WEEKLY TEST SOLUTION TYM – 02 - TEST – 05 18 AUGUST 2019

PHYSICS

1. (b) $\text{Power} = \frac{\text{Work}}{\text{Time}} = \frac{ML^2T^{-2}}{T} = ML^2T^{-3}$

2. (b) Angular momentum = $mvr = MLT^{-1} \times L = ML^2T^{-1}$

3. (b) $F = \frac{Gm_1m_2}{d^2} \Rightarrow G = \frac{Fd^2}{m_1m_2}$

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

4. (b) Angular momentum = mvr

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

5. (c) $E = hv \Rightarrow [ML^2T^{-2}] = [h][T^{-1}] \Rightarrow [h] = [ML^2T^{-1}]$

6. (a) Momentum = $mv = [MLT^{-1}]$

Impulse = Force $\times$ Time = $[MLT^{-2}] \times [T] = [MLT^{-1}]$

7. (b) Pressure = $\frac{\text{Force}}{\text{Area}} = \frac{\text{Energy}}{\text{Volume}} = ML^{-1}T^{-2}$

8. (d) $[h] = [\text{Angular momentum}] = [ML^2T^{-1}]$

9. (a) By principle of dimensional homogenity $\left[\frac{a}{V^2}\right] = [P]$

$\therefore [a] = [P][V^2] = [ML^{-1}T^{-2}] \times [L^6] = [ML^5T^{-2}]$

10. (c) Let $v^x = kg^y\lambda^z\rho^\delta$. Now by substituting the dimensions of each quantities and equating the powers of M, L and T we get $\delta = 0$ and $x = 2, y = 1, z = 1$.

11. (b) From the principle of homogenity $\left(\frac{x}{v}\right)$ has dimensions of T.

12. (a) $Q = [ML^2T^{-2}]$ (All energies have same dimension)

13. (a) By substituting the dimension of each quantity we get $T = [ML^{-1}T^{-2}]^a[L^{-3}M]^b[MT^{-2}]^c$

By solving we get $a = -3/2$, $b = 1/2$ and $c = 1$

14. (b) $v \propto g^p h^q$ (given)

By substituting the dimension of each quantity and comparing the powers in both sides we get $[LT^{-1}] = [LT^{-2}]^p[L]^q$

$\Rightarrow p + q = 1, -2p = -1, \therefore p = \frac{1}{2}, q = \frac{1}{2}$

15. (a) Power = $\frac{\text{Energy}}{\text{Time}}$