ST. XAVIER'S SENIOR SECONDARY SCHOOL, DELHI – 110 054

Class 10 Time: 3 hrs.

23-9-2023 MID TERM EXAMINATION - **SCIENCE** Max. Marks : 80

General Instructions:

i) This question paper consists of 39 questions in 5 sections.

ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

iii) Section A consists of 20 objective type questions carrying 1 mark each.

iv) Section B consists of 6 Very Short answer type questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.

v) Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.

vi) Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.

vii) Section E consists of 3 source-based / case-based units of assessment of 04 marks each with sub-parts.

Section – A

Select and write the most appropriate option out of the four options given for each of the questions 1 - 20.

1. Which of the following statements about the reaction given below is correct? (1)

$$MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$$

A) HCl is oxidised to Cl_2 B) $MnCl_2$ acts as an oxidising agent.

C) MnO_2 is reduced to Cl_2. D) HCl acts as an oxidising agent.

2. Anand took four colourless solutions P, Q, R and S and tested these with the following indicators. Which of the following statements is true? (1)

INDICATOR	SOLUTION P	SOLUTION Q	SOLUTION R	SOLUTION S
Methyl Orange	No change in colour	Turns red	No change in colour	No change in colour
Phenolphthalein	No change in colour	No change in colour	No change in colour	Turns Pink
Red Litmus	No change in colour	No change in colour	No change in colour	Turns litmus blue
Blue Litmus	No change in colour	Turns litmus red	No change in colour	No change in colour

A) Both P and S are salt solutions B) Both Q and S are basic solutions

C) Both Q and R are salt solutions D) Both P and R are neutral solutions

3. Which of the following metals has lowest density? (1)

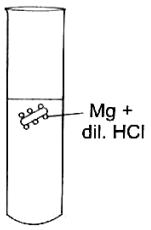
A) Copper B) Iron C) Lithium D) Zinc

4. Three solutions A, B and C have pH values 4.0, 10.5 and 7.4 respectively. The correct order of their increasing hydrogen ion concentration is: (1)

A) A < B < C B) A < C < B

C) B < C < A D) C < B < A

5. The diagram given below shows the reaction between Mg and dilute hydrochloric acid.



What is the reason for the behaviour of Mg in the test tube? (1)

A) Mg is lighter than dil. HCl.

B) Mg reacts with dil. HCl to produce H_2 gas which helps in floating.

C) Mg reacts with dil. HCl to produce Cl_2 gas which helps in floating.

D) Mg reacts with dil. HCl to produce O_2 gas which helps in floating.

6. Small amount of copper oxide is taken in a test tube and dilute hydrochloric acid is added to it with stirring. Which colour will be obtained in the test tube? (1)
   A) Blue green B) Black C) Pink D) Colourless

7. Which of the following is not a property of ionic compounds? (1)
   A) Ionic compounds are solid at room temperature.
   B) Ionic compounds have high melting points.
   C) Ionic compounds are good conductors of electricity in solid state.
   D) Ionic compounds are soluble in water.

8. Which of the following statement(s) is (are) true about respiration? (1)
   i) During inhalation, ribs are lifted and diaphragm is flattened.
   ii) In the alveoli, exchange of gases takes place, i.e. oxygen from blood diffuses into alveoli.
   iii) Haemoglobin has greater affinity for carbon dioxide than oxygen.
   iv) Alveoli increase surface area for exchange of gases.

   A) (i) and (iv) B) (ii) and (iii)
   C) (i) and (iii) D) (ii) and (iv)

9. In which part of the alimentary canal food is finally digested? (1)
   A) Stomach B) Mouth cavity
   C) Large intestine D) Small intestine

10. Choose the incorrect statement about insulin. (1)
   A) It is produced from pancreas.
   B) It regulates growth and development of the body.
   C) It regulates blood sugar level.
   D) Insufficient secretion of insulin will cause many harmful effects.

11. Which is the correct sequence of the components of a reflex arc? (1)
   A) Receptors →Muscles → Sensory Neuron → Motor Neuron → Spinal Cord.
   B) Receptors → Motor Neuron → Spinal Cord → Sensory Neuron → Muscle
   C) Receptors → Spinal Cord → Sensory Neuron → Motor Neuron → Muscle
   D) Receptors → Sensory Neuron → Spinal Cord → Motor Neuron → Muscle

12. Food web is formed by (1)
   A) relationship between the organisms and the environment.
   B) relationship between plants and animals.
   C) various interlinked food chains in an ecosystem.
   D) relationship between animals and environment.

