

## FLUID MECHANICS

1. If a person studies about a fluid which is at rest, what will you call his domain of study?

- a) Fluid Mechanics b) Fluid Statics c) Fluid Kinematics d) Fluid Dynamics

2. The value of the Bulk Modulus of an ideal fluid is

a) zero

b) unity

c) infinity

d) less than that of a real fluid

3. In which type of matter, one won't find a free surface?

- a) Solid b) Liquid c) Gas d) Fluid

4. The value of the viscosity of an ideal fluid is

a) zero

b) unity

c) infinity

d) more than that of a real fluid

5. The value of the compressibility of an ideal fluid is

- a) zero b) unity c) infinity d) more than that of a real fluid

6. Which one of the following is the unit of mass density?

- a)  $\text{kg} / \text{m}^3$  b)  $\text{kg} / \text{m}^2$  c)  $\text{kg} / \text{m}$  d)  $\text{kg} / \text{ms}$

7. Which one of the following is the unit of specific weight?

a)  $\text{N} / \text{m}^3$  b)  $\text{N} / \text{m}^2$  c)  $\text{N} / \text{m}$  d)  $\text{N} / \text{ms}$

8. The value of the surface tension of an ideal fluid is

a) zero b) unity c) infinity d) more than that of a real fluid

9. Which one of the following is the dimension of mass density?

a)  $[\text{M}^1 \text{L}^{-3} \text{T}^0]$ .

b)  $[\text{M}^1 \text{L}^3 \text{T}^0]$ .

c)  $[\text{M}^0 \text{L}^{-3} \text{T}^0]$ .

d)  $[\text{M}^0 \text{L}^3 \text{T}^0]$ .

10. The specific gravity of a liquid has

a) the same unit as that of mass density

b) the same unit as that of weight density

c) the same unit as that of specific volume

d) no unit

11. The specific volume of a liquid is the reciprocal of

a) weight density b) mass density c) specific weight d) specific volume

12. Two fluids 1 and 2 have mass densities of  $\rho_1$  and  $\rho_2$  respectively. If  $\rho_1 > \rho_2$ , which one of the following expressions will represent the relation between their specific volumes  $v_1$  and  $v_2$ ?

a)  $v_1 > v_2$

b)  $v_1 < v_2$

c)  $v_1 = v_2$

d) Cannot be determined due to insufficient information.

13. A beaker is filled with a liquid up to the mark of one litre and weighed. The weight of the liquid is found to be 6.5 N. The specific volume of the liquid will be

- a) 1 l/kg
- b) 1.5 l/kg
- c) 2 l/kg
- d) 2.5 l/kg

14. Which one of the following is the dimension of specific weight of a liquid?

- a)  $[ML^{-3} T^{-2}]$ . b)  $[ML^3 T^{-2}]$  c)  $[ML^{-2} T^{-2}]$  d)  $[ML^2 T^{-2}]$

15. A beaker is filled with a liquid up to the mark of one litre and weighed. The weight of the liquid is found to be 6.5 N. The specific weight of the liquid will be

- a) 6.5 kN/m<sup>3</sup>
- b) 6.6 kN/m<sup>3</sup>
- c) 6.7 kN/m<sup>3</sup>
- d) 6.8 kN/m<sup>3</sup>

16. The viscous force the relative motion between the adjacent layers of a fluid in motion. Which one of the flowing fits best in the sentence?

- a) opposes
- b) never affects
- c) facilitates
- d) may effect under certain conditions

17. A beaker is filled with a liquid up to the mark of one litre and weighed. The weight of the liquid is found to be 6.5 N. The specific gravity of the liquid will be

- a) 0.65
- b) 0.66

- c) 0.67
- d) 0.68

18. The viscosity of a fluid in motion is 1 Poise. What will be its viscosity (in Poise) when the fluid is at rest?

- a) 0
- b) 0.5
- c) 1
- d) 2

19. For an incompressible fluid does density vary with temperature and pressure?

- a) It varies for all temperature and pressure range
- b) It remains constant
- c) It varies only for lower values of temperature and pressure
- d) It varies only for higher values of temperature and pressure

20. Specific gravity is what kind of property?

- a) Intensive
- b) Extensive
- c) None of the mentioned
- d) It depends on external condition

21. Which of the following correctly states how the viscosities of a liquid and a gas will change with temperature?

- a) Viscosity increases with the increase in temperature of a liquid and decreases with the increase in temperature of a gas
- b) Viscosity increases with the increase in temperature of a liquid and increases with the increase in temperature of a gas
- c) Viscosity decreases with the increase in temperature of a liquid and decreases with the increase in temperature of a gas

d) Viscosity decreases with the increase in temperature of a liquid and increases with the increase in temperature of a gas

22. If a glass tube of 10 mm diameter is immersed in water, what will be the rise or fall in capillary? (Take surface tension = 0.075 N/m,  $g = 10 \text{ m/s}^2$  and angle of contact = 0)

a) 0.75 mm

b) 1.5 mm

c) 3 mm

d) 6 mm

23. Which of the following is a unit of dynamic viscosity?

a)  $[M^1 L^1 T^{-1}]$ .

b)  $[M^1 L^{-1} T^{-1}]$ .

c)  $[M^1 L^{-2} T^{-2}]$ .

d)  $[M^1 L^{-2} T^{-2}]$ .

