NEW STANDARD ACADEMY

Marks: 60

Date : 15-07-24   CLASS : 11TH Time: 3 HRS

PHYSICS

1. Convert one newton to dyne.
2. A calorie is a unit of heat or energy and it equals about 4.2 J where 1 J = 1kg m^2 s^{-2} Suppose we employ a system of units in which the unit of mass equals α kg, unit of length equalsβm and unit of time is γ s. Show that a calorie has magnitude 4.2 $\alpha^{-1}\beta^{-2}\gamma^2$ in terms of new units.
3. A planet moves round the Sun in a circular orbit. Assuming that the period of revolution t of the planet depends upon radius (R) of its orbit, mass of the sun (M) and universal gravitational constant (G) then prove dimensionally t$^2\propto \frac{R^3}{GM}$ or t = $2\pi\sqrt{\frac{R^3}{GM}}$ where 2π is value of constant.
4. If the velocity of light is c, the constant of gravitation G and Plank's constant h, be chosen as fundamental units find the value of mass, length and time in terms of dimensions of these quantities.
5. Given that the time period of oscillations of a gas bubble from an explosion under water depends on static pressure (P), density of water (ρ) and total energy of explosion (E). Using method of dimensions derive expression for time period (t).
6. Which physical quantity is represented by $\sqrt{\lambda}$g, where λ is wavelength and g is acceleration due to gravity?
7. If a person travels a distance S$_1$ with velocity v_1 and distance S$_2$ with velocity v in the same direction, then what should be the average velocity of person ?
8. Two straight lines drawn on the displacement-time graph make angles 30° and 60° with time axis respectively as shown in figure. Which line represents greater velocity? What is the ratio of two velocities ?

9. A body covers a distance of 4 m in 3rd second and 12 m in 5th second. If the motion is uniformly accelerated, how far will it travel in the next 3 seconds?
10. The reaction time for an automobile is 0.6 s. If the automobile can be decelerated at 5 m s^{-2}, calculate the total distance travelled in coming to stop from an initial velocity of 30 km h^{-1}, after the signal is observed.

CHEMISTRY

1. Express the following numbers in such a way that the number has 3 significant figures:
   (a) 6.024$\times 10^{19}$ (b) 8000
2. Two oxides of carbon contain 57.2% and 72.73% oxygen. Show that these data confirm the law of multiple proportions.
3. Calculate the volume occupied by 10^{22} molecules of N$_2$ at 27°C and one atmospheric pressure.
4. Volume % of ethanol in its aqueous solution is 20. If density of the solution is 0.96g / cc calculate the molarity and molality of the solution.
   Density of water = 1g / mL.
5. Calculate λ of the radiations when the electron jumps from III to II orbit in H-atom. The electronic energy in II and III Bohr orbit of H-atom are - 5.42$\times 10^{-12}$ and - 2.41$\times 10^{-12}$ erg respectively.
6. A proton is accelerated to one-tenth of the velocity of light. The inaccuracy in the determination of light is $\pm$1% Calculate the uncertainty in position (m = 1.66$\times 10^{-27}$ kg.)
7. The mass of a ball is 0.15 kg and its uncertainty in position is 10^{-10} metre. What is the value of uncertainty in its velocity?
8. Calculate the momentum of a particle whose wavelength is 2Å.
   Given that h = 6.6$\times 10^{-34}$ kg m^2 s^{-1}.

9. All the sodium atom in 0.23 mg of sodium vapours are to be converted in Na^+ (g). If IE of sodium is 495 kJ/mol, then calculate the energy required . Atomic mass of sodium is 23.

10. Why does the $\Delta_i H_2$ of an element always higher than its $\Delta_i H_1$?

BIOLOGY

1. Distinguish between albuminous and ex-albuminous seed
2. Describe the internal structure of a dorsiventral leaf with the help of labelled diagrams.
3. Explain different mode of Respiration in frog.
4. Explain the process of condensation. Give an example using sugars.
5. How are prosthetic groups different from co-factors?
6. Discuss briefly the role of nucleolus in the cells actively involved in protein synthesis.
7. Comment on the cartwheel structure of centriole.
8. What are the chemical substances that compose the plasma membrane?
9. How does cytokinesis in plant cells differ from that in animal cells?
10. What is crossing over? In which stage of meiosis does this event occur?

MATHS

1. A college awarded 38 medals for Honesty, 15 for Punctuality and 20 for Obedience. If these medals were bagged by a total of 58 students and only 3 students got medals for all three values, how many students received medals for exactly two of the three values?
2. Two finite sets have m and k elements. If the number of subsets of the first set is 112 more than the number of subsets of the second set, then find the values of m and k.
3. If A = {1, 2, 3,….,17} and R is a relation on A defined by R = {(x,y): 3x-y = 0, x,y ∈ A},then write R in the roster from.
4. If a real function f is defined by $f(x)=\frac{|x|-x}{2x}$, then find its domain and range.

5. Find the domain of the function
   $f(x)= \frac{1}{4-x^2} + log_{10}(x^2-x)$
6. Find the degree measures corresponding to the radian measures :- $\frac{3}{4}$
7. If $\alpha + \beta = \frac{\pi}{4}$, prove that
   $(1+\tan \alpha)(1 + tan\beta) = 2.$
8. Prove that cos x cos $2x$ cos$4x$
   $cos8x=\frac{sin16\ x}{16\sin\ x}.$
9. A manufacturer has 600 litres of 12% solution of acid. How many litres of 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18% acid?
10. Solve the following inequalities:
    i) $\frac{7}{|2x+5|} > 1$
    ii) $\frac{2}{|3-5x|} \leq 7.$