1st Unit Test
Sub – Physics
Class – XI

<u>Time – 1 hour</u>   <u>Full marks~25</u>

<u>(The figures in the margin indicate full marks for the questions}</u>

1. Each question carries 1 mark .   **1 x 5 =5**

(a) State which of the following is dimensionally correct .

(i) Pressure = Energy per unit volume

(ii) Pressure = Momentum × volume × time

(b) State dimensional formula and S.I. unit of angle.

(c) Magnitude of force experienced by an object moving with speed v is given by $F = kv^2$. Find dimensions of k.

(d) 5.74 g of a substance occupies 1.2 cm^3. Express its density to correct significant figures.

(e) Write two limitations of dimensional analysis.

2. Each question carries 2 marks .   **2 x 4 = 8**

(a) Check the correctness of the equation , $v^2 = u^2 + 2aS$.

(b) In Van der Waal's gas equation $\left(P + \dfrac{a}{v^2}\right)(v - b) = RT.$, dimensions of a and b. Where P is pressure and v is volume . Find [ab]

(c) Give the number of significant figures/digits in the following :

(1) 0.00206 m²   (2) 1.03 g cm⁻²   (3) 6.023 X 10²³ kg   (4) 70000 J

(d) A physical quantity A is related to four observable a, b, c and d as follows,

$$A = \frac{a^2 b^3}{c\sqrt{d}}$$

, The percentage errors of measurement in a, b, c and d are 1%, 3%, 2% and 2% respectively. What is the percentage error in the quantity A

3. Each question carries 3 marks .   3 X 4 = 12

(a) The frequency of vibration of a string depends of on, (i) tension in the string (ii) mass per unit length of string, (iii) vibrating length of the string. Establish dimensionally the relation for frequency.

(b) The length of a rod as measured in an experiment was found to be 2.48m, 2.46m, 2.49m, 2.50m , 2.52m and 2.43m. Find the average length, absolute error and percentage error. Express the result with error limit.

(c) What is parallactic angle ? The moon is observed from two observatories A and B on the surface of Earth , 552 km apart . The angle θ subtended at the moon by the two directions of observation is **2 º 36 ′** . Compute the distance of the moon from the Earth. .

(d) A gas bubble from an explosion under water oscillates with a period T proportional to **P ª ρ ᵇ Eᶜ** , where P is the static pressure, ρ is the density of water and E is the total energy of the explosion. Find the values of *a, b* and c.