April-2016

कंठस्थ - 024

Seat Number

* 0 5 2 8 *

PHYSICS PAPER - I : PHY-111
Mechanics and Properties of Matter
(112101)

P. Pages : 4

Time : Two Hours **Max. Marks : 60**

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. Draw neat and labelled diagram wherever necessary.
6. Use of logarithmic table or standard electronic calculator is allowed.
7. Figures to the right indicating full marks.

1. a) Attempt **any six** of the following. Select the correct option and rewrite the following. **6**

i) Using Kater's Pendulum 'g' can be calculated by ------

a) $\frac{4\pi^2 L^2}{T^2}$ b) $\frac{4\pi^2 L}{T^2}$

c) $\frac{2\pi L^2}{T^2}$ d) $\frac{2\pi^2 L}{T^2}$

ii) The modulus of rigidity (n) using torsional pendulum is given by -----

a) $\frac{4\pi IL}{T^2 r^4}$ b) $\frac{T^2 r^4}{8\pi IL}$

c) $\frac{8\pi I^2 L}{T^2 r^4}$ d) $\frac{8\pi IL}{T^2 r^4}$

iii) The three moduli y, k & n are related to ------

a) Fluid b) Surface tension

c) Elasticity d) Viscosity

iv) Bending moment is given by -------

a) $\frac{Y_g I_g}{R}$ b) $\frac{Y I_g}{R^2}$

c) $\frac{Y}{R}$ d) $\frac{Y_g^2 I_g}{R^2}$

v) The bodies which regains their original shape and size after removal of the deforming forces are called -----

a) Elastic and Plastic bodies b) Organic bodies

c) Plastic bodies d) Elastic bodies

vi) S. I. unit of surface tension is ------

a) N/m b) $dyne/m^2$

c) N/m^2 d) cm/s^2

vii) The angle of contact is ------ for a liquid which partially wets the solid.

a) 90° b) Obtuse

c) acute d) 0°

viii) In turbulent flow the path of the particles during their motion is ....

a) circular b) constant

c) in a particular layer d) zig-zag

b) Attempt **any six** of the following. Answer in one sentence. 6

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

ii) What is torsional pendulum?

iii) Define beam.

iv) Write formulae for modulus of rigidity.

v) What is Adhesion.

vi) Write any two examples of surface tension.

vii) What is critical velocity.

viii) Write the two types of the flow of liquids.

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

i) Draw neat labelled diagram of Bifilar pendulum.

ii) What is Compound Pendulum?

iii) Define elasticity with some examples.

iv) What is meant by Cantilever?

v) Define the term angle of contact.

vi) State unit and dimensions of surface tension.

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

viii) What is meant by viscosity. State the dimension.

ix) Steel is more elastic than rubber. Justify.

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

i) In case of compound pendulum, show that centers of suspension and oscillation are Interchangeable.

ii) State the basic assumptions for theory of bending.

iii) A soap bubble has a diameter of 4mm. Calculate the pressure inside if the atmospheric pressure is $10^5 N/m^2$. S.T. of soap solution is $28 \times 10^{-3} N/m$.

iv) What are elastic and plastic bodies? Write their some examples.

v) Explain the various factors that affect the surface tension of liquid.

vi) Obtain the relation between surface tension and surface energy.

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

i) Water flow through a horizontal capillary tube of 2mm internal diameter and length 70cm. under pressure of a column of water 30cm. in height. Find the rate of flow of water through capillary tube. (Given – Viscosity of water = 10^{-3} dyne – s/cm^2).

ii) Obtain expression for excess pressure inside a soap bubble.

iii) Write a short note on pitot tube.

iv) Describe an experiment "Y" by bending of beam.

v) Discuss the theory of Kater's pendulum.

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

i) Explain Bifilar pendulum. Obtain an expression for period of Bifilar pendulum when two suspension threads are parallel.

ii) What is Cantilever? Derive an expression for the depression of the free end of Cantilever fixed at one end and loaded at the other end.

iii) State and prove Bernoulli's Theorem.

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