Nov-2016

कठोर - 020

*1050*

# Physics Paper - 1 : PHY - 111
# Mechanics and Properties of Matter
## (112101)

P. Pages : 4

Time : Two Hours

Max. Marks : 60

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Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory and carry equal marks.
5. Figures to the right indicating full marks.
6. Draw a neat labelled diagram wherever necessary.
7. Use of the logarithmic table or standard electronic calculator is allowed.

1. A) Attempt **any six** of the following select correct option and rewrite the following.

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i) The value of 'g' using Katers pendulum is determined by equation.

a) $g = \dfrac{8\pi^2(\ell_1 + \ell_2)}{T_1^2 + T_2^2}$

b) $\dfrac{4\pi^2(\ell_1^2 + \ell_2^2)}{T_1 + T_2}$

c) $g = \dfrac{2\pi^2(\ell_1 + \ell_2)}{T_1^2 + T_2^2}$

d) None of these

ii) The modulus of rigidity of material wire can be experimentally determined with the help of ---------.

a) Katers pendulum

b) simple pendulum

c) torsional pendulum

d) bifilar pendulum

iii) During bending of beam, the layer which remain unaltered is called -----------.

a) principle axis

b) y – axis

c) Neutral axis

d) x – axis

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iv) The three moduli Y, K, η are related to -----------.
   a) surface tension
   b) elasticity
   c) viscosity
   d) fluid

v) Mutual attraction between the molecules of the same substances is called -----------.
   a) Adhesion
   b) Tension
   c) Cohesion
   d) None of these

vi) The angle of contact for water with glass is
   a) 90°
   b) 0°
   c) 30°
   d) 180°

vii) The S. I. unit of coefficient of viscosity is -----------.
   a) Ns/m²
   b) Dynes – sec./cm²
   c) Ns/cm²
   d) Poise

viii) According to Bernoulli's Theorem the sum of the energies possessed by a following liquid at any point is -----------.
   a) not constant
   b) unpredictable
   c) predictable
   d) constant

B) Attempt **any six** of the following.                                          6

   i) Write the equation of compound pendulum for it's period.

   ii) Write the examples of angular S. H. M.

   iii) What is bending moment?

   iv) Give any two examples of elastic body.

   v) Write dimension of surface tension.

   vi) State the angle of contact for Kerosene.

   vii) State Poiseuille's formula for the flow of liquid through a capillary tube.

   viii) Write the types of the flow of fluids.

2.   Attempt **any six** of the following.                                    12

   i)   Define point of suspension and point of oscillation.

   ii)  Draw neat labelled diagram of compound pendulum.

   iii) What is meant by Elasticity?

   iv)  State the basic assumption for theory of bending.

   v)   Define the term angle of contact.

   vi)  Why raindrops are spherical.

   vii) The layer of castor oil 3mm thick moves the speed of 3 cm/sec. What
        is velocity gradient?

   viii) What is viscosity and write it's dimension.

   ix)  Explain the term velocity gradient.

3.   Attempt **any four** of the following.                                   12

   i)   A plate of metal $10^{-2}m^2$ area rests on layer of castor oil $2 \times 10^{-3}$m
        thick, where coefficient of viscosity is 1.55 $Ns/m^2$. Calculate
        horizontal force required to move the plate with a uniform speed
        $3 \times 10^{-3}$ m/s.

   ii)  Explain why only solid possess all the three constant of elasticity.

   iii) What is cantilever? State the expression for the depression of free
        loaded and end neglecting weight of cantilever.

   iv)  What is Katers pendulum? Write the mathematical equation for the 'g'
        of Katers pendulum with meaning of each symbol.

   v)   Explain bending of beams and bending of moment.

   vi)  Discuss an equation of continuity.

4. Attempt **any three** of the following. 12

i) Obtain an expression for modulus of rigidity of a wire by torsional oscillation.

ii) A uniform rod of length 1.2 m oscillates about a vertical axis passing through 0.2m from the midpoint find the period. Also find the position of three other where the period of oscillation will be same.

iii) Write a short note on Jaegers method for determining the surface tension.

iv) Describe a pitot tube and Derive the necessary expression.

v) Derive an expression for depression of beam supported at the ends and loaded at the middle.

5. Attempt **any two** of the following. 12

i) What is compound pendulum? Obtain an expression for it's periodic time. Obtain the length of an equivalent simple pendulum.

ii) State and prove Bernoull's Theorem.

iii) Define S.T. show that the excess pressure acting on the curved surface of a curved membrane is given by, $P = 2T\left(\dfrac{1}{R_1} + \dfrac{1}{R_2}\right)$.

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