# Chapter – 10 MECHANICAL PROPERTIES OF FLUIDS

## I. One mark questions (PART – A):

- 1. Mention the property which distinguishes liquids and gases from solids.(U)
- 2. Why liquids and gases are called as fluids?(K)
- 3. What is pressure?(K)
- 4. Define average pressure. (K).
- 5. Write the dimensions of pressure.
- 6. What is the SI unit of pressure?
- 7. Mention the common unit of pressure.
- 8. What is density of fluid?
- 9. Write the dimensional formula for density.
- 10. What is the SI unit of density?
- 11. State the Pascal's law.
- 12. What is gauge pressure?
- 13. Define atmospheric pressure.
- 14. What is the value of atmospheric pressure at sea level?
- 15. Mention the device used to measure atmospheric pressure.
- 16. Mention the common unit of pressure used in meteorology field.
- 17. How many pascal's equal to one bar pressure?
- 18. State the Pascal's law for transmission of fluid pressure.
- 19. Mention the principle on which the Hydraulic breaks work.
- 20. What is steady flow of fluid?
- 21. What is streamline flow of fluid.
- 22. Write the equation of continuity for streamline flow of fluid.
- 23. What is the critical speed with respect to flow of fluids?
- 24. What is turbulent flow of fluids?
- 25. Give an example where turbulence plays important role.
- 26. What is laminar flow of fluids?
- 27. Write Bernoulli's equation.
- 28. State the Bernoulli's principle.
- 29. Define viscosity of fluid.
- 30. Write the Bernoulli's equation for the fluid at rest.
- 31. What is meant by efflux?
- 32. Who discovered the speed of efflux?
- 33. What is Venturi-meter?
- 34. What is dynamic lift?
- 35. Define co-efficient of viscosity.
- 36. Write the dimensions of viscosity.
- 37. How the viscosity of the liquids varies with temperature?
- 38. How the viscosity of the gases varies with temperature?
- 39. What is terminal velocity?
- 40. Mention the cause for twinkling of stars.
- 41. What is Reynolds number?

- 42. Why the Reynolds number remains same in any system of unit?
- 43. Define surface energy.
- 44. Define surface tension.
- 45. How does the surface tension of liquid varies with temperature?
- 46. When does fluid will stick to a solid surface?
- 47. Define angle of contact.
- 48. When does a liquid wet the solid surface?
- 49. What is the angle of contact forms between mercury and solid surface.
- 50. Write the equation, which gives the relation between surface tensions of liquidair, solid-air and solid-liquid.
- 51. Mention the kind of angle of contact forms if  $S_{sl} > S_{la}$ . (i.e., Surface tension of solid-liquid is greater than the liquid-air)
- 52. . What is the cause for capillary action?
- 53. Why water does not wet grease or dirt?
- 54. How terminal velocity of the bob in a viscous medium is related to radius of the bob?

### II. <u>Two mark questions (PART – B):</u>

- 1. Write the equation for gauge pressure and explain the terms.(U)
- 2. Write the expression for absolute pressure and explain the terms.(U)
- 3. Mention the two fields in which 'mm of Hg' and 'torr' units are used to measure pressure.(A)
- 4. Mention any two applications of Pascal's law.(A)
- 5. Write the Bernoulli's general expression and explain the terms.(U)
- 6. Write the Stokes' law expression and explain the terms.(U)
- 7. Mention the factors on which viscous drag force 'F' depends.(U)
- 8. Write the expression for terminal velocity and explain the terms.(U)
- 9. Mention the factors on which terminal velocity depends.(U)
- 10. Write the expression for coefficient of viscosity and explain the terms.(U)
- 11. Write the expression of Reynolds number and explain the terms.(U)
- 12. Write the equation for surface tension and explain the terms.(U)
- 13. Why are drops and bubbles spherical?(U)
- 14. Write the expression for terminal velocity of the spherical body inside fluid. Explain the terms.(U)
- 15. Write the expression for capillary rise and explain the terms.(U)
- 16. Write the expression for pressure difference in liquid drops.(U)
- 17. Write the expression for pressure difference in air bubble.(U)

### 18. Three mark questions (PART – C):

- 1. Mention the factors on which gauge pressure at a point inside the fluid depends.(U)
- What is the average pressure on human two thigh bones, each of cross-sectional area 10cm<sup>2</sup> support the upper part of human body of mass 50kg? (Taking 'g' = 10 ms<sup>-2</sup>) (Ans: 2.5 x 10<sup>5</sup>Nm-<sup>2</sup>)(A)
- 3. Differentiate the streamline motion, turbulent motion and unsteady motion on the basis of Reynolds number.(A)
- 4. Derive the expression for pressure difference in liquid drops.(U)
- 5. Mention three application of surface tension.(U)

### Five mark questions (PART – D):

- 1. State and prove the Pascal's law.
- 2. Deduce the expression for variation of pressure with depth in fluid which is at rest in a container. ( U & A & S)
- 3. Derive an expression for co-efficient of viscosity. (U & A & S)
- 4. Derive the expression for capillary rise by drawing a relevant diagram.( U & A & S)

#### Problem

1. At a depth of 1000m in an ocean (a) What is the absolute pressure? (b) What is the gauge pressure? (c) Find force acting on the window of area 20 cm x 20 cm of a submarine at this depth, the interior of which is maintained at sea level atmospheric pressure. (Given: The Density of sea water is  $1.03 \times 10^3$  kgm<sup>-3</sup> and g = 10 ms<sup>-2</sup>) [Ans: (a)  $104.01 \times 10^5$  Pa, (b)  $103 \times 10^5$  Pa and (c)  $4.12 \times 10^5$  N]