



SCIENCE

Class 10 - Science

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective-type questions carrying 1 mark each.
4. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
5. 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.
6. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.
7. Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

Section A

1. To balance the following chemical equation the values of x and y should respectively be: [1]  
 $2\text{NaOH} + x\text{Al}_2\text{O}_3 \rightarrow y\text{NaAlO}_2 + \text{H}_2\text{O}$ 
  - a) 2, 3
  - b) 2, 4
  - c) 1, 2
  - d) 1, 4
2. In a double displacement reaction such as the reaction between sodium sulphate solution and barium chloride solution: [1]
  - A. exchange of atoms takes place
  - B. exchange of ions takes place
  - C. a precipitate is produced
  - D. an insoluble salt is producedThe correct option is:
  - a) A and C
  - b) B and D
  - c) only B
  - d) B, C and D
3. 2 g of yellow sulphur powder is burnt in a china dish and the fumes are collected in a test tube. Water is added in the test tube and the solution is tested separately with blue and red litmus paper. The correct option is: [1]
  - a) Blue litmus remains blue and red litmus
  - b) Blue litmus turns red and red litmus remains

remains red.

red.

c) Blue litmus turns red and red litmus turns blue.

d) Blue litmus remains blue and red litmus turns blue.

4. Identify a group of the unsaturated hydrocarbons from the following: [1]

a) Butyne, Ethene, Propyne

b) Propane, Ethene, Butyne

c) Cyclohexane, Methane, Ethane

d) Ethene, Propane, Hexane

5. Copper is used for making cooking utensils. Which of the following physical properties of copper is NOT responsible for the same? [1]

a) High melting point

b) Thermal conductivity

c) High reactivity

d) Malleability

6. The number of electrons in the outermost shell of the atom of a non-metal can be: [1]

a) 1, 2 or 3

b) 5, 6 or 8

c) 3, 4 or 5

d) 5, 6 or 7

7. Butanone is a four-carbon compound with the functional group [1]

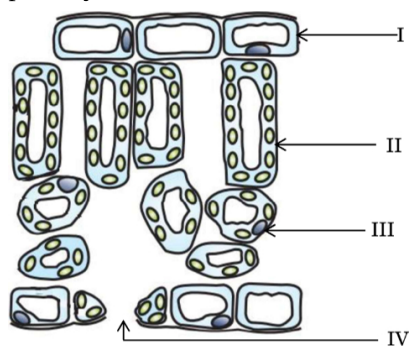
a) aldehyde

b) carboxylic acid

c) ketone

d) alcohol

8. In the following diagram, identify the cells through which massive amounts of gaseous exchange takes place for photosynthesis: [1]



a) I

b) III

c) IV

d) II

9. In an experiment to study independent inheritance of two separate traits : shape and colour of seeds, the ratio of the different combinations in F<sub>2</sub> progeny would be [1]

a) 9 : 3 : 3 : 1

b) 9 : 1 : 1 : 3

c) 1 : 2 : 1

d) 1 : 3

10. Part(s) of a flower which attracts insects for pollination is (are): [1]

a) sepals only

b) petals only

c) petals and Sepals

d) anther and Stigma

11. Father of Human genetics is [1]

a) H.G Khurana

b) Sir Archibald Garrod

c) Gregor Mendel

d) Charles Darwin

12. Select from the following the correct statement about tropic movement in plants: [1]

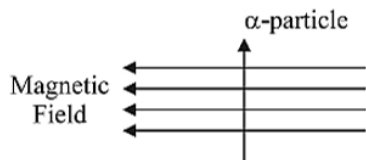
a) It is a growth related movement.

b) It does not depend upon the direction of stimulus received.

c) It is due to stimulus of touch and temperature.

d) It is observed only in roots and not in stems.

13. An alpha particle enters a uniform magnetic field as shown. The direction of motion of the alpha particle is: [1]



a) out of the page

b) into the page

c) towards right

d) towards left

14. S.I. unit of electrical resistivity is [1]

a) ohm · metre

b) ohm per metre<sup>2</sup>

c) ohm · metre<sup>3</sup>

d) ohm per metre<sup>3</sup>

15. What will happen if the deer are missing in the following food chain? [1]

Grass → Deer → Tiger

a) The population of tigers will increase

b) The tigers will die

c) The tigers will start eating grass

d) The amount of grass will decrease

16. A food chain always starts with: [1]

a) Respiration

b) Decomposition

c) Photosynthesis

d) Nitrogen fixation

17. **Assertion (A):** When calcium carbonate is heated, it decomposes to give calcium oxide and carbon dioxide. [1]

**Reason (R):** The decomposition reaction takes place on application of heat, therefore, it is an endothermic reaction.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A) :** XX chromosome give rise to female child whereas XY give rise to male child. [1]

**Reason (R) :** The Y chromosome in males is small than X chromosome.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

19. **Assertion (A):** The direction of force is given by Flemings left hand rule. [1]

**Reason (R):** A magnetic field exert a force on a moving charge in the same direction as the direction of field itself.

a) Both A and R are true and R is the correct

b) Both A and R are true but R is not the

explanation of A.

correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** The concentration of harmful chemicals is more in human beings. [1]

**Reason (R):** Man is at the apex of the food chain.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

### Section B

21. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess. [2]

i. How is 5% solution of  $\text{KMnO}_4$  prepared?

ii. State the role of alkaline potassium permanganate in this reaction. What happens on adding it in excess?

iii. Write chemical equation of this reaction.

