## St. Mary's School, Dwarka <br> Holiday Homework <br> Class - XI <br> Subject: Physics

## Objective:

1) To revise the concepts already taught in the class .
2) To enhance your numerical ability .

Homework: Write the four experiments of section $A$ based on the least count of different instruments and calculation of volume with a vernier calliper in your practical file and submit the file on reopening of School. Please file these assignments in a folder.

## General instructions :

1 mark questions should be answered in 20 to 25 words.
2 mark questions should be answered in 30 to 50 words.

3 mark questions should be answered in 60 to 80 words.

## UNITS AND MEASUREMENT

Q1. Write the dimensional formula of torque.
Q2. Name the physical quantity for each of the following dimensional formula (i) $\left(\mathrm{ML}^{-1} \mathrm{~T}^{-1}\right)$, (ii) $\left(\mathrm{M}^{-1} \mathrm{~L}^{3} \mathrm{~T}^{-2}\right)$ (iii) ( $\mathrm{ML}^{2} \mathrm{~T}^{-3}$ ) and (iv) ( $\mathrm{ML}^{0} \mathrm{~T}^{-2}$ )

Q3. In Poiseuille's equation, $\mathrm{V}=\pi \rho r^{4} / 8 \eta l$, determine the dimension of $\eta$ where p is pressure, r is radius V is volume per unit time of the liquid flowing out of a tube of length $l$

Q4. Find the value of the following up to the appropriate significant figures :
(i) 53.312-53.3
(ii) $2.02 \times 23$

Q5. The resistivity $\rho$ of the material depends on the length $l$, diameter $d$ and resistance R of the wire. Derive the relation for resistivity using the method of dimensions.

Q6. The escape velocity $v$ of a body depends upon (i) the acceleration due to gravity $g$ of the planet and (ii) the radius R of the planet. Establish dimensionally the expression for escape velocity $v$.

Q7. Using the principle of homogeneity of dimensions, find which of the following is correct.
(i) $\mathrm{T}^{2}=4 \pi^{2} \mathrm{r}^{2}$,
(ii) $\mathrm{T}^{2}=\frac{4 \pi^{2} r^{3}}{G}$ and
(iii) $\mathrm{T}^{2}=\frac{4 \pi^{3} r^{2}}{4 M}$

Q8. In an experiment to measure the focal length of a concave mirror, the value of the focal length in successive observations turns out to be $17.3 \mathrm{~cm}, 17.8 \mathrm{~cm}, 18.3 \mathrm{~cm}, 18.2 \mathrm{~cm}, 17.9 \mathrm{~cm}$ and 18.0 cm . Calculate the mean absolute error and percentage error. Express the result of the focal length with percentage error.

## MOTION IN A STRAIGHT LINE

Q1. Draw position - time graph for (i) Negative velocity and (ii) Positive velocity.
Q2. A train 500 m long crosses a bridge of 1000 m in 10 s . Find the average speed of the train when it just crosses the bridge.

Q3. Find the displacement of the particle when its velocity is zero.
Q4. Suppose two trains A and B are moving with uniform velocity along parallel tracks in the same direction and the velocity of $A$ and $B$ is $60 \mathrm{~km} / \mathrm{h}$ in the east direction and $65 \mathrm{~km} / \mathrm{h}$ in the east respectively. Find the relative velocity of B w.r.t. A.

Q5. The velocity of a particle is given by equation $v=4+2\left(C_{1}+C_{2} t\right)$ where $\mathrm{C}_{1}$ and $\mathrm{C}_{2}$ are constant. Find the initial velocity and acceleration of the particle.

Q6. At $t=0$, a particle is at rest at the origin. Its acceleration is $2 \mathrm{~m} / \mathrm{s}^{2}$ for the first 3 s and $-2 \mathrm{~m} / \mathrm{s}^{2}$ for next 3 s , plot the acceleration versus time and velocity versus time graph.

Q7. Two parallel rail tracks run North - South. Train A moves North with a speed of $54 \mathrm{kmh}^{-1}$ and train B moves South with a speed of $90 \mathrm{kmh}^{-1}$. What is the:
(i) relative velocity of B with respect to A ?
(ii) relative velocity of the ground with respect to B ?
(iii) velocity of a monkey as observed by a man standing on the ground (Given : The monkey is running on the roof of the train A with a velocity of $18 \mathrm{kmh}^{-1}$ with respect to train A and in a direction opposite to that of A )

Q8. Define relative velocity of an object w.r.t. another. Draw position - time graphs of two objects moving along a straight line, when their relative velocity is (i) zero and (ii) non - zero.

## MOTION IN A PLANE

Q1. If $|A+B|=|A-B|$, what is the angle between A and B ?
Q2. Two forces whose magnitudes are in the ratio 3:5, give a resultant of 28 N . If the angle of their inclination is $60^{\circ}$. Find the magnitude of each force.

Q3. Determine that vector which when added to the resultant of $\mathrm{A}=3 \hat{\imath}-5 \hat{\jmath}+7 \hat{k}$ and $\mathrm{B}=2 \hat{\imath}+4 \hat{\jmath}-3 \hat{k}$ gives unit vector along y - direction.

Q4. The velocity of a particle is given by the equation, $v=4 t^{2}+5 t+6 \mathrm{~cm} / \mathrm{s}$. Find (i) the change in velocity of the particle during the time interval between $\mathrm{t}_{1}=2 \mathrm{~s}$ and $\mathrm{t}_{2}=4 \mathrm{~s}$ (ii) the average acceleration during the same interval and (iii) the instantaneous acceleration at $\mathrm{t}_{2}=4 \mathrm{~s}$.

