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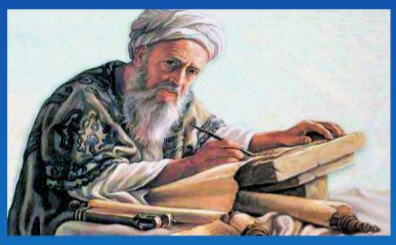
SEVEN MUSLIMS NOTES

PHYSICS 11



Al-Biruni (973–1048) calculated the Earth's radius and worked on the physics of planetary motion.

Best Regards to

Sir Muhammad Ali

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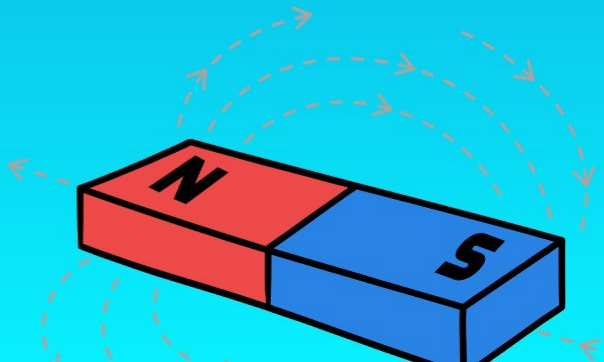

FLUID DYNAMICS

EXERCISE SHORT QUESTIONS

6.1. Explain what do you understand by the term viscosity?

"Frictional effect between different layers of a flowing fluid is called viscosity."

OR "Viscosity means how much force is required to slide one layer over other."

Example:

Viscosity of honey is much greater than water.

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 liquid depend?

"An object moving through a fluid experiences a retarding force called drag force."

Dependence:

Drag force depends upon

1. Speed of the moving object
2. Shape of the object
3. Viscosity of the fluid

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

6.3. Why fog droplet appears to be suspended in air?

The terminal velocity of a fog droplet falling vertically downward is given as

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

$$v \propto m$$

Since mass of fog droplet is very small therefore it falls with very small velocity such that it appears to be suspended.

6.4. Explain the difference between laminar flow and turbulent flow.

	Laminar flow	Turbulent flow
1.	The flow is said to be streamline or laminar if every particle moves along exactly the same path as followed by particles which passed that point earlier.	The irregular or unsteady flow of the fluid is called turbulent flow.
2.	**For example:** Flow of water from a tap, flow of blood through capillaries.	**For example:** Water flow in river.

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

The sum of pressure, kinetic energy per unit volume and potential energy per unit volume for a non viscous, incompressible fluid flowing steadily through a non-uniform pipe is constant.

Applications:

1. Swing in a cricket ball
2. Working of carburetor of a car
3. Working of Perfume sprayer

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

Yes, the speed of air between the person and the train is high creating there a low pressure area while pressure of air behind the person is high, so there is a danger that the high pressure air can push the person towards the train.

6.7.Identity the correct answer according to Bernoulli's effect.

(i) Where the speed of the fluid is high the pressure will be low. **(True)**

(ii) Where the speed of the fluid is high the pressure is also high. **(False)**

(iii) This theorem is valid only for turbulent flow of the liquid. **(False)**

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

The speed of water between the boats moving parallel in the same direction is high creating there a low pressure area while pressure on other sides of the boats is high, so high pressure water pushes the boats towards each other.

6.9. Explain how the swing is produced in a fast moving cricket ball?

When a cricket ball is thrown by a bowler, the speed of air on shining side of the ball is greater creating there a low pressure area while on the rough side the speed of air is less and pressure is high. So high pressure air deflects the ball towards low pressure area.

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

Carburetor of a car engine uses a venture duct to feed the correct mixture of air and petrol to the Cylinders. A tiny inlet at the side of the duct is fed with petrol. The air through the duct moves very fast, Creating a low pressure in the duct, which draws petrol vapours into the air stream.

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

c) Lying horizontally, because each part of the body is at equal distance from the reference surface and approximately at the level of heart.

6.12. In an orbiting space station, would the blood pressure in major arteries in the leg ever be larger Than the blood pressure in major arteries in the neck?

No, under weightlessness condition, the blood pressure will be equal in major arteries of leg and neck in an orbiting space station.