

آ. مؤيد *

Dimensions

ch. 3

M = Mass : kg
L = length : m
T = time : sec

1

$Q = A \cdot U$

$Q ; \frac{m^3}{sec} \rightarrow [L^3 T^{-1}]$

$A = m^2 \rightarrow [L^2]$

$U = m/s \rightarrow [L T^{-1}]$

$Q = A \cdot U$

$[L^3 T^{-1}] = [L^2][L T^{-1}]$
 $[L^3 T^{-1}] = [L^3 T^{-1}]$

$F = m g$

Where

$F = N ; \frac{kg \cdot m}{s^2} \rightarrow [M L T^{-2}]$

$m = kg \rightarrow [M]$

$g ; m/s^2 \rightarrow [L T^{-2}]$

$[M L T^{-2}] = [M][L T^{-2}]$

$[M L T^{-2}] = [M L T^{-2}]$

Kin
FORG
SURF
Shee
PR
A
M
M

$$P = \frac{F}{A}$$

2

$$P = \frac{N}{m^2} = \frac{kg \cdot m / s^2}{m^2} = \frac{kg}{m \cdot s^2} \rightarrow [M L^{-1} T^{-2}]$$

$$F = N = \frac{kg \cdot m}{s^2} \rightarrow [M L T^{-2}]$$

$$A = m^2 \rightarrow [L^2]$$

$$P = \frac{F}{A}$$

$$[M L^{-1} T^{-2}] = \frac{[M L T^{-2}]}{[L^2]}$$

$$[M L^{-1} T^{-2}] = [M L^{-1} T^{-2}]$$

$$\text{Work} = F \cdot L$$

$$\text{Work ; J.} = N \cdot m = \frac{kg \cdot m}{s^2} \cdot m = \frac{kg \cdot m^2}{s^2} \rightarrow [M L^2 T^{-2}]$$

$$F \rightarrow [M L T^{-2}]$$

$$L = m \rightarrow [L]$$

$$\text{Work} = F \cdot L$$
$$[M L^2 T^{-2}] = [M L T^{-2}] [L]$$

Power = Work / time

Power ; $\frac{J}{s} = W$

$= \frac{N \cdot m}{sec} = \frac{\frac{kg \cdot m}{s^2} \cdot m}{s} = \frac{kg \cdot m^2}{s^3} \rightarrow [ML^2T^{-3}]$

Work = J ; $N \cdot m = \frac{kg \cdot m}{s^2} \cdot m = \frac{kg \cdot m^2}{s^2} \rightarrow [ML^2T^{-2}]$

Time = sec $\rightarrow [T]$

Power = Work / time

$[ML^2T^{-3}] = \frac{[ML^2T^{-2}]}{[T]} =$

$[ML^2T^{-3}] = [ML^2T^{-3}]$

Torque ; $N \cdot m = J$ \rightarrow ✓

Moment \rightarrow $J ; N \cdot m$

Momentum \rightarrow $kg \cdot m / sec$

$$U = \sqrt{\frac{2g(\rho_m - \rho)\Delta z}{\rho}}$$

4

$$U = \frac{m/s}{\longrightarrow} [L T^{-1}]$$

$$g; m/s^2 \longrightarrow [L T^{-2}]$$

$$\rho; kg/m^3 \longrightarrow [M L^{-3}]$$

$$z; \longrightarrow [L]$$

$$U = \sqrt{\frac{2g(\rho_m - \rho)\Delta z}{\rho}}$$

$$[L T^{-1}] = \sqrt{\frac{[L T^{-2}] [M L^{-3}] [L]}{[M L^{-3}]} = \sqrt{L^2 T^{-2}}$$

$$[L T^{-1}] = [L T^{-1}]$$

$$Q = \frac{8}{15} c d \tan \frac{\theta}{2} \sqrt{2g} z^{5/2}$$

$$Q \xrightarrow{m^3/s} [L^3 T^{-1}]$$

$$g \xrightarrow{} [L T^{-2}]$$

$$z \xrightarrow{} [L]$$

$$[L^3 T^{-1}] = \sqrt{[L T^{-2}]} [L]^{5/2}$$

$$= L^{1/2} T^{-1} L^{5/2} = L^3 T^{-1} = L^3 T^{-1}$$

$$h = r \phi \left[\frac{\delta}{(\text{sp. wt}) r^2} \right] \Rightarrow \begin{pmatrix} M \\ L \\ T \end{pmatrix} \underline{\underline{5}}$$

Where

$$h; m \xrightarrow{\hspace{10em}} [L]$$

$$r; m \xrightarrow{\hspace{10em}} [L]$$

$$\delta; \frac{N}{m}; \frac{\text{kg} \cdot m/s^2}{m}; \frac{\text{kg}}{s^2} \xrightarrow{\hspace{10em}} [MT^{-2}]$$

$$\text{sp. wt}; \frac{N}{m^3} = \frac{\text{kg} \cdot m/s^2}{m^3} = \frac{\text{kg}}{m^2 s^2} \xrightarrow{\hspace{10em}} [ML^{-2}T^{-2}]$$

$$h = f(\text{sp. wt}, \delta, \cancel{h}, r)$$

$$h = f(\text{sp. wt}, \delta, r)$$

$$h = k [\text{sp. wt.}^a \cdot \delta^b \cdot r^c]$$

$$[L] = k [ML^{-2}T^{-2}]^a [MT^{-2}]^b [L]^c$$

$$\text{for } M \Rightarrow 0 = 1a + 1b \Rightarrow \boxed{a = -b}$$

$$\text{for } L \Rightarrow 1 = -2a + 1c \Rightarrow -2a = 1 - c \Rightarrow \boxed{a = -\frac{1}{2} + \frac{c}{2}}$$

