5

A string, tied to a sinusoidal oscillator at P and running over a support at Q, is stretched by a block of mass *m* as shown in Fig. 5.1. The amplitude of the motion at P is small enough for that point to be considered a node. A node also exists at Q.

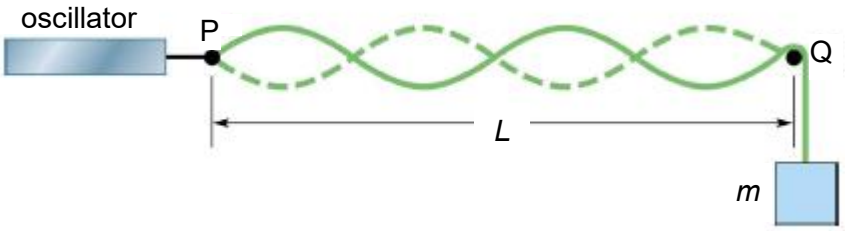

Fig. 5.1

(a)

Explain how stationary waves are formed along the string.

……

……

……

……

[2]

(b)

The frequency of the oscillator is set at 120 Hz. A stationary wave is formed when the length *L* is 1.20 m. The maximum displacement of the antinode is 0.80 cm. The length is slowly increased and the stationary wave disappears. The stationary wave is formed again when *L* is increased by 0.30 m.

(i)

Determine the velocity of the wave in the string.

velocity = …….. m s^{-1}

[2]

(ii)

Point X is at one of the antinodes when *L* is 1.50 m. Point Y is at a distance $\lambda/8$ away from point X, where λ is the wavelength of the wave.

Determine the phase difference between the two points.

phase difference = …….. rad

[1]