

Total Questions : 50

|  | PATTERN \& MARKING SCHEME |  |  |
| :---: | :---: | :---: | :---: |
| Section | (1) Physics \& Chemistry | (2) Achievers Section | (3) Mathematics <br> or <br> Biology |
| No. of Questions | 25 | 5 | 20 |
| Marks per Ques. | 1 | 3 | 1 |



Scan the QR code for more details

## SYLLABUS

Section - 1 : Physics : Units and Measurements, Mechanics, Properties of Matter, Heat and Thermodynamics, Oscillations, Waves.
Chemistry : Some Basic Concepts of Chemistry, Structure of Atom, Classification of Elements and Periodicity in Properties, Chemical Bonding and Molecular Structure, Thermodynamics, Equilibrium, Redox Reactions, Organic Chemistry - Some Basic Principles and Techniques, Hydrocarbons.
Section - 2 : Higher Order Thinking Questions - Syllabus as per Section - 1.
Section - 3 : Sets, Relations and Functions, Logarithms, Complex Numbers \& Quadratic Equations, Linear Inequalities, Sequences and Series, Trigonometry, Straight Lines, Conic Sections, Permutations and Combinations, Binomial Theorem, Statistics, Limits and Derivatives, Probability, Introduction to 3-D Geometry.

Section - 3 : Diversity in the Living World, Structural Organisation in Plants and Animals, Cell : Structure and Functions, Plant Physiology, Human Physiology.

## PHYSICS AND CHEMISTRY

1. Three particles $P, Q$ and $R$ are at rest at the vertices of an equilateral triangle of side $s$. Each of the particles starts moving with constant speed $v$. $P$ is moving along $P Q, Q$ along $Q R$ and $R$ along $R P$. The particles will meet each other at time $t$ given by

(A) $\frac{s}{v}$
(B) $\frac{3 s}{v}$
(C) $\frac{3 s}{2 v}$
(D) $\frac{2 s}{3 v}$
2. A boy throws a table tennis ball of mass 20 g upwards with a velocity of $u_{0}=10 \mathrm{~m} / \mathrm{s}$ at an angle $\theta_{0}$ with the vertical. The wind imparts a horizontal force of 0.08 N , so that the ball returns to the starting point. Then, the angle $\theta_{0}$ must be such that, $\tan \theta_{0}$ is
(A) 0.2
(B) 0.4
(C) 2.5
(D) 1.2 .
3. A weight is attached to the free end of a sonometer wire. It gives resonance at a length 40 cm when it is resonanced with a tuning fork of frequency 512 Hz . The weight is then immersed wholly in water, the resonant length is reduced to 30 cm . The relative density in which
weight suspended is
(A) $16 / 9$
(B) $16 / 7$
(C) $16 / 5$
(D) $16 / 3$.
4. Which of the following will decrease the pH of a 50 mL solution of 0.01 M HCl ?
(A) Addition of 5 mL of 1 M HCl
(B) Addition of 50 mL of 0.01 M HCl
(C) Addition of 50 mL of 0.002 M HCl
(D) Addition of Mg
5. Maximum enol content is observed in
(A) $\mathrm{CH}_{3} \mathrm{COCH}_{2} \mathrm{COOC}_{2} \mathrm{H}_{5}$
(B)

(C) $\mathrm{CH}_{3} \mathrm{COCH}_{2} \mathrm{COCH}_{3}$
(D) $\mathrm{CH}_{3} \mathrm{COCH}_{3}$
6. In the reaction,

$$
4 \mathrm{NH}_{3(g)}+5 \mathrm{O}_{2(g)} \rightarrow 4 \mathrm{NO}_{(g)}+6 \mathrm{H}_{2} \mathrm{O}_{(l)}
$$

when 1 mole of ammonia and 1 mole of $\mathrm{O}_{2}$ are made to react to completion
(A) 1.0 mole of $\mathrm{H}_{2} \mathrm{O}$ is produced
(B) 2.0 moles of NO will be produced
(C) All the oxygen will be consumed
(D) All the ammonia will be consumed.

## ACHIEVERS SECTION

7. A bob is attached to one end of a string and other end of which is fixed at peg $A$. The bob is taken to a position where string makes an angle of $30^{\circ}$ with the horizontal. On the circular path of the bob in vertical plane, there is peg $B$ at a symmetrical position with respect to the initial position of bob as shown in the figure. If $v_{c}$ and $v_{a}$ be the minimum speeds in clockwise and anticlockwise directions respectively, given to bob in order to hit the peg $B$, then ratio $v_{c}: v_{a}$ is equal to

(A) $1: 1$
(B) $1: \sqrt{2}$
(C) $1: 2$
(D) $1: 4$
8. A natural gas was containing mixture of methane and ethane only. On complete combustion of 10 litres of gas at STP, the heat evolved was 474.6 kJ . Assuming $\Delta H_{\text {comb }} \mathrm{CH}_{4(g)}=-894 \mathrm{~kJ} / \mathrm{mol}$ and $\Delta H_{\text {comb }} \mathrm{C}_{2} \mathrm{H}_{6(g)}$ $=-1500 \mathrm{~kJ} / \mathrm{mol}$, the percentage of $\mathrm{CH}_{4}$ and $\mathrm{C}_{2} \mathrm{H}_{6}$ will be respectively
(A) $30 \%, 70 \%$
(B) $22 \%, 78 \%$
(C) $72 \%, 28 \%$
(D) $70 \%, 30 \%$.

## MATHEMATICS

9. Out of 800 boys in a school, 224 played Cricket, 240 played Hockey and 336 played Basketball. Of the total, 64 played both Basketball and Hockey; 80 played Cricket and Basketball; 40 played Cricket and Hockey and 24 played all the three games. The number of boys who did not play any game is $\qquad$ _.
(A) 128
(B) 216
(C) 240
(D) 160
10. The value of $\cos \frac{\pi}{15} \cos \frac{2 \pi}{15} \cos \frac{3 \pi}{15} \cos \frac{4 \pi}{15} \cos \frac{5 \pi}{15} \cos \frac{6 \pi}{15} \cos \frac{7 \pi}{15}$ is
(A) $\frac{1}{164}$
(B) $\frac{1}{138}$
(C) $\frac{1}{60}$
(D) $\frac{1}{128}$

## BIOLOGY

9. Read the given statements and select the correct option.
Statement 1 : Chloroplasts and mitochondria are semi-autonomous bodies.

Statement 2 : Chloroplasts and mitochondria have their own DNA and protein synthesising machinery.
(A) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
(B) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
(C) Statement 1 is correct and statement 2 is incorrect.
(D) Both statements 1 and 2 are incorrect.
10. Refer to the given graph.


Under normal conditions, how much oxygen is transported to the tissues by blood on passing from lungs to tissues?
(A) 15 mL of $\mathrm{O}_{2} / 100 \mathrm{~mL}$ of blood
(B) 10 mL of $\mathrm{O}_{2} / 100 \mathrm{~mL}$ of blood
(C) 5 mL of $\mathrm{O}_{2} / 100 \mathrm{~mL}$ of blood
(D) 20 mL of $\mathrm{O}_{2} / 100 \mathrm{~mL}$ of blood