22. A student observed a permanent slide showing asexual reproduction in Hydra. Draw labelled diagram in proper sequence of the observations that must have been made by the student. Name the process of reproduction also. [2]

23. Draw a diagram of human excretory system and label the following: [2]

i. Urinary bladder

ii. Left kidney

iii. Left ureter

OR

Explain the process of transport of oxygenated and deoxygenated blood in a human body.

24. Name the type of mirror used in a solar furnace. How can high temperature be achieved by this device? [2]

25. State 10% law. Explain with an example how energy flows through different trophic levels. [2]

OR

Explain an agricultural practice that has a harmful effect on ecosystem.

26. What is dispersion? What happens when light is passed through a glass prism? [2]

### Section C

27. The atomic number of an element is 20. Write its electronic configuration. State whether this element is a metal or a non-metal. What is its valency? Write the name and formula of the compound which this element forms with chlorine. [3]

28. A lady bought a new iron container and kept blue vitriol solution into it. On the next day, she found that the blue colour of the solution fades. She went to the shopkeeper and complained. [3]

But the shopkeeper argued that the container is of good quality and he refused to return her money. An aware person Ankit came there and asked the matter. He told the lady that the container is of good quality and you have kept the wrong substance in it, so fault is all yours.

On the basis of given passage, answer the following questions.

i. What qualities are exhibited by Ankit?

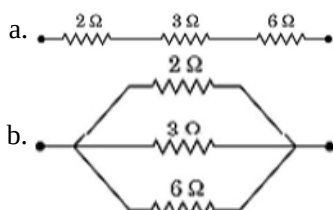
ii. Why the container becomes porous when blue vitriol solution is kept into it?

OR

A metal 'X' is found in the form of filings which burns vigorously when sprinkled on flame. When these filings are treated with sulphur a black coloured compound 'Y' is formed which is not attracted by magnet. 'X' reacts with dil

HCl to liberate hydrogen gas. 'X' reacts with steam to form 'Z' along with hydrogen gas. Identify 'X', 'Y', and 'Z'. Write the reaction involved.

29. Food does not pass through the digestive system by 'gravity'. This is clear from the fact that we can digest the food even if we are lying down. Explain the logic behind the passage of food through our digestive system. [3]
30. Give the respective scientific terms used for studying [3]
- The mechanism by which variations are created and inherited.
  - the development of new types of organisms from the existing ones.
31. What should be the position of an object with respect to focus of a convex lens of focal length 20cm, so that its real and magnified image is obtained? [3]
32. Define the term electric power. An electric device of resistance R when connected across an electric source of voltage V draws a current I. Derive an expression for the power in terms of resistance R and voltage V. What is the power of a device of resistance  $400\Omega$  operating at 200 V? [3]
33. Find the equivalent resistance of the following combinations of resistors: [3]



#### Section D

34. i. It is observed that covalent compounds are bad conductors of electricity. Give reason. [5]
- ii. Carbon can neither form  $C^{4+}$  cation nor  $C^{4-}$  anion. Why?
- iii. Draw electron dot structure of Ethanol.
- iv. Identify hetero atom(s) in the following compounds:
- $CH_3CH_2 - \overset{\overset{O}{||}}{C} - CH_3$
  - $CH_3CH_2Cl$
- OR
- a. Draw electron dot structure of methane molecule.
- b. Identify the functional groups present in the following compounds:
- $C_2H_6O$
  - $C_2H_4O$
- c. A mixture of oxygen and ethyne is burnt for welding. Why do you think a mixture of ethyne and air is not used for welding?
35. a. List three different categories of contraception methods. [5]
- b. Why has Government of India prohibited prenatal sex determination by law? State its benefits in the long run.
- c. Unsafe sexual act can lead to various infections. Name two bacterial and two viral infections caused due to unsafe sex.

OR

- i. List three points of difference between nervous and hormonal mechanisms for control and coordination in animals.

- ii. How are auxins related with the bending of plant shoot towards unidirectional light? Explain.
36. A student wants to project the image of a candle flame on the walls of the school laboratory by using a mirror. [5]
- Which type of mirror should he use and why?
  - At what distance, in terms of focal length  $f$  of the mirror, should he place the candle flame to get the magnified image on the wall?
  - Draw a ray diagram to show the formation of the image in this case.
  - Can he use this mirror to project a diminished image of the candle flame on the same wall State 'how' , if your answer is 'yes' and why not', if your answer is 'no'.

