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R—121—2017

FACULTY OF SCIENCE

B.Sc. (Second Year) (Third Semester) EXAMINATION

MARCH/APRIL, 2017

PHYSICS

Paper VI

(Waves, Oscillations and Acoustics)

(MCQ + Theory)

(Monday, 10-4-2017)

Time : 2.00 p.m. to 4.00 p.m.

Time—2 Hours

Maximum Marks—10+30=40

- N.B. :—*
- (i) All questions are compulsory.
 - (ii) Q. No. 1 is MCQ type, with negative marking and answer MCQs on OMR sheet only.
 - (iii) Q. No. 2, Q. No. 3, Q. No. 4 are descriptive type.
 - (iv) Symbols used in the question paper have their usual meanings.

MCQ

1. Attempt all multiple choice questions : 10

- (1) When a simple harmonic wave is propagated through a medium, the displacement of a particle (in cm) at any instant of time is given by :

$$y = 10 \sin \frac{2\pi}{\lambda} (3600 t - 20)$$

Then wave velocity of vibrating particle is :

- (A) 10 cm/sec
- (B) 100 cm/sec
- (C) 3600 cm/sec
- (D) 20 cm/sec

P.T.O.

- (2) When transverse progressive wave travels in the medium, then which of the following is transferred :
- (A) Momentum (B) Energy
(C) Crest and trough (D) All of these
- (3) For stationary wave of stretched string one end is fixed. If displacement, amplitude, velocity and acceleration is zero, then this point corresponds to :
- (A) node (B) antinode
(C) node and antinode (D) neither node nor antinode
- (4) When stationary wave travels in open end organ pipe, then each antinode is separated by distance :
- (A) λ (B) $\lambda/2$
(C) 2λ (D) $\lambda/4$
- (5) The differential equation of undamped harmonic motion is :
- (A) $\frac{d^2y}{dt^2} + y = 0$ (B) $\frac{d^2y}{dt^2} - y = 0$
(C) $\frac{d^2y}{dt^2} - ny = 0$ (D) $\frac{d^2y}{dt^2} + n^2y = 0$
- (6) The vibratory motion produced in a body by the influence of another body. When their time periods are exactly equal, then it is known as :
- (A) Amplitude (B) Frequency
(C) Resonance (D) Oscillations
- (7) The time period of oscillations depends on :
- (A) Length of pendulum
(B) Acceleration due to gravity at the place
(C) Both (A) and (B)
(D) None of the above

- (8) Reverberation time of auditorium depends upon :
- (A) Size of room or auditorium
 (B) The nature of reflecting material on wall and ceiling
 (C) The area of reflecting surface
 (D) All of the above
- (9) The most simplest common method of production of ultrasonic waves is :
- (A) Piezo-electric generator
 (B) Magnetostriction generator
 (C) Both (A) and (B)
 (D) None of the above
- (10) The fundamental frequency of vibration for ultrasonic waves is calculated by :

(A) $N = \frac{1}{2l} \sqrt{\frac{y}{\rho}}$ (B) $N = \frac{1}{l} \sqrt{\frac{y}{\rho}}$
 (C) $N = \frac{1}{2l} \sqrt{\frac{\rho}{y}}$ (D) $N = \frac{1}{l} \sqrt{\frac{\rho}{y}}$

Theory

2. Attempt any *five* of the following questions : 10

- (a) Write down the relation between maximum particle velocity and wave velocity.
- (b) Define stationary wave.
- (c) What do you mean by resonance ?
- (d) Define reverberation time.
- (e) Define ultrasonics.
- (f) What do you mean by forced vibrations.
- (g) Write Sabine's formula.

P.T.O.

3. Attempt any *two* of the following questions : 10
- (i) Obtain an expression for differential equation of wave motion.
 - (ii) Show that energy is not transferred in stationary wave.
 - (iii) Explain conditions for good accoustical design of auditorium.
 - (iv) What do you mean by free undamped vibrations ? Obtain differential equation for it.
4. Attempt any *one* of the following questions : 10
- (i) Give analytical treatment of stationary waves, when closed end organ pipe or string fixed at other end.
 - (ii) What is piezo-electric effect ? Explain piezo-electric generator for production of ultrasonic waves.