PHYSICS

1. From the given set of charges,which charge (s)is/are not possible?
   (a) $0.8 \times 10^{-16} C$
   (b) $3.2 \times 10^{-20} C$

2. There are two charges +1 C and +5 μC separated by some distance. The ratio of the forces acting on them will be

3. According to Coulomb's law, which is the correct conditions for the attraction?

4. A charge q is placed at the centre of the line joining two equal charges Q, the system of the three charges will be in equilibrium, if q is equal to

5. Two point charges +3 μC and +8 μC repel each other with a force of 40 N. If a charge of -5 μC is added to each of them, then force between them will become

6. The work done in moving a charge of 2 C across two points having a potential difference of 12 V is

7. The potential at a point 01 m from an isolated point charge is +100 V The nature of the point charge is

8. If 50J of work must be done to move an electric charge of 2 C from a point where potential 1s - 10 V to another point where potential is V volt, then the value of Vis

9. Two charged spheres of radii 10 cm and 15 cm are connected by a thin wire. No charge will flow if they have

10. Calculate the number of electrons constituting one coulomb of charge.

CHEMISTRY

1. What are amphoteric oxides? Give two examples of amphoteric oxides.

2. Name two metals which will displace hydrogen from dilute acid, and two metals which will not.

3. What are ionic compound? Show the physical Properties of ionic compound.

4. Pratyush took sulphur powder on a spatula and heated it. He collected the gas evolved by inverting a test tube over it, as shown in figure below.
   (a) What will be the action of gas on
   (I) dry litmus paper?
   (II) moist litmus paper?
   (b) Write a balanced chemical equation for the reaction taking place.

Collection of gas
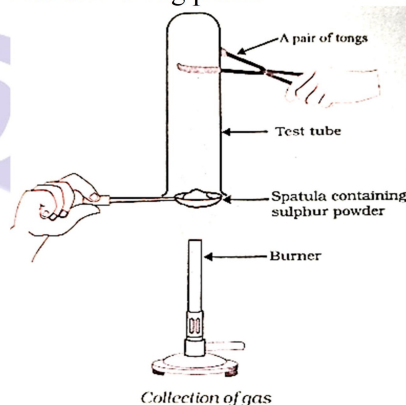
5. What type of oxides are formed when non-metals combine with oxygen?

6. Give reasons
   (a) Platinum, gold and silver are used to make Jewellery.
   (b) Sodium. potassium and lithium are stored under oil.
   (c) Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.

7. Differentiate between metal and non-metal on the basis of their chemical properties.

8. Generally, when metals are treated with mineral acids, hydrogen gas is liberated but when metals (except Mn and Mg), treated with HNO_3, hydrogen is not liberated, why?

9. A non-metal A which is the largest constituent of air, when heated with H_2, in 1:3 ratio in the presence of catalyst (Fe) gives a gas B. On heating with O_2, it gives an oxide C. If this oxide is passed into water in the presence of air it gives an acid D which acts as a strong oxidising agent.
   (a) Identify A, B, C and D
   (b) To which group of periodic table does this non-metal belong?

10. A metal A, which is used in thermite process, when heated with oxygen gives an

oxide B, which is amphoteric in nature. Identify A and B. Write down the reactions of oxide B with HCI and NaOH.?

BIOLOGY
1. Write the botanical name of the plant on which Mendel carried out his experiments.
2. Name the scientists who rediscovered Mendel's work.
3. Define the term phenotype and genotype.
4. State any two reasons why Mendel selected pea plant for his experiment.
5. Define test cross.
6. What are genes? Where are they located?
7. Write any five contrasting characters that Mendel observed in garden pea.
8. Explain in brief how the traits may be dominant or recessive
9. How do Mendel's experiments show that Inheritance of two traits is independent of each other?
10. A Mendelian experiment consisted of breeding pea plants bearing violet flowers with pea plants bearing white flowers. What will be the result in F progeny?

MATHS
1. Show that $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$.
2. If a $\cos\theta$ + b $\sin\theta$ = c, then prove that a $\sin\theta$ − b $\cos\theta = \sqrt{a^2 + b^2 - c^2}$.
3. In the given figure D is mid – point of BC,then the value of $\frac{\cot y}{\cot x}$ is
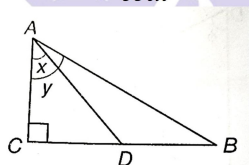
4. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$,then m^2-n^2 is equal to
5. Prove that $\sqrt{\frac{secA-1}{secA+1}} + \sqrt{\frac{secA+1}{secA-1}}$ =2 cosec A
6. Prove that $\frac{tan\theta - cot\theta}{sin\theta\ cos\theta}$ =$\sec^2\theta - \operatorname{cosec}^2\theta$
7. Prove that : 2 ($\sin^6\theta + \cos^6\theta$) − 3 ($son^4\theta + \cos^4\theta$)+1= 0
8. Prove the $\cos^2\theta + \frac{1}{1+cot^2\theta} = 1$
9. Prove the trigonometric identities $\tan^2\theta - \frac{1}{cos^2\theta} = -1$

10. Prove the $\frac{cos\theta}{1-sin\theta} + \frac{cos\theta}{1+sin\theta} = 2\ sec\theta$