OR

An object 6 cm in size is placed at 50 cm in front of a convex lens of focal length 30 cm. At what distance from the lens should a screen be placed in order to obtain a sharp image of the object? Find the nature and size of the image. Also draw labelled ray diagram to show the image formation in this case.

#### Section E

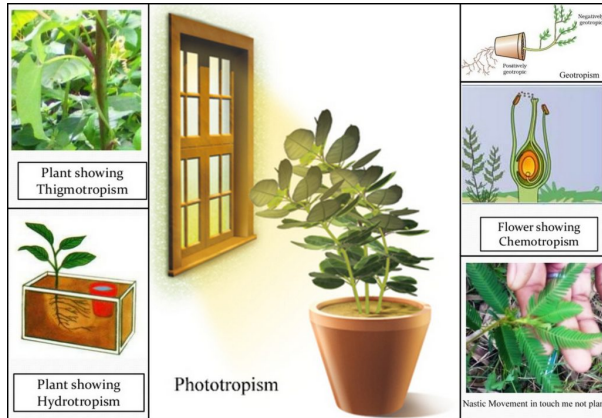
37. **Read the following text carefully and answer the questions that follow:** [4]
- Salt of a strong acid and strong base is neutral with a pH value of 7. NaCl common salt is formed by a combination of hydrochloride and sodium hydroxide solution. This is the salt that is used in food. Some salt is called rock salt, bed of rock salt was formed when seas of bygone ages dried up. The common salt thus obtained is an important raw material for various materials of daily use, such as sodium hydroxide, baking soda, washing soda, and bleaching powder.
- If given acids are phosphoric acid, carbonic acid, hydrochloric acid and sulphuric acid, then which acid does not form an acidic salt? (1)
  - What is the formula of baking soda? (1)
  - Name the substance which on treatment with chlorine to obtain bleaching powder. (2)

OR

Which salt is used for removing the permanent hardness of water? (2)

38. **Read the following text carefully and answer the questions that follow:** [4]
- Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chhui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch. There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement. So plants show two different types of movement - one dependent on growth and the

other independent of growth.



- i. Plants neither have nervous system nor muscles, then how does chemical coordination occur in plants? (1)
- ii. Why *Mimosa pudica* leaves drop down when we touched? Write its another name also. (1)
- iii. What is turgor movement? (2)

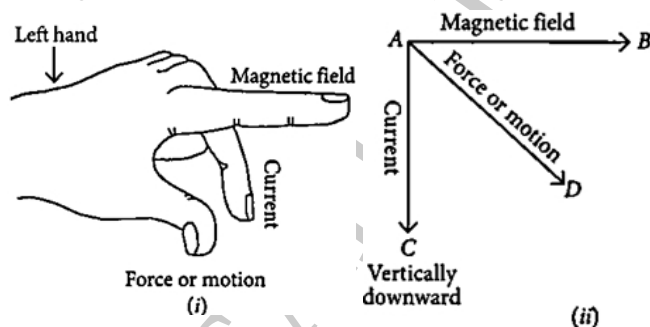
**OR**

What is a tropic movement? Explain with an example. (2)

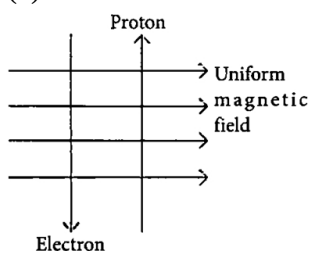
39. **Read the following text carefully and answer the questions that follow:**

[4]

Andre Marie Ampere suggested that a magnet must exert an equal and opposite force on a current-carrying conductor, which was experimentally found to be true. But we know that current is due to charges in motion. Thus, it is clear that a charge moving in a magnetic field experience a force, except when it is moving in a direction parallel to it. If the direction of motion is perpendicular to the direction of magnetic field, the magnitude of force experienced depends on the charge, velocity ( $v$ ), strength of magnetic field ( $B$ ), and sine of the angle between  $v$  and  $B$ . Direction of magnetic force is given by Fleming's left-hand rule.



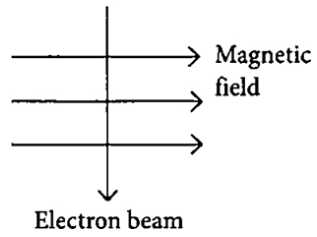
- i. If an electron is travelling horizontally towards east. A magnetic field in vertically downward direction exerts a force on the electron along which direction? (1)
- ii. A charged particle is moving with velocity  $v$  in a magnetic field of induction  $B$ . The force on the particle will be maximum when (1)
- iii. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in figure. In the field, an electron and a proton move as shown. Where do the electron and the proton experience the force? (2)



**OR**

An electron beam enters a magnetic field at right angles to it as shown in the figure. What would be the

direction of force acting on the electron beam? (2)



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