

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech., Summer 2017-18 Examination

Semester: 3

Subject Code: 03104202

Subject Name: Fluid Mechanics-I

Date: 11/06/2018

Time: 2:00 pm to 4:30 pm

Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - ((All are compulsory) (Each of one mark) (15)

1. Capillary fall occurs in case of which fluid
 a.) Water b.) Mercury c.) Oil d.) None of the above
2. Centre of buoyancy is
 a.) Centroid of floating body b) Centroid of fluid displaced
 c.) Centre of gravity d.) None of the above
3. The hydrostatic force acts through
 a.) Centre of pressure b.) Centre of top edge c.) Centre of bottom edge d.) Metacenter
4. Equation of continuity of flow is based on the principle of conservation of
 a.) Mass b.) Momentum c.) Force d.) All of these
5. Static head of a liquid particle is the sum of
 a.) Potential head and kinetic head b.) kinetic head and pressure head
 c.) potential head and pressure head d.) potential head, pressure head and kinetic head
6. Weight of water displaced by a floating wooden block of density 850kg/m^3 , 4 m long, 3m wide and 2 m high, is _____.
7. Vacuum pressure is the difference of atmospheric pressure and _____.
8. Define rate of flow.
9. Discharge Q over a triangular weir of length L and height H, is given by the equation _____.
10. Flow in pipes is turbulent if Reynold number is _____.
11. Give the relation between the hydraulic co-efficient C_v , C_c , C_d _____.
12. Define specific volume.
13. The ratio of dynamic viscosity and density is _____.
14. The unit of total pressure force is _____.
15. Simple manometers are used for measuring _____ between two points.

Q.2 Answer the following questions. (Attempt any three) (15)

- A) Define Viscosity and obtain an expression for it.
- B) State the various losses in a pipe along with the formulas
- C) Explain the following: (i) vortex flow, (ii) Centre of pressure (iii) Centre of buoyancy (iv) Buoyancy (v) Total Pressure Force
- D) Classify the different types of notches and explain any two.

Q.3 A) The water is flowing through a pipe having diameters 30cm and 20cm respectively. The rate of flow (07)

through pipe is 30 liters/sec. The section 1 is 5m above datum and section 2 is 3m above datum. If the pressure at section 1 is 40 N/cm^2 , find the intensity of pressure.

- B) Name the different classifications of the fluid flow and explain any two classifications in detail. (08)

OR

- B) State Hydrostatic Law and obtain the expression for it. (08)

Q.4 A) A block of wood of specific gravity 0.9 floats in water. Determine the metacentric height of the (07)

block if its size is $4\text{m} \times 3\text{m} \times 2\text{m}$. Also state whether the body is in stable or unstable equilibrium.

OR

- A) Derive the equation for total pressure and center of pressure for a vertical plane surface submerged in liquid. (07)

- B) Define Orifice. Explain the hydraulic co-efficient of an orifice and express the relationship between them. (08)