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VITTHALBHAI PATEL & RAJRATNA P.T. PATEL SCIENCE COLLEGE
VALLABH VIDYANAGAR

First internal test: 2013

B.Sc. [Semester-I] **Subject-Physics** **Course Code No- US01CPHY01**

Date: 04-10-2013, Friday **Time: 11 am to 12 pm** **Total Marks-30**

Instruction: (1) Attempt all the questions
(2) Figures on right hand side indicates full mark of that question.
(3) Symbols have their usual meanings.

Q-1 **Multiple Choice Questions: [Attempt all]** 6

(a) **Within the elastic limit, the ratio of longitudinal stress to the linear strain is called.....**

(i) Bulk modulus (ii) Young's modulus
(iii) Modulus of Rigidity (iv) Poisson's ratio

(b) **Within the elastic limit, The Poisson's ratio is define by**

(i) $\frac{\beta}{\alpha}$ (ii) $\frac{\alpha}{\beta}$
(iii) $\frac{1}{\alpha}$ (iv) $\frac{1}{\beta}$

(c) **The equation of time period for Torsional pendulum is given by.....**

(i) $T = 2\pi\sqrt{\frac{I}{g}}$ (ii) $T = 2\pi\sqrt{\frac{I}{C}}$
(iii) $T = 2\pi\sqrt{\frac{C}{I}}$ (iv) $T = 2\pi\sqrt{\frac{1}{C}}$

(d) **The Statistical method is the based on the direct application of the expression for.....**

(i) The rigidity (ii) The Maxwell's needle
(iii) The twisting couple (iv) The Torsional pendulum

(e) **The expression of velocity of plane waves in a gas is represented by.....**

(i) $v = \sqrt{\frac{K}{\mu}}$ (ii) $v = \sqrt{\frac{K}{\varrho}}$
(iii) $v = \sqrt{\frac{Y}{\varrho}}$ (iv) None of above

(f) **The speed of sound in moist air is .....in the dry air**

(i) Lesser than (ii) Greater than
(iii) Equal to (iv) None of above

Q-2 **Answer any three questions in short.** 6

(a) State and explain Hook's law.

(b) A steel wire 1 meter long is suspended from a rigid support and carries a 10 kg mass at its lower end. If the wire is 1 mm square in cross section and if young modulus for the wire is 20×10^{11} Nm^{-2}, calculate the increase in length.

(c) Define and explain Torsional pendulum.

(d) Write the advantages of Maxwell's vibrating needle method.

(e) Explain the effect of Pressure on the speed of Sound.

(f) What correction has been suggested by Laplace for the speed of sound waves in air and why?

Q-3 **Derive following relations:**

(a) Prove that work done per unit volume in stretching the wire 3

$W = \frac{1}{2}(stress \times strain)$

(b) $\frac{1}{K} = 3(\alpha - 2\beta)$ 3

OR

Q-3 **Define Poisson's ratio and derive the following formula:** 6

$\sigma = \frac{1}{2}\left(1 - \frac{1}{A}\frac{dV}{dL}\right)$.

Q-4 **Explain how to determine the moment of inertia with the help of a Torsional pendulum.** 6

OR

Q-4 **Write a note on Cantilever in detail.** 6

Q-5 **Find an expression for the velocity of longitudinal waves in metal rod.** 6

OR

Q-5 **Explain the applications of Kundt's tube.** 6

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