SBU
SARALA BIRLA UNIVERSITY

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Subject: Applied Physics-1

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Q1. Write the dimensional formula of the following physical quantities

(a) Radius (b) weight (c) Universal gravitation constant (d) Potential energy (e) Kinetic energy (f) coefficient of elasticity (g) coefficient of viscosity, (h) Power

Q2. In the given relation

$$P = \frac{a}{b}\, exp\left(\frac{-aV}{K_B T}\right)$$

P is the pressure, V is the volume, T is the temperature, K_B is the Boltzmann constant .
Find the dimensional formulae of constant a & b.

Q3. Vander wall's equation of state foe a real gas is given by

$$\left(P + \frac{a}{V^2}\right)(V - b) = RT$$

Where P is the pressure, V is the volume. Find the dimensional formulae of constant a & b.

Q4. State the principle of homogeneity.

Height of a liquid in a capillary tube is given by

$$h = \frac{r\rho g}{2T cos\theta}$$

Where T is the force of surface tension, ρ is the density of liquid, θ is angle of contact and g is the acceleration due to gravity and r is the radius of capillary tube. Check whether the relation is correct using the dimensional formula.

Q5. Covert a kinetic energy of 5 Erg into joules using method of dimensional analysis?

Q6. State the limitations of dimensional analysis.

Q7. Force of viscosity 'F' acting on a spherical body moving through a fluid depends upon its velocity (v),
radius (r) and coefficient of viscosity 'η' of the fluid. Using method of dimensions obtain an expression
for 'F'.

Q8. The displacement of a particle at time t is given by

$$y = a \sin (wt - kx)$$

What are the dimensions of a, w and k?

Q9. A particle of mass 'm' tied to a string of length 'l' is revolved in a horizontal circle with a uniform velocity. Obtain an expression for centripetal force which depends upon these factors.

Q10. The terminal velocity (V_T) of ball depends upon (i) the weight of the ball mg (ii) the coefficient of viscosity η (iii) the radius of the ball r. Obtain an expression for terminal velocity using the method of dimensional analysis.