Topic: Newton's formula for speed of sound — The general expression for the speed/velocity (v) of a wave in a air or gaseous medium of density (ρ), and bulk modulus of elasticity (E), are given as —

$$v = \sqrt{E/\rho} \quad \text{——— (1)}$$

Newton assumed that the propagation of sound in a gas take place under isothermal change, when the bulk elasticity of a gas equals in pressure. Hence, the above formula can be written as,

$$v = \sqrt{P/\rho} \quad \text{——— (2)}$$

Where, P is the pressure of air/gas.

Let a mass of gas at initial pressure (P) and volume (V). Then the pressure of this mass of gas be increased by a small amount p. and and corresponding volume be v. Then according Boyle's law

$$PV = (P+p)(V-v) \quad \text{——— (3)}$$

Continued next E-contents.