

Question Bank
FLUID MECHANICS - 4th semester

2 mark Question :-

1. PROPERTIES OF FLUID

- ① Define Density and its unit?
- 2) Define Specific weight, Specific gravity, specific volume and its unit?
- ③ Define viscosity and its unit?
- ④ Define Kinematic viscosity and its unit?
- ⑤ Define Capillarity? Define formula for capillary rise?
- ⑥ State Pascal's law?

2. Fluid pressure & measurement :-

- ⑦ what is vacuum pressure?

3. Hydrostatics :-

- 8) Define Hydrostatic pressure.
- 9) Define total pressure & centre of pressure?
- 10) Define total of pressure & centre of pressure of a vertical plane surface submerged in liquid.
- 11) Define Archimedes principle?

- 12) Define Buoyancy and centre of Buoyancy?

4. Kinematics of flow:

- 13) State continuity equation

- 14) Define orifice

- 15) ~~what~~ what is pitot-tube?

- 16) Define vena-contracta.

- 17) what is difference between notch and weir?

5 - Orifices, notches & weirs :-

- 18) Define pipe?

- 19) what are loss of energy in pipes?

6 - flow through pipe :-

- 20) Determine the loss of head due to friction in pipe using Darcy formula.

21) Determine the loss of head due to friction in pipes by using Chezy's formula?

7. Impact of jets :-

22) Derive work done on series of vanes.

23) Derive condition for maximum efficiency on series of vanes.

24) Derive work done on impact of jet on moving curved vanes.

25) Derive condition for maximum efficiency on moving curved vanes.

5 marks Question:-

- ① 1) calculate density, specific weight and weight of one litre of petrol of specific gravity = 0.7
- 2) A plate 0.025 mm distance from a fixed plate moves at 60 cm/s and requires a force of 2 N per unit area i.e. 2 N/m^2 to maintain this speed. Determine the fluid viscosity between the plate.
- 3) Define surface tension? find surface tension on liquid droplet, hollow bubble, and on a liquid jet?
- ② 4) Differentiate between (i) Absolute & gauge pressure
5) what are pressure measuring instrument
- ③ 6) Find the volume of water displaced & position of centre of buoyancy for a wooden block of width 2.5 m and depth 1.5 m, when it floats horizontally in water. The density of wooden block is 650 kg/m^3 & its length 6.0 m.
- 7) what are conditions of equilibrium of a floating and submerged bodies.
- ④ 8) state and prove Bernoulli's theorem.
- 9) Derive the expression $C_d = C_v \times C_c$
- 10) The head of water over the centre of an orifice of diameter 20 mm is 1 m. The actual discharge through the orifice is 0.85 lit/s. find

co-efficient of discharge.

(11) Find the discharge of water flowing over a rectangular notch of 2m length when the constant head over the notch is 300mm. take $C_d = 0.60$.

(5) 12) A rectangular channel 2m wide has a discharge of 250 lit/sec, which is measured by a right angle V-notch weir. Find the position of the apex of the notch from the bed of the channel if maximum depth of water is not to exceed 1.3m. $C_d = 0.62$.

(6) 13) Define & Explain (i) Hydraulic gradient line
(ii) Total gradient line.

(7) 14) Find the force exerted by a jet of water of diameter 75mm on a stationary flat plate, when the jet strikes the plate normally with velocity of 20m/s.

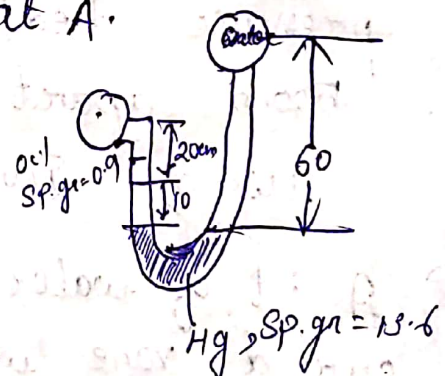
15) A jet of water of diameter 10cm strikes a flat plate normally with a velocity of 15m/s. The plate is moving with a velocity of 6m/s in the direction of the jet and away from the jet. Find
(i) The force exerted by jet on the plate
(ii) work done by the jet on the plate per sec.

10 marks Question:-

(1) Calculate the capillary effect in millimeters in a glass tube of 4mm diameter, when connected in (i) water (ii) mercury. The temperature of the liquid is 20°C & the values of the surface tension of water and mercury at 20°C in contact with air are 0.073575 N/m & 0.51 N/m respectively. The angle of contact for water is zero & that for mercury is 130° . Take density of water at 20°C as equal to 998 kg/m^3 .

(2) A simple U-tube manometer containing mercury is connected to a pipe in which a fluid sp. gr = 0.8 & having vacuum pressure is flowing. Other end of manometer is open to atmosphere.

(3) A differential manometer is connected at the two points A & B as shown. At B air pressure is 9.81 N/cm^2 . Find the absolute pressure at A.

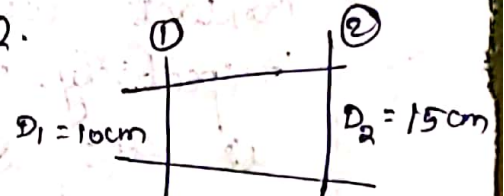


4) A rectangular plane surface is 2m wide & 3m deep. It lies on vertical plane in water. Determine the total pressure and position of centre of pressure on the plane surface when its upper edge is horizontal.

a) coincides with water surface.

b) 2.5m below the free surface,

5) ~~As a solid cylinder of~~
The diameter of a pipe at section 1 and 2 are 10cm and 15cm. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 15 m/s. Determine also the velocity at section 2.



6) A horizontal venturimeter with inlet and throat diameter 30cm and 15cm respectively is used to measure the flow of water. The reading of differential manometer connected to the inlet and the throat is 20cm of Hg. Determine the rate of flow; $C_d = 0.98$

7) Calculate the discharge through a pipe of diameter 200mm when the difference of pressure head between two ends of a pipe 500m apart is 4m of water. Take $f = 0.009$ using Darcy's Formula.

8) A jet of water having a velocity 15 m/s, strikes a curved vane which is moving with a velocity of 5 m/s in same direction as that of the jet at inlet. The vane is so shaped that the jet is deflected through 135° . The diameter of jet is 100mm.

- Force exerted by the jet on the vane in direction of motion.
- power exerted on the vane.
- efficiency of vane.