**Progressive Education Society's**
**Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16**
**End Semester Examination: Jan.2022**
**Faculty: Science and Technology**

**Program:** B.Sc. Code (Gen03) **Semester: I** **SET: A**
**Program (Specific):** General B.Sc. **Course Type: Core course**
**Class:** F.Y.B.Sc (Gen) **Max. Marks: 35**
**Name of the Course:** Mechanics and Properties of Matter
**Course Code:** 22-PHY-111 **Time: 2Hr**
**Paper: I**

**Instructions to the candidate:**

1) ***There are 4 sections in the question paper. Write each section on separate page.***
2) ***All Sections are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a well labeled diagram wherever necessary.***
5) ***Use of calculator and log table is allowed.***

## SECTION: A

**Q1) Answer in short any 5** **5**

I) What is work done, when particle moves in circular path?
II) Define surface tension.
III) Define Gravitational force.
IV) Write the equation of continuity.
V) State relation between Joule (J) and erg.
VI) Define viscosity.

**Q2) Answer in short any 5** **10**

I) How does displacement differ from distance travelled?
II) What do you mean by work done? Give its S.I Unit.
III) What is a fluid? State any two properties for it.
IV) State any two properties of magnetic force.
V) Define "Elasticity". State "Hooke's law of elasticity".
VI) Draw neat labeled diagram of "Pitot Tube".

## SECTION: B

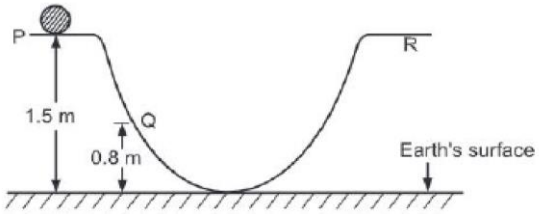
**Q3) Answer the following questions any 4** **12**

I) State and explain Newton's third law with suitable example.
II) Explain inertial and non-inertial frames of reference.
III) Derive relation for work energy theorem.
IV) Derive the relation for bulk modulus of Elasticity.
V) Calculate Poisson's ratio for aluminum, if Young's modulus of aluminum is $7 \times 10^{10}$ $N/m^2$ and modulus of rigidity is $2.5 \times 10^{10}$ $N/m^2$.
VI) One end of a wire 2 m long and 0.2 $cm^2$ in cross-section is fixed to a ceiling and a load of 4.8 kg is attached to the free end. Find the extension of the wire. Young's modulus of steel = $2 \times 10^{11}$ $N/m^2$. (Take g = 10 $m/s^2$)

## SECTION: C

**Q4) Answer the following questions any 2** **8**

I) State Bernoulli's theorem and derive its expression.
II) Define "angle of contact"? State the physical significance of acute and obtuse angle.
III) A small marble ball is kept at point P of a frictionless track PQR as shown in fig. The ball is pushed slightly towards right. Find the speed of the ball when it reaches the point Q. (Given g = 9.8 $m/s^2$)




IV) Two horizontal pipes of diameter 40 cm and 60 cm are joined together. The speed and pressure of water flowing in the first pipe are 9 m/s and $2 \times 10^4$ $N/m^2$. Calculate these quantities in the second pipe. (Density of water, $\rho = 10^3$ $kg/m^3$)