

If momentum (P), area (A) and time (T) are taken to be the fundamental quantities then the dimensional formula for energy is : **[Main Sep. 02, 2020 (II)]**

(a) $[P^2AT^{-2}]$

(b) $[PA^{-1}T^{-2}]$

(c) $[PA^{1/2}T^{-1}]$

(d) $[P^{1/2}AT^{-1}]$

(c) Energy, $E \propto A^a T^b P^c$

or, $E = kA^a T^b P^c$... (i)

where k is a dimensionless constant and a , b and c are the exponents.

Dimension of momentum, $P = M^1 L^1 T^{-1}$

Dimension of area, $A = L^2$

Dimension of time, $T = T^1$

Putting these value in equation (i), we get

$$M^1 L^2 T^{-2} = M^c L^{2a+c} T^{b-c}$$

by comparison

$$c = 1$$

$$2a + c = 2$$

$$b - c = -2$$

$$c = 1, a = 1/2, b = -1 \quad \therefore E = A^{1/2} T^{-1} P^1$$