13. The Focal length of eye lens decreases when eye muscles are: (1)
   A) Relaxed and lens become thinner B) Contract and lens become thicker
   C) Relaxed and lens become thicker D) Contract and lens become thinner

14. Magnification produced by diverging lens for an object placed in front of the lens is always: (1)
   A) Less than one B) More than one
   C) Equal to one D) None of the above

15. Choose the incorrect statement from the following: (1)
   A) Ozone is a molecule formed by three atoms of oxygen.
   B) Ozone shields the surface of the earth from ultraviolet radiations.
   C) Ozone is deadly poisonous.
   D) Ozone gets decomposed by UV radiations.

16. Which of the following has valve: (1)
   A) artery B) arteriole C) capillary D) vein

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

a) Both A and R are true, and R is the correct explanation of A.
b) Both A and R are true, and R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

17. Assertion (A): The strength of acids and bases depends on the number of H^+ ions and OH^- ions respectively produced when dissolved in water.
Reason (R) : The process of dissolving an acid or base in water is highly exothermic. (1)

18. Assertion (A): Nitrogen is an essential element for plant growth and is taken up by plants in the form of inorganic nitrates or nitrites.
Reason (R) : The soil is the nearest and richest source of raw materials like nitrogen, phosphorous and other minerals for the plants. (1)

19. Assertion (A): If image formed by a lens is virtual and erect then the lens must be concave.
Reason (R) : The Convex lens can form virtual image. (1)

20. Assertion (A): Man is a herbivore.
Reason (R): Omnivores eat plant food and meat of animals. (1)

Section – B

Question Nos. 21 to 26 are very short answer questions.

21. a) Name the following:
i) A non- metal that is lustrous.
ii) A metal that is liquid at room temperature.
b) Differentiate between metals and non-metals on the basis of any one chemical property. (2)

22. a) What will happen if diaphragm of a person gets ruptured in an accident?
b) Ventricles have thicker muscular walls than atria. Why? (2)

23. Sameer was studying in his room. Suddenly he smells something burning and sees smoke in the room. He rushes out of the room immediately. Was Sameer's action voluntary or involuntary? Why?

(OR)

Answer the following:
i) Which hormone is responsible for the changes noticed in females at puberty?
ii) Dwarfism results due to deficiency of which hormone?
iii) Name the hormone responsible for increasing the heartbeat and deal with special situation.
iv) iodine is necessary for the synthesis of which hormone? (2)

24. A student wants to get bigger image of candle flame on the walls of a room by using a mirror. Which type of mirror should he use and why? Draw a ray diagram to show formation of image. (2)

25. Draw a ray diagram to explain the term "Angle of Deviation".

(OR)

Explain the formation of a rainbow with the help of a neat diagram. (2)

26. What will be the amount of energy available to the organisms of the second trophic level of a food chain, if the energy available at the first trophic level is 10,000 joules? (2)

Section – C

Question Nos. 27 to 33 are short answer questions.

27. Give balanced chemical equations for the following chemical changes:
i) Aqueous solution of silver nitrate is reacted with copper metal.
ii) Lead nitrate solution is mixed with potassium iodide solution in a test tube.
iii) The chemical reaction that is used in black and white photography. (3)

28. Give reasons for the following:
    i) Gold and platinum are found in free- state in the earth's crust.
    ii) Aluminium oxide is an amphoteric oxide.
    iii) Sodium metal is kept immersed in kerosene oil.

    (OR)

    Justify the following observations:
    i) Copper does not liberate hydrogen gas when it reacts with dilute hydrochloric acid.
    ii) Aluminium is highly reactive metal, yet it is used for making utensils.
    iii) Hydrogen is not evolved when most metals react with nitric acid. (3)

29. Design an experiment to demonstrate hydrotropism. (3)

30. a) Name the group of organisms which occupy the first trophic level of all food chains. Why are they called so?
    b) Why are the human beings most adversely affected by biomagnification?
    c) What will happen if decomposers are removed from an ecosystem? (3)

31. A student needs spectacles of power -0.5 D for correction of his vision. Name the defect of vision he is suffering from. Draw a ray diagram to explain the defect and its correction. (3)

32. Why does the sun appear reddish early in the morning? Explain the phenomena involved. Will this phenomenon be observed by an astronaut on moon? (3)

33. Give reasons why:
    i) Normal eye is not able to see clearly objects placed closer than 25 cm.
    ii) Stars twinkle but planets do not.
    iii) White light splits into its constituent colours on passing through glass prism. (3)

Section – D

Question Nos. 34 to 36 are long answer questions.

34. a) Explain why an aqueous solution of ammonium chloride is acidic in nature.
    b) Write the chemical name and chemical formula of washing soda.
    c) A compound of sodium 'X' is used as an ingredient in antacids. On heating X produces a colourless gas which extinguishes the candle flame:
        i) Identify 'X' and the gas evolved.
        ii) Write the chemical equation for the preparation of compound 'X'.
        iii) Give any two uses of 'X' apart from being an ingredient of antacids.

