Specific weight, (3) Specific gravity and (4) Viscosity.

Unit II

1. Derive 3D continuity equation in differential form.
2. Derive the Bernoulli's equation from Euler's Equation.

Unit III

1. Explain the procedure for dimensional analysis by Buckingham's law method.
2. Compute the velocity and rate of flow in the model, if a pipe of diameter 1.2 m is required to transfer an oil of specific gravity 0.9 and viscosity of 0.03 poise flowing at the rate of 3000 l/s. Tests were conducted on a 15cm diameter pipe using water at 20°C. Find the velocity and rate of flow in the model. Take Viscosity of water at 20°C = 0.01 poise.

Unit IV

1. Derive Hagen-Poiseuille's equation for viscous flow through a circular pipe.
2. Determine Reynolds number, velocity line, wall shear, and power required for the flow. Viscosity of the oil is 1 poise and specific gravity is 0.8, on the pipe of 500m, with 50mm dia. Rate of flow is 1.9lit/s.

Unit V

1. Describe boundary layer and the methods of preventing the separation of boundary layer.
2. For the velocity profile for laminar boundary layer $\frac{u}{U} = \frac{3}{2} \left(\frac{y}{\delta}\right) - \frac{1}{2} \left(\frac{y}{\delta}\right)^3$
Determine the boundary layer thickness, shear stress, drag force and co-efficient of drag in terms of Reynold number.