

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech. Summer 2018 Examination**

**Semester: 3**  
**Subject Code: 03104202**  
**Subject Name: Fluid Mechanics-I**

**Date: 27/05/2019**  
**Time: 02:00 pm to 04:30 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 rise occurs in case of which fluid  
a.) Water b.) Mercury c.) Petrol d.) None of the above
2. The distance between Metacenter and Centre of Gravity is known as  
a.) Centroid of floating body, b.) Metacentric Height c.) Centre of Buoyancy d.) None of the above
3. The hydrostatic force acts through  
a.) Centre of pressure ii.) Centre of top edge iii.) Centre of bottom edge iv.) Metacenter
4. The continuity equation is represented as  
a.)  $Q_1 = Q_2$  b.)  $M_1 V_1 = M_2 V_2$  c.)  $m_1 a_1 = m_2 a_2$ , d.) All of these
5. Total 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 the floating wooden block of density  $950 \text{ kg/m}^3$ , 3m long, 2m wide and 1 m high, is \_\_\_\_\_.
7. Gauge pressure is the difference of absolute pressure and \_\_\_\_\_.
8. Define rate of flow.
9. Discharge Q over a V-notch of angle  $\theta$  and height H, is given by the equation \_\_\_\_\_.
10. Flow in pipes is transitional if Reynolds number is \_\_\_\_\_.
11. Differential manometer has \_\_\_\_\_.
12. Define specific gravity.
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 Bernoulli's theorem. Write down the assumptions used for the derivation of it.
- C) Explain the following( Any 5): (i) Vortex flow, (ii) Rotation (iii) Centre of buoyancy (iv) Buoyancy (v) Total Pressure Force (vi) Mouthpiece
- D) Classify the different types of notches and explain any two.

**Q.3 A) Derive the equation for total pressure and center of pressure for an inclined plane surface submerged in liquid. (07)**

- B) A block of wood of specific gravity 0.9 floats in water. Determine the metacentric height of the 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. (08)

**OR**

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

**Q.4 A) Define Orifice. Explain the hydraulic co-efficient of an orifice and express the relationship between them. (07)****OR**

- A) The water is flowing through a pipe having diameters 30cm and 20cm at sections 1 & 2 respectively. The rate of flow through the 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  $40 \text{ N/cm}^2$ , find the intensity of pressure at section 2. (07)

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