$$\text{for } T \Rightarrow 0 = -2a - 2b \Rightarrow \boxed{a = -b}$$

$$[L] = k [ML^{-2}T^{-2}]^a [MT^{-2}]^b [L]^c$$

$$h = k [\text{sp. wt.}]^a [\delta]^b [r]^c$$

$$h = r \phi \left[\frac{\delta}{(\text{sp. wt}) r^2} \right]$$

$F = \frac{u^2}{\rho} \phi \left[\frac{\rho u d}{\mu} \right]$

$F = \frac{N}{m} = \frac{kg \cdot m}{sec^2 \cdot m} = \frac{kg \cdot m \cdot s^{-2}}{m} = \frac{kg}{sec^2} \rightarrow [MT^{-2}]$

$u = \frac{m}{s} \rightarrow [LT^{-1}]$

$\rho = \frac{kg}{m^3} \rightarrow [ML^{-3}]$

$d = m \rightarrow [L]$

$\mu = \frac{N}{m^2} = \frac{kg \cdot m}{sec^2 \cdot m^2} = \frac{kg}{m \cdot sec^2} \rightarrow [ML^{-1}T^{-2}]$

$F = f(\rho, \mu, u, d)$

$F = K (\rho^a \mu^b u^c d^d)$

$[MT^{-2}] = K [ML^{-3}]^a [ML^{-1}T^{-2}]^b [LT^{-1}]^c [L]^d$

For M $\rightarrow 1 = 1a + 0b + 0c + 0d$

For T $\rightarrow 0 = -2a - 2b + c + 0d \Rightarrow 3a = -b + c + d$
 $a = -\frac{b}{3} + \frac{c}{3} + \frac{d}{3}$

For L $\rightarrow 0 = -3a - b + c + d \Rightarrow -2b = -2 + c \Rightarrow b = 2 - c$

$T \rightarrow -2 = -2b - c \Rightarrow b = 1 - \frac{c}{2}$

$[MT^{-2}] = K [ML^{-3}]^{\frac{c}{2}} [ML^{-1}T^{-2}]^{1-\frac{c}{2}} [LT^{-1}]^c [L]^d$

$F = \frac{u^2}{\rho} \phi \left[\frac{\rho u d}{\mu} \right]$

المسألة *

7

فلزعة

$$F = \frac{N}{m} = \frac{kg \cdot m}{sec^2} \cdot \frac{1}{m} = \frac{kg}{sec^2} \rightarrow [MT^{-2}]$$

$$D = m \rightarrow [L]$$

$$V = \frac{m}{s} \rightarrow [LT^{-1}]$$

$$\rho = \frac{m}{V} = \frac{kg}{m^3} \rightarrow [M \cdot L^{-3}]$$

$$\mu = \frac{N}{m^2} = \frac{kg \cdot m}{sec^2} \cdot \frac{1}{m^2} = \frac{kg}{m \cdot sec^2} \rightarrow [M \cdot L^{-1} \cdot T^{-2}]$$

Kin

$$F = f(\rho, \mu, V, D)$$

$$F = K (\rho^a \mu^b V^c D^d)$$

$$[MT^{-2}] = K [ML^{-3}]^a [MLT^{-2}]^b [LT^{-1}]^c [L]^d$$

For

$$M \rightarrow 1 = a + b \Rightarrow \boxed{a = 1 - b}$$

For

$$L \rightarrow 0 = -3a + b + c + d \Rightarrow +3a = b + c + d$$
$$\boxed{a = \frac{b}{3} + \frac{c}{3} + \frac{d}{3}}$$

For

$$T \rightarrow -2 = -3a - 2b - c \Rightarrow +3a = 2 - 2b - c$$
$$\boxed{a = \frac{2}{3} - \frac{2}{3}b - \frac{c}{3}}$$

$$[MT^{-2}] = K [ML^{-3}]^{1-b} [MLT^{-2}]^b [LT^{-1}]^c [L]^d$$

Force
surface
shear
Pres
G
Area
lus
d33

(آ. مؤید) *

$\omega = T^{-1} \frac{8}{s}$

$P = (\rho D^2 u^2) f \left[\left(\frac{\mu}{\rho D u} \right), \left(\frac{DN}{u} \right) \right]$

$\rho = \frac{N}{m^2} = \frac{kg \cdot m}{sec^2 \cdot m^2} = \frac{kg}{m \cdot sec^2} \rightarrow [ML^{-1}T^{-2}]$

$\mu = \frac{kg}{m \cdot sec} \rightarrow [ML^{-1}T^{-1}]$

$D = \rightarrow [L]$

$u = \rightarrow [LT^{-1}]$

$N = \rightarrow [MLT^{-2}]$

$P = f(\rho, \mu, u, D, N)$

$P = K(\rho^a \cdot \mu^b \cdot u^c \cdot D^d \cdot N^e)$

$[ML^{-1}T^{-2}] = K []^a []^b []^c []^d []^e$

for $M \Rightarrow 1 = a + b \Rightarrow a = 1 - b$ --- 1

for $L \Rightarrow -1 = -a + b + c + d \Rightarrow a = \dots$

for $T \Rightarrow -2 = -2b - c - e \Rightarrow 2b = 2 - c - e$

$b = 1 - \frac{c}{2} - \frac{e}{2}$ --- 2

نقوضا 2 ني 1

نسبہ سوال الیادہ بالخصیص
H.M
P. 2.1
صلا 9