Oct-2014

Seat Number

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कोकीळा - 020

PHYSICS PAPER - I : PHY - 111
Mechanics & Properties of Matter
(11125)

P. Pages : 3

Time : Two Hours **Max. Marks : 40**

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same 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 indicate full marks.
6. Draw neat and labelled diagram wherever necessary.
7. Use of logarithmic table or standard electronic calculator is allowed.
8. Symbols have their usual meanings.

1. Attempt **any eight** of the following. Select correct option. **8**

i) The modulus of rigidity (η) using torsional pendulum is given by .....

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

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

ii) The periodic time of compound pendulum is ---------- when the length of compound pendulum equal to its radius of gyration about horizontal axis passing through its C.G.

a) maximum b) minimum
c) zero d) unchanged

iii) The three moduli Y, K & η are related to --------

a) surface tension b) viscosity
c) elasticity d) fluid

iv) The surface containing the neutral axis and perpendicular to the plane of bending is called the ----------
a) Plane surface b) curved surface
c) neutral surface d) parallel surface

v) S.I. unit of Young's modulus is ----------
a) N/m^2 b) N/cm^2
c) N^2/m d) N^2/cm

vi) The angle of contact is --------- for a liquid which partially wets the solid.
a) acute b) 90°
c) 0° d) obtuse

vii) When a ship at sea is caught in a storm, oil is poured on the surface of sea. This ---------- surface tension of the sea water and calm down the sea.
a) decreases b) does not affect
c) makes zero d) increases

viii) C.G.S. unit of S.T. is ----------
a) N/m^2 b) dyne/cm
c) $dyne/cm^2$ d) N/cm

ix) According to Bernoullis theorem the sum of the energies possessed by a flowing liquid at any point is ---------
a) not constant b) unpredictable
c) predictable d) constant

x) The energy possessed by liquid due to the pressure exerted on the liquid while it is flowing is ----------
a) K.E. b) P.E.
c) Pressure energy d) flow energy

2. Attempt **any four** of the following. **8**

i) What is Bifilar pendulum ?

ii) Draw the neat labelled diagram of Kater's pendulum.

iii) Define point of suspension and point of oscillation.

iv) Define beam and bending moment.

v) Define surface tension & angle of contact.

vi) Explain streamline flow.

3. Attempt **any two** of the following. **8**

i) In Poiseuille's method for the determination of the coefficient of viscosity, following observations were made.
Volume of water issuing out per second = 0.118 cm^3
Head of water = 34.1 cm
Length of tube = 56.5 cm
Radius of tube = 0.0514 cm
Calculate the coefficient of viscosity of water.

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

iii) Explain Jaeger's method for determination of surface tension of a liquid.

4. a) Attempt **any two** of the following. **6**

i) Derive an expression for time period of conical pendulum.

ii) Explain bending of beams and bending moment.

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

b) What is torsional pendulum. **2**

5. Attempt **any one** of the following. **8**

i) What is cantilever ? Obtain an expression for the depression of the free end of cantilever fixed at one end and loaded at the other end. Neglect the weight of the cantilever.

ii) What is venturimeter ? Show how it is used to measure the rate of flow of liquid in a pipe. Derive the necessary formula.

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