State	**PARISHRAM ACADEMY** **NAME of Student : _____** **Subject : Physics** **Class : XII** **Topic: 2 - Mechanical Properties of Fluids** **Total Marks :- 35**	

SECTION – A

Q. 1. Select the write the correct answer: **(4 Marks)**

(i) Two capillary tubes of radii 0.3 cm and 0.6 cm are dipped in the same liquid. The ratio of heights through which the liquid will rise in the tubes is

(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

(ii) The energy stored in a soap bubble of diameter 6 cm and T = 0.04 N/m is nearly

(a) 0.9×10^{-3} J (b) 0.4×10^{-3} J (c) 0.7×10^{-3} J (d) 0.5×10^{-3} J

(iii) The surface tension of a liquid is T. The increase in its surface energy on increasing the surface area by A is

(a) $\frac{A}{T}$ (b) A^2T (c) AT (d) A^2T^2

(iv) Two hail stones with radii in the ratio of 1 : 4 fall from a great height through the atmosphere. Then the ratio of their terminal velocities is

(a) 1 : 2 (b) 1 : 12 (c) 1 : 16 (d) 1 : 8

Q. 2. Answer the following: **(3 Marks)**

(i) State the properties of a fluid.

(ii) Define intermolecular force.

(iii) Define Sphere of influence

SECTION – B

Attempt any Four **(8 Marks)**

Q. 3. Derive an expression for pressure exerted by liquid column. On which factors does the pressure due to liquid column depend ?

Q. 4. Write a note on atmospheric pressure.

Q. 5. State Pascal's law of fluid pressure. Describe the experimental proof for the same.

Q. 6. Define and explain surface tension. Write down its unit and dimension.

Q. 7. A rectangular wire frame of size 2 cm × 2 cm, is dipped in a soap solution and taken out. A soap film is formed, if the size of the film is changed to 3 cm × 3 cm, calculate the work done in the process. The surface tension of soap film is 3×10^{-2} N/m.

SECTION – C

Attempt any Four **(12 Marks)**

Q. 8. Explain surface tension on the basis of molecular theory.

Q. 9. Twenty seven droplets of water, each of radius .1 mm coalesce into a single drop. Find the change in surface energy. Surface tension of water is 0.072 N/m.

Q. 10. Define terminal velocity. Obtain an expression for the terminal velocity of a small sphere falling under gravity through a viscous fluid.

Q. 11. Water rises to a height 3.2 cm in a glass capillary tube. Find the height to which the same water will rise in another glass capillary having half area of cross section.

Q. 12. A capillary tube of radius 0.5 mm is dipped vertically in a liquid of surface tension 0.04 N/m and relative density 0.8 g/cc. Calculate of contact is 10^o. [g = 9.8 m/s^2]

SECTION – D

Attempt Any Two: **(8 Marks)**

Q. 13. (a) What is critical velocity ? State its formula.

(b) What is Reynold's number ? Explain how Reynold's number is used to determine the nature of flow of liquid.

Q. 14. State equation of continuity. Give explanation for the same.

Q. 15. A spherical liquid drop of diameter 2×10^{-4} m is falling with a constant velocity through air under gravity. If the density of the liquid is 500 kg/m^3 and the coefficient of viscosity of air is 2×10^{-5} Pa-s, determine the terminal velocity of the drop and the viscous force acting on it. Neglect the density of air. [g = 9.8 m/s^2]