EXERCISE

SHORT QUESTIONS

Q:- 6.1 Explain what do you understand by the term viscosity?

ANS:- See artical 6.1 in theory.

Q. 6.2 :- What is meant by drag force? what are the factors upon which drag force acting upon a small sphere of radius 'r' moving down through a fluid, depend?

ANS. :- Drag Force :- An object moving through a fluid experience a retarding force (which acts opposite to its motion) is called Drag Force.

By Stoke's law its relation is given as:

$$F_D = 6\pi\eta r v$$

Factors :-

(i)- **Velocity :-** The drag force is directly proportional to the speed of the body in the fluid.

(ii)- **Radius :-** The drag force also depends upon radius of the object (sphere).

(iii)- **Nature of Fluid :-** It also deperds upon coefficient of viscosity of the fluid, i-e nature of the fluid.

NOTE :- In the given case, radius of small sphere is given i.e 'r' which means that radius remains constt. Then drag force will depend upon velocity of the object and nature of the fluid only.

Also $V_t = 2gr^2\rho/9\eta$ So $V_t \propto \rho$ $\therefore F_D \propto \rho$

Q. 6.3 :- Why fog droplets appear to be suspended in air?

ANS. :- As we know that

$$V_t = \frac{mg}{6\pi\eta r}$$

As mass of fog droplet is very small, so its terminal velocity will also be very small.

For this reason, fog droplets appear to be suspended in air as its speed is very low.

Q. 6.4 :- Explain the difference between laminar flow and turbulent flow.

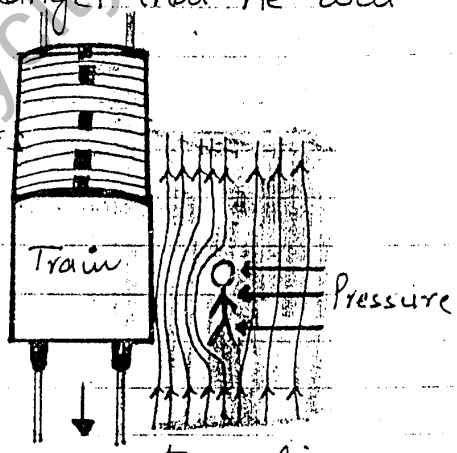
ANS :- See Theory

Q. 6.5 :- State Bernoulli's relation for a liquid in motion and describe some of its applications.

ANS. :- See Theory.

Q. 6.6 :- A person is standing near a fast moving train. Is there any danger that he will fall towards it?

ANS. :- As we know from applications of Bernoulli's theorm that, Where the speed is faster, there the stream-lines are forced closer together and pressure will be low there.



So between train and person streamlines are closer due to high speed, there will be low pressure exerted by fluid on person. But on the other side speed of fluid is low and streamlines are spaced together so from that side pressure will be greater. Therefore there will be a danger for a person that he will fall towards the fast moving train.

Q-6.7 :- Identify the correct answer. What do you infer from Bernoulli's theorm?

(i)- Where the speed of the fluid is high the pressure will be low?

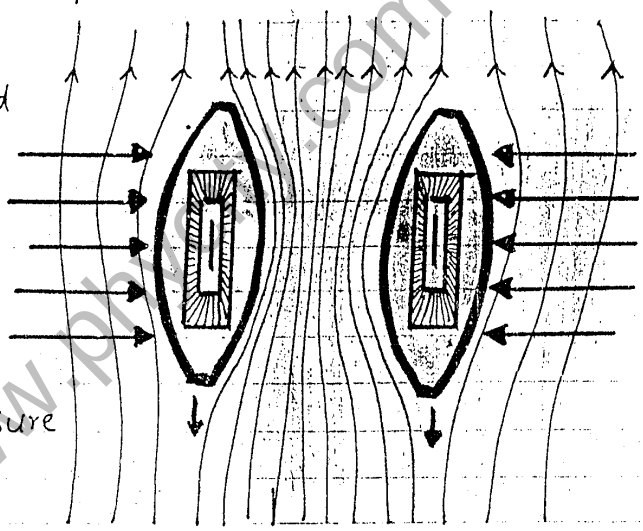
(ii)- Where the speed of the fluid is high, the pressure is also high.

(iii)- This theorm is valid only for turbulent of the liquid

ANS. :- The correct answer is (i). Where the speed of the fluid is high the pressure will be low.

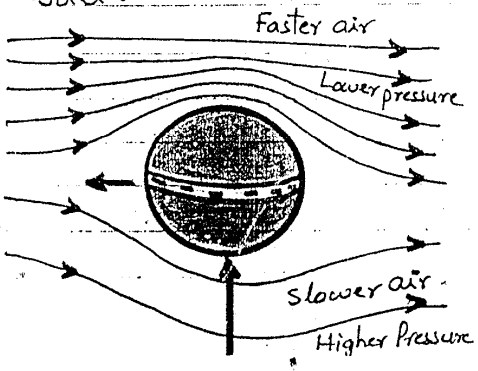
Q. 6.8 :- Two row boats moving parallel in the same direction are pulled towards each other. Explain.

ANS. According to Torricelli's theorem and relation b/w velocity and pressure, the stream lines are forced closer with each other if speed is faster. And where speed is faster, the pressure will be lower. Between row boats the velocity of fluid is high but pressure is low and out side the boats velocity is low but pressure is large, So these pressures will force the boats towards each other as shown in figure.



Q. 6.9 :- Explain, how the swing is produced in a fast moving cricket ball.

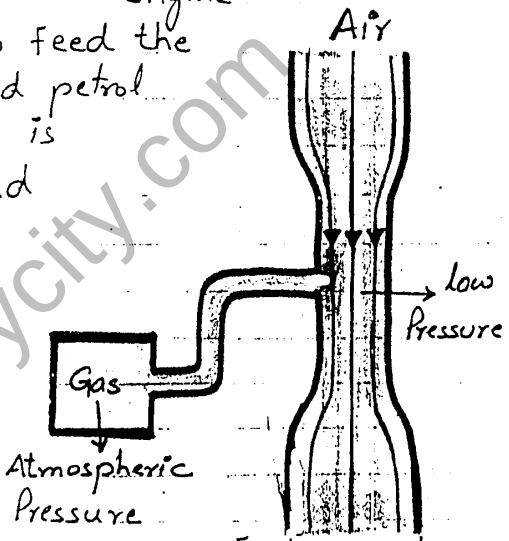
ANS:- When a bowler bowled a cricket ball, then it spins as well as moves forward. The velocity of air on one side of the ball increases on one of its surface (i-e shinned one) due to which pressure decreases.



where as on the other surface (i-e rough one), velocity of air decreases, so pressure increases. This gives an extra curvature to ball known as swing, which may deceive an opponent batsman.

Q. 6.10 :- Explain the working of a carburetor of a motorcar using Bernoulli's principle.

ANS :- The carburetor of a car engine uses a Venturi duct to feed the correct mix of air and petrol to the cylinders. Air is drawn through duct and along a pipe to the cylinders. A tiny inlet at the side of duct is fed with petrol.



The air through the duct moves very fast, creating low pressure in the duct, which draws petrol vapour into the air stream.

Q. 6.11 :- For which position will the maximum blood pressure in the body have the smallest value

(a)- Standing up right
(b)- Sitting
(c)- Lying horizontally
(d)- Standing on one's head.

ANS.:- (C) The maximum blood pressure in the body have the smallest value when body is lying horizontally.

Q. 6.12.: In an orbiting space station, would the blood pressure in major arteries in the leg ever be greater than the blood pressure in major arteries in the neck?

The End