24. Which one of the following is not a unit of dynamic viscosity?

a) Pa-s

b)  $\text{N-s/m}^2$

c) Poise

d) Stokes

25. Which of the following is the dimension of kinematic viscosity?

a)  $[L^1 T^{-1}]$ . b)  $[L^1 T^{-2}]$  c)  $[L^2 T^{-1}]$ . d)  $[L^2 T^{-2}]$ .

26. Which one of the following is the CGS unit of dynamic viscosity?

- a) Stokes
- b) Pa-s
- c)  $\text{m}^2/\text{s}$
- d) Poise

27. The dynamic viscosity of a fluid is 1 Poise. What should one multiply to it to get the answer in  $\text{N-s}/\text{m}^2$ ?

- a) 0.1
- b) 1
- c) 10
- d) 100

28. The kinematic viscosity of a fluid is 0.1 Stokes. What will be the value in  $\text{m}^2/\text{s}$ ?

- a)  $10^{-2}$
- b)  $10^{-3}$
- c)  $10^{-4}$
- d)  $10^{-5}$

29. The shear stress at a point in a liquid is found to be  $0.03 \text{ N}/\text{m}^2$ . The velocity gradient at the point is  $0.15 \text{ s}^{-1}$ . What will be its viscosity (in Poise)?

- a) 20
- b) 2
- c) 0.2
- d) 0.5

30. Find the kinematic viscosity of oil having density  $1962 \text{ g}/\text{m}^3$ . The force experienced for area of  $20 \text{ m}^2$  is  $4.904 \text{ kN}$  and velocity of gradient at that point is  $0.2/\text{s}$ .

a) 0.625

b) 1.25

c) 2.5

d) None of the mentioned

31. Calculate the magnitude of capillary effect in millimeters in a glass tube of 7mm diameter, when immersed in mercury. The temperature of the liquid is 25°C and the values of surface tension of mercury at 25°C is 0.51 N/m. The angle of contact for mercury is 130°

a) 140 b) 280 c) 170 d) 210

32. In which types of fluids it is observed that momentum transfer dominates cohesive forces with increase in temperature and hence viscosity increases

a) Gases

b) Liquids

c) Solids

d) None of the mentioned

33. In liquids in order to measure the viscosity of fluid experimentally we consider the variation of shear stress with respect to what property?

a) strain

b) shear strain

c) rate of shear strain

d) none of the mentioned

34. Find the capillarity rise or fall if a capillary tube of diameter .03m is immersed in hypothetical fluid with specific gravity 6.5, surface tension 0.25 N/m and angle of contact 147°.

a) 0.44mm fall

- b) 0.88mm fall
- c) 0.44mm rise
- d) 0.88mm rise

35. For liquid fluids will capillarity rise (or fall) increase or decrease with rise in temperature.

- a) Increase
- b) Decrease
- c) Remain constant
- d) First decrease then increase

36. What will be the diameter (in mm) of a water droplet, the pressure inside which is  $0.05 \text{ N/cm}^2$  greater than the outside pressure? (Take surface tension as  $0.075 \text{ N/m}$ )

- a) 3
- b) 0.3
- c) 0.6
- d) 6

37. A soap bubble of  $d$  mm diameter is observed inside a bucket of water. If the pressure inside the bubble is  $0.075 \text{ N/cm}^2$ , what will be the value of  $d$ ? (Take surface tension as  $0.075 \text{ N/m}$ )

- a) 0.4
- b) 0.8
- c) 1.6
- d) 4

38. If a fluid of certain surface tension and diameter is used to create a soap bubble and a liquid jet. Which of the two, bubble or liquid jet, will have greater pressure difference on the inside and outside.

- a) Liquid jet
- b) Soap bubble



- c) Both will have same pressure difference
- d) None of the mentioned

39. The rise in the level of a liquid in a tube is  $h$ . What will be the rise in the level if the same amount of liquid is poured into a tube of half the diameter.

- a) 0
- b)  $h/2$
- c)  $h$
- d)  $2h$

40. The surface tension of fluid in contact with air at  $25^\circ\text{C}$  is  $0.51\text{N/m}$ . The pressure inside a droplet is to be  $0.05\text{ N/cm}^2$  greater than outside pressure. Determine the diameter of the droplet of water.

- a)  $4.08\text{mm}$
- b)  $8.16\text{mm}$
- c)  $2.04\text{mm}$
- d) None of the mentioned