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FIRST YEAR B.Sc.
24PHY11101:Mechanics
(Semester I)

Program: B.Sc. Code(03)
Program Specific: B.Sc.(General)
Course Type: Major
Paper: Mechanics

Credits: 2
Time: 2 Hours
Max. Marks: 30
SET: A

Instructions to the candidate:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Draw a well labelled diagram wherever necessary.

Q1) Attempt ANY FIVE of the following: [5 X 2 = 10]

- a) Define stress. What is its unit?
- b) What is an inertial frame of reference?
- c) Define angle of contact. State under what conditions it is zero.
- d) What is a streamline flow?
- e) Define coefficient of viscosity. Give its S.I. unit.
- f) State and explain Newton's second law of motion.
- g) What is bending of a beam?

Q2) Attempt ANY THREE of the following: [3 X 4 = 12]

- a) What is electromagnetic force? Give its properties?
- b) With the help of a neat diagram, explain working of a pitot tube. Derive expression for speed of flow.
- c) Define surface tension.

The tube of mercury barometer has an internal diameter of 5 mm. How much error does surface tension introduce in the readings? What does the negative height indicate?

Given: Angle of contact is 128° and surface tension is $465 \times 10^{-3} \text{ N/m}$.

- d) Define Poisson's ratio.

Calculate the Poisson's ratio for silver. Given: Young's modulus for silver is $7.25 \times 10^{10} \text{ N/m}^2$ and bulk modulus is $11 \times 10^{10} \text{ N/m}^2$.

e) Write a note on various types of beam loading and support.

Q3) Attempt ANY TWO of the following:

[2 X 4 = 08]

a) What is pseudo force? Illustrate with examples.

b) State Bernoulli's theorem.

Water flowing in a horizontal pipe has a speed 20 cm/s at one end point and 15 cm/s at another point. Determine the pressure drop between two points.

c) Write a note on factors affecting surface tension.

d) Derive an expression for work done during longitudinal strain.
