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BF—101—2016
FACULTY OF SCIENCE
B.Sc. (Third Semester) EXAMINATION
OCTOBER/NOVEMBER, 2016
PHYSICS
Paper VI
(Waves, Oscillations and Acoustics)
(MCQ + Theory)

(Monday, 24-10-2016)   **Time : 2.00 p.m. to 4.00 p.m.**

Time—2 Hours   *Maximum Marks—10+30=40*

N.B. :—   (i)   Attempt *All* questions.

       (ii)   Q. No. **1** is MCQ type, answer MCQ questions on OMR sheet only.

       (iii)   Q. No. **2**, Q. No. **3** and Q. No. **4** are descriptive type.

       (iv)   Negative marking system is applicable to MCQ questions.

       (v)   Symbols used in the question paper have their usual meanings.

MCQ

1.   Attempt all multiple choice questions.   10

   (1)   The particle velocity at any instant is :

      (A) $\dfrac{dy}{dx} = v^2 \dfrac{dy}{dt}$ (B) $\dfrac{dy}{dx} = v \dfrac{dy}{dt}$

      (C) $\dfrac{d^2 y}{dt^2} = v^2 \dfrac{dy}{dx}$ (D) $\dfrac{d^2 y}{dt^2} = v^2 \dfrac{d^2 y}{dx^2}$

   (2)   The frequency of vibration of a string is :

      (A) $n = \dfrac{1}{2l} \sqrt{T / m}$ (B) $n = 2l \sqrt{T / m}$

      (C) $n = \dfrac{1}{2l} \sqrt{m / T}$ (D) $n = \dfrac{1}{2l} \sqrt{1 / m}$

                                  P.T.O.

(3) The amplitude of vibration from node to antinode is :

(A) Minimum to zero

(B) Maximum to maximum

(C) Minimum to minimum

(D) Zero to maximum

(4) Antinode is a position of :

(A) Maximum amplitude and Minimum Strain

(B) Maximum amplitude and Maximum Strain

(C) Minimum amplitude and Minimum Strain

(D) Minimum amplitude and Maximum Strain

(5) The distance between successive node and antinode is :

(A) λ 　　　　　　　　　(B) $\lambda/2$

(C) $\lambda/4$ 　　　　　　　　(D) $2\lambda/3$

(6) In forced vibration the time period of a body executing simple harmonic motion depend on :

(A) Dimension of body and elastic properties

(B) Amplitude

(C) Frequency

(D) None of the above

(7) The equation of critically damped motion is :

(A) $y = y_0 \, e^{-kt} \, (kt)$

(B) $y = y_0 \, e^{-kt} \, (1 + kt)$

(C) $y = y_0 \, e^{-kt}$

(D) $y = y_0 \, e^{-kt} \, (1 - k)$

(8) In the production of ultrasonic waves :

(A) Magnetostriction effect is used

(B) Stark effect is used

(C) Zeeman effect is used

(D) Compton effect is used

(9)   The method for production of the ultrasonic waves is :

     (A)   Piezo-electric oscillator

     (B)   Magnetostriction oscillator

     (C)   Galton whistle

     (D)   All of the above

(10)   The velocity of ultrasonic waves can be measured in liquid and gases with the help of :

     (A)   Diffraction grating   (B)   Plane grating

     (C)   Acoustic grating   (D)   Convex lens method

Theory

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

   (*i*)   Write the general equation of a simple harmonic wave.

   (*ii*)   State forced vibrations.

   (*iii*)   Define reverberation time.

   (*iv*)   Write any *two* applications of ultrasonic waves.

   (*v*)   Define aperiodic motion.

   (*vi*)   Define standing waves.

   (*vii*)   Define absorption coefficient.

3.   Attempt any *two* questions from the following :   10

   (*i*)   Explain differential equation of wave motion.

   (*ii*)   Explain how the energy is not transferred in a stationary wave.

   (*iii*)   Explain the effect of damping on frequency.

   (*iv*)   Explain the piezoelectric oscillator.

                                                 P.T.O.

4. Attempt any *one* of the following :

Give the analytical treatment of stationary waves when closed end organ pipe or string fixed at the other end. 10

Or

(*x*) Explain the detection of ultrasonic waves by using Acoustic Grating. 5

(*y*) Explain the velocity of transverse waves along a string. 5