4 Fig. 4.1 shows an arrangement for producing stationary waves in a tube that is closed at one end.

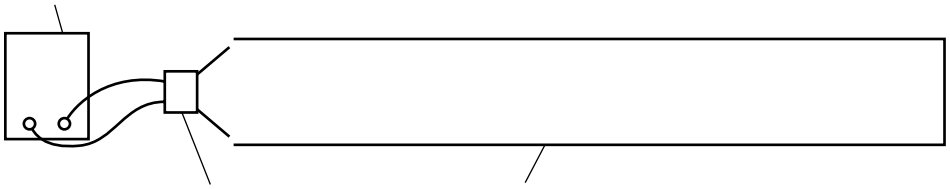

Fig. 4.1

(a) Explain how waves from the loudspeaker produce stationary waves in the tube.

.....

.....

.....

.....

.....[3]

(b) One of the stationary waves that may be formed in the tube is represented in Fig. 4.2.

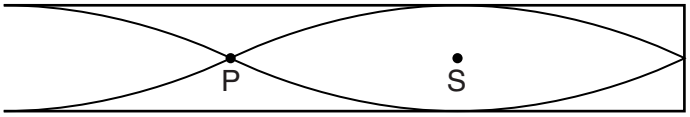

Fig. 4.2

(i) Describe the motion of the air particles in the tube at

1. point P,

.....[1]

2. point S.

.....[1]

(ii) The speed of sound in the tube is 330 m s^{-1} and the frequency of the waves from the loudspeaker is 880 Hz. Calculate the length of the tube.

length = ... m [3]