SECOND SEMESTER B.Sc. DEGREE EXAMINATION, MAY 2014

(U.G.–CCSS)

Core Course—Physics

PH 2B 03—PROPERTIES OF MATTER, WAVES AND ACOUSTICS

(2009 – 2012 admissions)

Time : Three Hours

Maximum : 30 Weightage

Section A

Objective Type Questions. (Answer all *twelve* questions) :

1 $\frac{1}{2} \times$ stress $\times$ strain = —————.

2 A beam fixed at one end and loaded at the other end is —————.

3 Amplitude of SHM is the ————— displacement from the mean position.

4 When K.E. of an SHM is minimum P.E. is —————.

5 The frictional force acting on a body opposite to its direction of motion is —————.

6 What is the condition for critically damped case ?

7 High value of Q-factor means damping of oscillation system is —————.

8 Superimposition of a wave and its reflected wave is called ————— wave.

9 In a transverse wave particles of the medium vibrate ————— to the direction of propagation of wave motion.

10 Velocity of longitudinal wave in a gas depends upon elasticity and ————— of medium.

11 Piezoelectric crystal method is used for the production of —————.

12 The reflected sound wave is called —————.

$(12 \times \frac{1}{4} = 3$ weightage)

Section B

Short Answer Type Questions (Answer all *nine* questions) :

13 Write down the relation between modulae of elasticities.

14 Using figure show angle of twist and angle of shear.

15 State the law connecting stress and strain.

16 What is a forced harmonic oscillator ?

Turn over

17 What is Q-factor ?

18 Write down an equation of progressive wave motion.

19 Define a plane progressive harmonic wave.

20 Mention two applications of ultrasonic waves.

21 Mention three conditions for the acoustics of a building.

$(9 \times 1 = 9$ weight

Section C

Short Essay *or* Paragraph Questions. (Answer any *five* questions from seven)

22 A rubber of side 6 cm has one side fixed while a tangential force equal to the weigh
200 kg is applied at the opposite side so that a displacement of 1.2 cm takes place. Calcu
the values of stress, strain and shear modulus of elasticity.

23 Find the work done in stretching a wire of cross section 1 mm^2 and length 3 m thro
1 mm. Young's modulus of the material of the wire = 200 GPa.

24 What is the wavelength of longitudinal waves of frequency 400 in an alloy whose der
is 5500 kg/m^3 and Young's modulus is 8.8×10^{10} N/m^2.

25 Explain the conditions for the applicability of Fourier's theorem.

26 If in air a plane wave of frequency 256 Hz and amplitude 1/1000 mm is produced. Calcu
the radiated energy per unit volume. (density of air = 1.29 kg/m^3).

27 A pendulum is constructed from a string of length 10 m and a heavy mass 1 kg :

  (a) Calculate the period of pendulum.

  (b) What happens if its amplitude of oscillation is very large.

28 A body having a mass of 4 gm executes SHM. The force acting on the body v
displacement is 8 cm is 24 gm. wt. Find the period. If maximum velocity is 500 cm/sec,
the amplitude and maximum acceleration.

$(5 \times 2 = 10$ weight

Section D

Essay Questions. (Answer any *two* questions from three)

29 Derive the equation for work done per unit volume in : (a) Linear strain ; (b) Shear st

30 Solve the differential equation of a harmonic oscillator and find the expression f
period velocity and displacement.

31 What is wave motion ? Explain different types of wave motions with equations. Ex
frequency, period, wavelength etc.

$(2 \times 4 = 8$ weigh