CET302-FLUID MECHANICS & HYDRAULIC MACHINES

2 Marks questions.

(a) What are the conditions for the most economical rectangular section of a channel?
(b) Write down the expression for loss of head due to friction by Darcy-Weisbach equation.
(c) Write down the expression for the meta -centric height of a floating body.
(d) Define laminar flow and turbulent flow.
(e) Define the terms HGL and TEL.
(f) What do you mean by total pressure and centre of pressure?
(g) What is a centrifugal pump?
(h) Define specific gravity of a fluid.
(i) What is a venturimeter? Write down an expression for discharge through a venturimeter.
(j) State Bernoulli's theorem for steady flow of an incompressible fluid.

5 Marks questions.

a) A hydraulic Press has a Ram of 20 cm diameter and a Plunger of 4 cm diameter. It is used for lifting a weight of 20 kN. Find the force required at the plunger.
b) The velocity distribution for flow over a flat plate is given by $u = \frac{3}{2}y - y^2$, where u is the point velocity in metre per second at a distance y metre above the plate. Determine the shear stress at y=9 cm. Assume dynamic viscosity as 8 poise.
c) One litre of crude oil weighs 9.6 N. Calculate its specific weight, density and specific gravity.
d) What are the assumptions made in the derivation of Bernoulli's equation? Derive Bermoulli's equation from Euler's equation.
e) A rectangular channel carries water at the rate of 400litre/second when bed slope is 1 in 2000. Find the most economical dimensions of the channel if C=50.
f) Explain various parts of a Centrifugal pump with a neat sketch.
g) Find the velocity of flow and rate of flow of water through a rectangular channel of 6 m wide and 3 m deep,when it is running full. The channel is having bed slope as 1 in 2000. Take Chezy's constant C=55.

10 Marks Questions

3.
a) What are the advantages of triangular notch over rectangular notch?
b) Determine the total pressure and depth of centre of pressure on a plane rectangular surface of 1 m wide and 3m deep when its upper edge is horizontal and (i) coincides with water surface and (ii) 2m below the free surface.

4.
a) State Newton's law of viscosity.
b) Water flows over a rectangular weir 1m wide and a depth of 150mm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively. Find the depth over the triangular weir.

5.
a) Define rate of flow of a fluid.
b) A 40cm diameter pipe conveying water branches into two pipes of diameter 30cm and 20cm. If average velocity in the 40cm diameter pipe is 3m/s. ,find the discharge in the pipe. Also determine the velocity in 20cm pipe if average velocity in 30cm diameter pipe is 2m/s.

6.
a) Define the term Buoyancy and centre of buoyancy.
b) Water is flowing through a pipe having diameter 300mm and 200mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2. Determine the difference in datum head if rate of flow through pipe is 40lit/sec.

7.   (a) What is a reciprocating pump?

        (b) The internal and external diameter of the impeller of a centrifugal pump are 200mm and 400m respectively. The pump is running at 1200rpm. The vane angles of the impeller at inlet and outlet are 20^0 and 30^0 respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by the impeller per unit weight of water