

(20 & A-12)  
(Eng)

Seat No.: \_\_\_\_\_

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**SARDAR PATEL UNIVERSITY**

**B.Sc. (Sem.- 1) EXAMINATION**

**Thursday, 17<sup>th</sup> November 2016**

**10:00 a.m. to 12:00 p.m.**

**Subject: PHYSICS**

**Course: US01CPHY01**

**Title: Properties of Matter and Sound Waves**

**Total Marks:70**

**N.B: (i) All the symbol have their usual meanings**

**(ii) Figures at the right side of questions indicate full marks**

**Q-1 Multiple Choice Questions ( Attempt All)**

**(10)**

- (1) The change per unit dimension of the body is called \_\_\_\_\_  
(a) stress (b) strain  
(c) elasticity (d) plasticity
- (2) Compressibility of a material is reciprocal of \_\_\_\_\_  
(a) modulus of rigidity (b) Young modulus  
(c) Bulk Modulus (d) coefficient of rigidity
- (3) The ratio of Tensile stress to shear strain is called \_\_\_\_\_  
(a) modulus of rigidity (b) Young Modulus  
(c) Bulk modulus (d) Poisson's ratio
- (4) The unit of twisting couple is \_\_\_\_\_  
(a) N·m (b) dynes/cm  
(c) N<sup>2</sup>·m (d) N·m<sup>2</sup>
- (5) In which part of cantilever the extension is maximum?  
(a) lowermost (b) uppermost  
(c) middle (d) none of these
- (6) According to Laplace, the propagation of sound waves is  
(a) isothermal process (b) adiabatic process  
(c) isobaric process (d) isochoric process
- (7) According to Newton's formula the velocity of sound in air is  
(a) 80 m/s (b) 180 m/s  
(c) 280 m/s (d) 380 m/s
- (8) In Kundt's tube experiment small heaps of powder are created at  
(a) nodes (b) antinodes  
(c) at two ends of the tube (d) outside the tube
- (9) Ultrasonic waves are  
(a) transverse waves (b) progressive wave  
(c) longitudinal waves (d) inverse wave
- (10) Ultrasonic waves are also called  
(a) SONAR waves (b) mechanical wave  
(c) super Position Waves (d) super Sonic Waves

**Q-2 Short Questions ( Attempt any Ten)**

**(20)**

- (1) Define Normal stress and Tangential stress
- (2) Define Young's modulus and Bulk Modulus
- (3) State the Hook's law
- (4) Differentiate statical and dynamical method

(1)

(P.T.O.)

- (5) Write the advantages of dynamical method
- (6) Explain the basic assumptions for the theory of bending
- (7) Discuss the effect of temperature on the velocity of sound in air
- (8) Discuss the effect of pressure on the velocity of sound in air
- (9) Discuss the effect of humidity on the velocity of sound in air
- (10) Explain the phenomenon of piezo-electric effect
- (11) Explain the musical sound and noise
- (12) Enlist any four applications of ultrasonic waves

Q-3 (a) Derive the relation  $\eta = \frac{1}{2(\alpha+\beta)}$  for deformation of cube. (6)

(b) Discuss the stress-strain diagram (4)

OR

Q-3 (a) Define Poisson's ratio and describe experimental method for determination of it. Derive the formula used (6)

(b) Derive the relation between three types of elastic module Y, K and  $\eta$  (4)

Q-4 (a) Derive an expression for torsional rigidity of the cylinder or a rod of uniform circular section (6)

(b) Explain the statical method of determination of modulus of rigidity (4)

OR

Q-4 (a) Describe dynamical method for determination of modulus of rigidity and derive the necessary formula (6)

(b) What is bending moment? Show that the bending moment of a beam is (4)  
 $M = \frac{Y}{R} I_g$ .

Q-5 (a) Derive the formula for the velocity of sound in a metal rod with the help of necessary diagrams (6)

(b) Calculate the velocity of sound in air using Newton's formula (4)

OR

Q-5 (a) Derive the formula for the velocity of sound in a gaseous medium with the help of necessary diagrams (6)

(b) Describe the Kundt's tube for determination of velocity of sound in metal rod (4)

Q-6 What is Doppler's effect? Derive the formula for the apparent pitch of a note (10)  
 (i) when source in motion and observer at rest, and (ii) when the observer in motion and the source is at rest

OR

Q-6 With the help of necessary figures, explain the phenomenon of magnetostriction and discuss the magnetostriction method of production of ultrasonic waves in detail. Also describe the properties of ultrasonic waves (10)

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 (2)