(g-Eng) Seat No:_____   No. of Printed Pages: 3

SARDAR PATEL UNIVERSITY

B.Sc. Examination, First Semester (NC)

Saturday, Date: 18-03-2017

Session : Morning   Time: 02.00 pm to 04.00 pm

Subject/ Course Code: US01CPHY01

Subject/Course Title: Properties of Matter and Sound Wave

Total marks:70

Q.1 Choose correct option to answer the following questions.   **[10]**

(1) The reciprocal of bulk modulus is known as _____.

    (a) elasticity   (b) compressibility

    (c) plasticity   (d) susceptibility

(2) The restoring force per unit area is called_____.

    (a) stress   (b) strain

    (c) elasticity   (d) plasticity

(3) The unit of Poisson's ratio is _____.

    (a) dyne.cm   (b) newton

    (c) pascal   (d) unitless

(4) If the material of a beam is _____ no bending should be produced.

    (a) homogenous   (b) isotropic

    (c) elastic   (d) plastic

(5) The bending moment of a beam is directly proportional to _____ of the beam.

    (a) Bulk modulus   (b) Young's modulus

    (c) modulus of rigidity   (d) radius of curvature

(6) Sound waves are _____ waves.

    (a) electric   (b) magnetic

    (c) longitudinal   (d) transverse

(7) The value of specific heat ratio for the air is _____.

    (a) 1.21   (b) 1.31

    (c) 1.41   (d) 1.51

(P.T.O.)

(8) Intensity of sound is directly proportional to _____ of amplitude of sound wave.

(a) square   (b) square root

(c) cube   (d) cube root

(9) 1 bel = _____ decibel

(a) 10   (b) 0.1

(c) 100   (d) 1000

(10) From the following materials, _____ is NOT a Piezo-electric material.

(a) Rochelle salt   (b) quartz

(c) tourmaline   (d) aluminium

Q.2 Answer the following questions in brief.(Any Ten)   **[20]**

(1) Give the definition of Young modulus and write its MKS unit.

(2) State the Hooke's law.

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

(4) State the drawbacks of statical method for the determination of modulus of rigidity.

(5) Define longitudinal waves and transverse waves.

(6) Show the effect of pressure on velocity of sound with necessary derivations.

(7) Describe the effect of wind on the velocity of sound in air.

(8) Obtain relation between velocity, frequency and wavelength of a wave.

(9) Define musical sound and noise.

(10) Define infrasonic waves and ultrasonic waves.

(11) Why ultrasonic waves are highly energetic waves?

(12) What is Piezo-electric effect?

Q.3 (a) For the case of an elongation strain obtain $W = \frac{1}{2} \times$ stress $\times$ strain for work done per unit time.   **[06]**

  (b) Draw and describe stress-strain diagram.   **[04]**

OR

Q.3 (a) Derive the expression of bulk modulus in the case of

deformation of a cube. **[06]**

(b) Obtain the relation connecting three elastic constants as $\frac{9}{Y} = \frac{3}{\eta} + \frac{1}{K}$ **[04]**

Q.4 (a) Describe the Maxwell's vibrating needle method of determination of modulus

of rigidity. **[06]**

(b) Derive the equation for time period for torsional pendulum. **[04]**

OR

Q.4 (a) What is cantilever? Obtain an expression **[06]**

$$y = \frac{WL^3}{3YI_g}$$

For the depression produced in a cantilever when it is loaded at free end.

(b) Describe construction of inertia table with necessary figure. **[04]**

Q.5 (a) Derive Newton's formula for calculation of the velocity of sound in air

and also discuss Laplace's correction . **[06]**

(b) Discuss the effect of temperature on the velocity of sound in air. **[04]**

OR

Q.5 (a) Obtain the expression for velocity of sound in a gaseous medium. **[06]**

(b) Describe how Kundt's tube experiment is useful to determine

(i) Young's modulus of the rod and

(ii) ratio of specific heat of a gas? **[04]**

Q.6 What is Doppler's effect? Discuss Doppler's effect for the following cases:

(i) when source is in motion and observer is at rest

(ii) when observer is in motion and source is at rest. **[10]**

OR

Q.6 Explain principle, construction and working of

magnetostriction method for the production of ultrasonic waves.

Write the properties of ultrasonic waves. **[10]**

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