Time: 60min	Physics ch 5,6	Marks: 20

SECTION A

1. **Select and write the correct answer for the following multiple choice type of questions:** **3**

   i. When an air column in a pipe closed at one end vibrates such that three nodes are formed in it, the frequency of its vibrations is _____times the fundamental frequency.
   (A) 2   (B) 3
   (C) 4   (D) 5

   ii. Which one of the following is not a characteristics of S.H.M?
   (A) Its acceleration is maximum in the extreme position.   (B) It is the projection of a uniform circular motion on a diameter.
   (C) Its velocity is maximum at the mean position.   (D) Its velocity time graph is a straight line.

   iii. Which of the following functions are sine and cosine functions?
   (A) non-periodic   (B) logarithmic
   (C) periodic   (D) algebraic

2. **Answer the following questions:** **3**

   i. What do you know about restoring force?

   ii. Calculate the velocity of a particle performing S.H.M. after 1 second, if its displacement is given by $x = 5 \sin\left(\frac{\pi t}{3}\right)$ m.

   iii. Define the following term: Waning

SECTION B

Attempt any TWO questions of the following: **4**

3. The equation of a transverse wave along a stretched string is $y = 3 \sin 2\pi\left(\frac{t}{0.02} - \frac{x}{40}\right)$ with distances expressed in cm and time in second. Calculate the wavelength and frequency of the wave.

4. A. Define stationary waves.

   B. Define linear simple harmonic motion.

5. State the laws of simple pendulum.

6. A tuning fork P produces 5 beats/s with a tuning fork Q. The frequency of the fork P is 500 Hz. When the prongs of the tuning fork P are filed, the beat frequency is found to be 7 beats per second. Find the natural frequency of the tuning fork Q.

SECTION C

Attempt any TWO questions of the following: **6**

7. Show that all harmonics are present on a stretched string between two rigid supports.

8. A body of mass 0.2 kg performs linear S.H.M. It experiences a restoring force of 0.2 N when its displacement from the mean position is 4 cm. Determine
   i. force constant
   ii. period of S.H.M. and
   iii. acceleration of the body when its displacement from the mean position is 1 cm.

9. A. Distinguish between progressive waves and stationary waves.

   B. State an equation of simple harmonic progressive wave travelling in the negative direction of X-axis.

SECTION D

Attempt any ONE question of the following: **4**

10. A. A set of 24 tuning forks is arranged in a series of increasing frequencies. If each fork gives 4 beats per second with the preceding one and the last sounds the octave of the first, find the frequencies of the first and the last forks.

   B. What are harmonics and overtones?

11. Discuss analytically, the composition of two S.H.M.s of same period and parallel to each other. Also find the equation of resultant amplitude and phase difference.