    (OR)

    a) What is the significance of half molecule of water in the formula of Plaster of Paris?
    b) Why is rock salt brown in colour?
    c) Give the chemical formulae of the following:
        i) Alkali obtained as a product of Chlor- alkali process.
        ii) The product formed when Plaster of Paris reacts with water.
    d) During electrolysis of brine solution a gas 'Y' is liberated at anode. When gas 'Y' is passed through slaked lime solution, compound 'Z' is formed which is used for disinfecting drinking water.
        i) Identify 'Y' and 'Z'.
        ii) Write the chemical equation to show the preparation of 'Z'. (5)

35. a) Give two methods used by plants to get rid of excretory products.
    b) Name the basic filtration unit present in the kidney.
    c) Draw excretory system in human beings and label the organs of excretory system which perform the following functions:
        i) Filter the blood.
        ii) Long tube which collects urine from kidney.
        iii) Store urine until it is passed out.

    (OR)

    a) Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body.
    b) Draw a neat and labelled diagram of human heart. (5)

36. a) What is meant by Power of a Lens? At what distance a 10 cm tall object, be placed in front of a lens of power 10D to get inverted image of twice the size of the object.
b) If one half of this lens is covered with black paper, will it produce a complete image of object? Explain with diagram.

(OR)

a) Define 1 Dioptre. Find the power of lens which forms real inverted image of same size of an object placed at a distance of 20 cm from the lens.
b) Draw a ray diagram to show the use of lens as a magnifying glass. (3+2)

SECTION – E

Question Nos. 37 to 39 are case-based/data -based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

37. Read the information given below and answer the questions that follow:

$$2FeSO_4\ (s) \xrightarrow{heat} Fe_2O_3\ (s) + SO_2\ (g) + SO_3\ (g)$$

In this reaction you can observe that a single reactant breaks down to give simpler products. This is a decomposition reaction. Ferrous sulphate crystals ($FeSO_4.7H_2O$) lose water when heated and the colour of the crystals changes. It then decomposes to ferric oxide (Fe_2O_3), sulphur dioxide (SO_2) and sulphur trioxide (SO_3). Ferric oxide is a solid, while SO_2 and SO_3 are gases with a characteristic odour of burning sulphur. When a decomposition reaction is carried out by heating, it is called thermal decomposition. Just like ferrous sulphate, lead nitrate and calcium carbonate also undergo thermal decomposition reaction.
Decomposition of calcium carbonate to calcium oxide and carbon dioxide on heating is an important decomposition reaction used in various industries. Calcium oxide is called lime or quick lime. It has many uses – one is in the manufacture of cement.

$$CaCO_3\ (s) \xrightarrow{heat} CaO\ (s) + CO_2\ (g)$$

a) What is the colour of ferrous sulphate crystals before and after heating?
b) Define thermal decomposition reaction.
c) If lead nitrate is heated in a boiling tube, it decomposes to give a brown coloured gas. Write the name and chemical formula of the brown gas evolved. Write the chemical equation to show the decomposition reaction in this case.

(OR)

c) i) Name the product obtained at cathode and anode during electrolysis of water.
ii) Why are a few drops of dilute sulphuric acid added to water during electrolysis of water? (1+1+2)

38. When growing plants detect light, a hormone called auxin, synthesised at the shoot tip, helps the cells to grow longer. When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus, the plant appears to bend towards light. Another example of plant hormones are gibberellins which, like auxins, help in the growth of the stem. Cytokinins promote cell division, and it is natural then that they are present in greater concentration in areas of rapid cell division, such as in fruits and seeds. These are examples of plant hormones that help in promoting growth. But plants also need signals to stop growing. Abscisic acid is one example of a hormone which inhibits growth. Its effects include wilting of leaves.

a) Name the plant hormone which acts as plant growth inhibitor.
b) Which hormone promotes cell division in plants?
c) Where is auxin synthesized in growing plants? State the function of auxin.

(OR)

c) i) Name one plant hormone which causes wilting of leaves.
ii) Name one function of gibberellins. (1+1+2)

39. Study the given table to answer the following questions: -

S. NO.	MATERIAL	REFRACTIVE INDEX
1	WATER	1.33
2	ALCOHOL	1.36
3	KEROSENE	1.44
4	ROCK SALT	1.54

a) What is the unit of refractive index?
b) In which medium, speed of light is maximum? Why?
c) State Snell's Law of Refraction. Calculate refractive index of rock salt with respect to alcohol.

(OR)

c) Trace the path of light at the interface of water and kerosene and state the relation between angle of incidence and angle of refraction. (1+1+2)

-x-x-x-x-x-x-x-