

Pre-Content/content Post-Content	Learning outcomes/Objectives	
	General	Specific
<u>Pre Content</u> Force, pressure, mass, density, volume. <u>Content</u> Gauge pressure, absolute pressure, atmospheric pressure, Pascal's law and its applications, barometer, manometer, Bernoulli's principle and its applications, Viscosity, Stoke's Law, Surface tension and its applications, angle of contact and capillary rise. <u>Post Content</u> Numerical problems on: Pressure, Pascal's Law, Bernoulli's Principle, Angle of Contact, viscosity and capillary rise.	Students will be able to: illustrate the applications of Pressure exerted by fluids. state and apply Bernoulli's principle in daily life situations. discuss the fluid friction in detail. study the concept of Surface tension in detail.	Students will be able to: - recall pressure and its SI units - state and apply Pascal's law of equal transmission in hydraulic lifts and brakes. - derive an expression for gauge pressure and absolute pressure. - apply the concept of gauge pressure to explain the working of a barometer and manometer. - define streamline and turbulent flow and state the conditions for turbulent flow - derive the equation of continuity - derive Bernoulli's equation. - interpret and apply Bernoulli Effect in the filter pump, venturi meter and atomizers, speed of efflux and Magnus effect. - solve problems by the help of Bernoulli's equation - define viscous and non-viscous fluids - describe that viscous force in a fluid causes a retarding force on an object moving through it - define and apply Stokes law to derive an expression for terminal velocity of spherical body falling through viscous fluids - define and interpret Surface Tension and surface energy. - define angle of contact. - derive expression for excess pressure inside drops and bubbles. - Illustrate capillary rise.

Home Work /Assignments:

- NCERT exercise discussed in the class is given as the home task.
- Assignment worksheets are given at the end of the chapter.

Teacher's Activity	Student's Activity	Teacher's observation and Remedial
Teacher will help students recall the formula for pressure done in class IX and introduce Pascal's law of equal transmission. derive the expression for Gauge pressure and absolute pressure. discuss the types of flow of fluids and hence obtain the equation of continuity. Annexure 9(A) demonstrate an activity to verify Bernoulli's Principle guide students to derive Bernoulli's Principle mathematically. discuss various applications of Bernoulli's principle. define Viscosity and Viscous Drag in fluids. state Stoke's law to calculate viscous drag on an object flowing through a viscous fluid. demonstrate an experiment to calculate terminal velocity of a metal ball flowing through glycerine explain the presence of extra energy of the surface liquid which results in Surface tension. define angle of contact and discuss its applications. discuss excess pressure and capillary rise as an application of Surface Tension.	Students will comprehend the application of Pascal's Law of equal transmission by explaining the working of Hydraulic brakes and lifts. apply the formula obtained to define and explain the working of manometer and barometer. define streamline and turbulent flow with examples. Annexure 9(a) perform the activity and discuss the real-life applications of Bernoulli's principle. apply work-energy theorem to derive Bernoulli's equation. apply Bernoulli's principle to explain :- the working of venturimeter, the Magnus effect, Torricelli's Law etc. identify viscous drag as the force of friction between the layers of Fluid apply Stoke's law to find out the expression for terminal velocity. perform an experiment to find the coefficient of viscosity of Glycerine. understand that the phenomenon of surface tension is only possible in liquids. apply the knowledge of angle of contact to explain situation based problems. derive the expressions for excess pressure and capillary rise, following the guidance of the teacher.	

Teaching Aids: Active inspire, ICR, glycerine in a long tube, metal balls, screw gauge and stop watch.

Methodology/Innovative: Enquiry, Discussion, Demonstration and experimentation.

Interdisciplinary Links: Mathematics

Annexure 9(A), 9(a) - Blowing between the Balloons

Subject	Physics
Class	XI
Chapter/Unit	Mechanics of fluids
Topic	Bernoulli's Principle
Time	10 minutes
Nature of Activity	Pair Work

What will I learn (Learning Outcome)?

To verify the statement of Bernoulli's theorem which states that an increase in the speed of a fluid occurs simultaneously with a decrease in static pressure or a decrease in the fluid's potential energy

Skills : Analyzing and Creating

What I have to do?

To verify that as the speed of air increases in a region, its static pressure decreases.

What do I require?

Two balloons, a thread roll and a wooden stick/metal rod.

What do I need to know?

Bernoulli's Principle holds true for a fluid that is incompressible, has a streamline flow and is non-viscous in nature. Bernoulli's theorem which states that an increase in the speed of a fluid occurs simultaneously with a decrease in static pressure or a decrease in the fluid's potential energy.

➤ **Teacher's Activity**

Teacher will

1. discuss the statement of Bernoulli's Principle.
2. make pairs of the students and will explain the steps of the activity.
3. ensure that each participant of the pair performs the activity on his/her own.

How will I proceed?

➤ **Student's Activity**

1. Blow up two balloons and tie off the ends.
2. Cut two pieces of string 1 foot each. Tie one end of each string to each balloon.
3. Tie both the balloons on a wooden stick/metallic rod.
4. Blow very hard between the two balloons and observe what happens.

What have I observed?

Tick the correct option:

S. No.	After blowing, the balloons come closer	After blowing, balloons move further away from each other
1		

What have I learnt?

As we blow hard between the two balloons, they move _____ as the pressure in between the balloons is _____ as compared to the either sides.

What am I curious to learn?

- Let us take a paper strip and blow above it. What do I observe and why?
- Let us take a hair dryer and keep it in a vertical position. Turn it on and keep a ping pong ball right above the stream of hot air coming out of the hair dryer. What do I observe and why?

Let me evaluate myself

- 1) State Bernoulli's Principle.

- 2) Express Bernoulli's Principle mathematically.

- 3) During a storm/tornado, the roof of the house is blown up. Justify the statement by giving reason.

- 4) It has been observed that it is difficult to hold an umbrella in a strong wind. Explain why?

- 5) Discuss the geometry of a venturimeter and an aerofoil as an application of Bernoulli's Principle.
