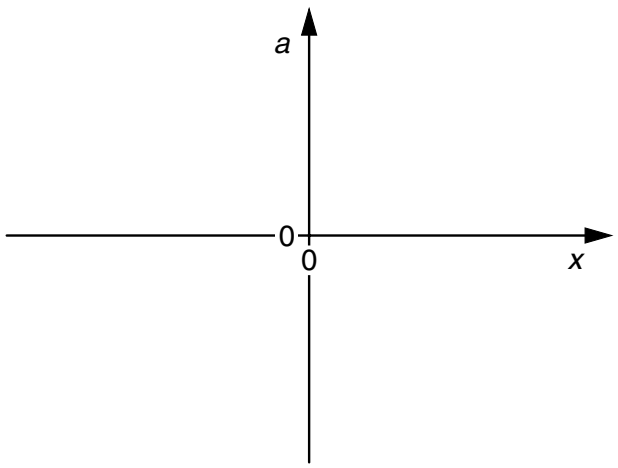
4 (a) (i) Define simple harmonic motion.

.....

.....

.....

(ii) On the axes of Fig. 4.1, sketch the variation with displacement x of the acceleration a of a particle undergoing simple harmonic motion.



[4]

Fig. 4.1

(b) A strip of metal is clamped to the edge of a bench and a mass is hung from its free end as shown in Fig. 4.2.

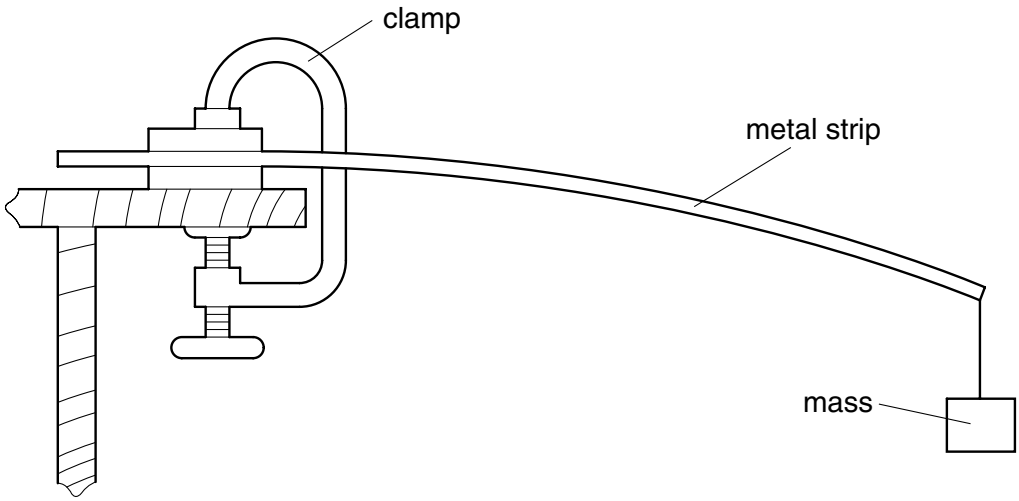


Fig. 4.2

The end of the strip is pulled downwards and then released. Fig. 4.3 shows the variation with time t of the displacement y of the end of the strip.

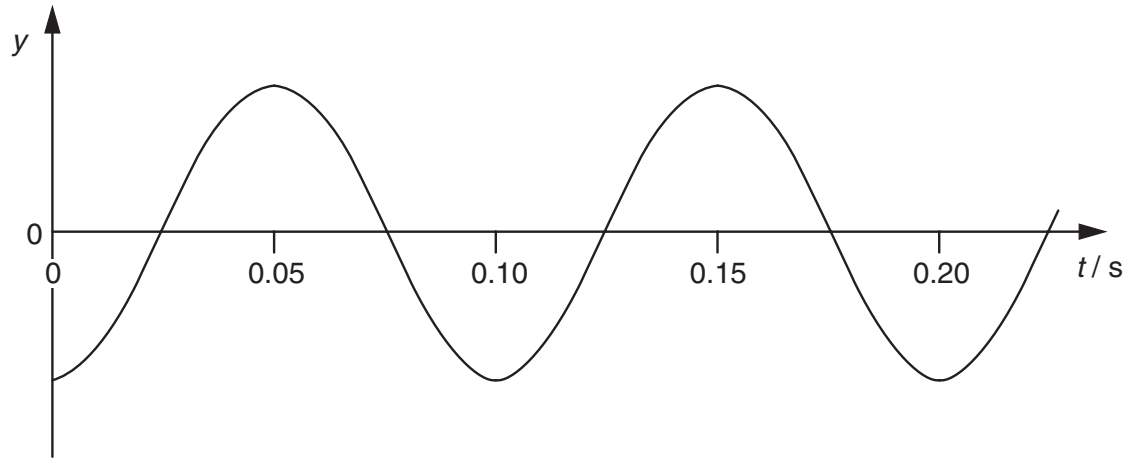


Fig. 4.3

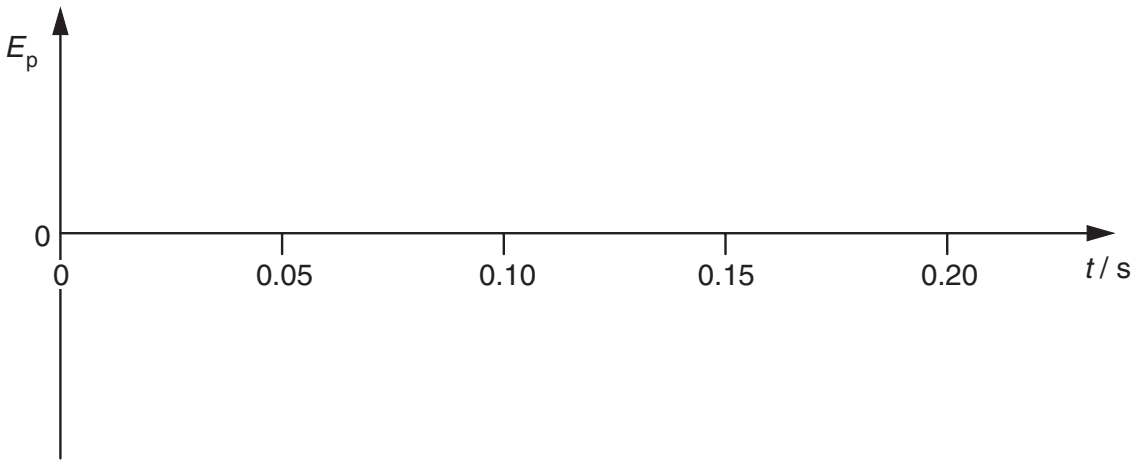


Fig. 4.4

On Fig. 4.4, show the corresponding variation with time t of the potential energy E_p of the vibrating system. [3]

(c) The string supporting the mass breaks when the end of the strip is at its lowest point in an oscillation. Suggest what change, if any, will occur in the period and amplitude of the subsequent motion of the end of the strip.

period: .....

amplitude: .....[2]