BANGALORE SAHODAYA SCHOOLS COMPLEX ASSOCIATION

PRE-BOARD EXAMINATION (2023-2024)

Grade X

Set-2

Date: 08.01.2023 **Max. Marks: 80**

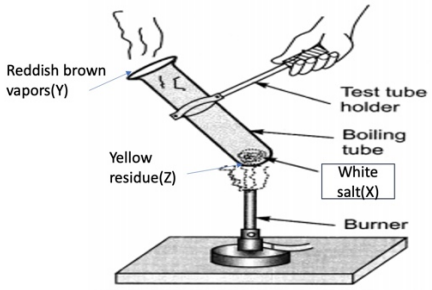
Subject: Science (086) **Time: 3 Hours**

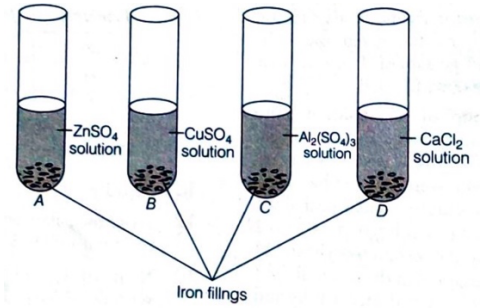
General Instructions:

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 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.*

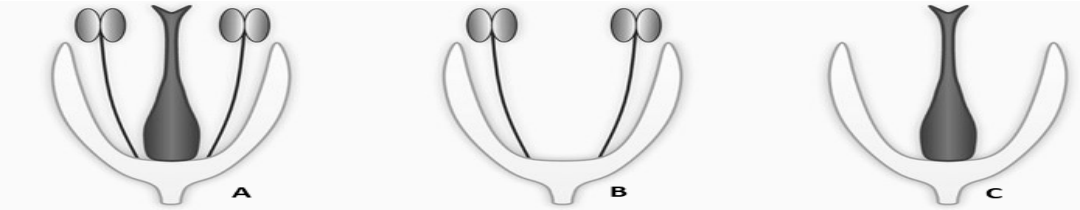
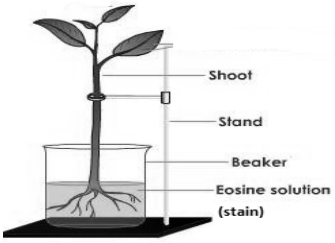
Section-A

Select and write the most appropriate option out of the four options given for each of the questions 1 - 20. There is no negative mark for incorrect response.

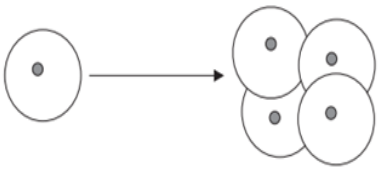
Q. Nos.	Questions	Marks
1	 Given picture shows thermal decomposition of a white coloured salt X. Identify X, Y and Z respectively. a) $FeSO_4$, SO_2, Fe_2O_3 b) $CuSO_4$, SO_2, CuO c) $Pb(NO_3)_2$, NO_2, PbO d) PbO, NO_2, $Pb(NO_3)_2$	1

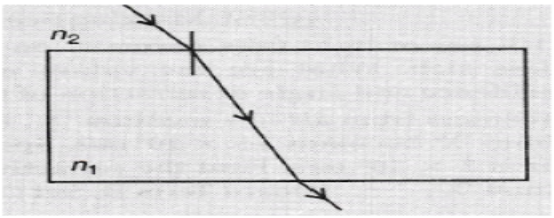
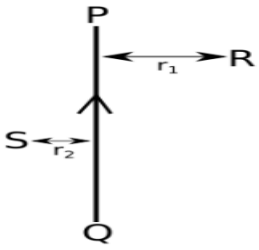
2	Iron fillings are added to four test tubes A, B, C and D containing $ZnSO_4$, $Cu(SO_4)_2$, $Al_2(SO_4)_3$ and $CaCl_2$ respectively. In which of the test tubes, changes will be observed?  a) A b) B c) C d) D	1
3	An aqueous solution 'A' turns phenolphthalein solution pink. On adding an aqueous solution 'B' to 'A', the pink colour disappears. Choose the correct statement: a) A is strongly basic and B is a weak base. b) A is strongly acidic and B is weak acid. c) A has pH greater than 7 and B has pH less than 7. d) A has pH less than 7 and B has pH greater than 7.	1
4	Which of the following combinations are correct on adding dilute HCl to given metals? **Metal** **Gas evolved** (i) Copper Yes (ii) Iron Yes (iii) Magnesium No (iv) Zinc Yes a) (i) and (iii) b) (i) and (iv) c) (ii) and (iii) d) (ii) and (iv)	1
5	Reaction between elements X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z? a) Has high melting point b) Insoluble in water c) Conducts electricity in molten state. d) Exist in solid state.	1

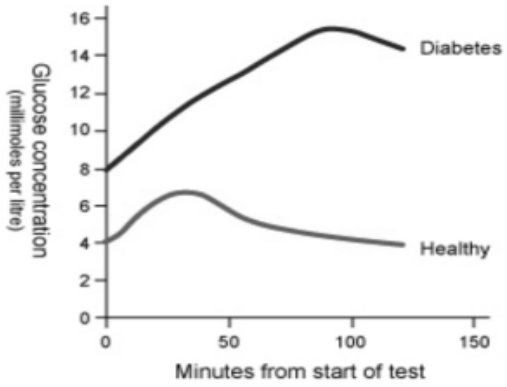
<table>
<tr><td>6</td><td>Which of the following compounds will give blue flame on combustion?
(i) C_2H_6
(ii) C_2H_2
(iii) C_3H_4
(iv) C_4H_{10}
a) (ii) and (iii)
b) (i) and (iv)
c) (ii) and (iv)
d) (i) and (iii)</td><td>1</td></tr>
<tr><td>7</td><td>Soham filled a copper jug with water and left it undisturbed for few days. He was surprised to see a dull green colour coating on the jug. His mother told him that this layer is a mixture of two compounds. Which are the two compounds his mother is referring to?
a) Copper hydroxide and Copper carbonate
b) Copper hydroxide and Copper sulphide
c) Copper oxide and Copper sulphide
d) Copper hydroxide and Copper oxide</td><td>1</td></tr>
<tr><td>8</td><td>Which row in the table below shows the correct products of anaerobic respiration in humans and yeast?
<table>
<tr><th></th><th>HUMANS</th><th>HUMANS</th><th>YEAST</th><th>YEAST</th></tr>
<tr><th></th><th>Lactic acid</th><th>Carbon dioxide</th><th>Lactic acid</th><th>Carbon dioxide</th></tr>
<tr><td>a)</td><td>X</td><td>√</td><td>X</td><td>X</td></tr>
<tr><td>b)</td><td>√</td><td>X</td><td>X</td><td>√</td></tr>
<tr><td>c)</td><td>X</td><td>√</td><td>√</td><td>X</td></tr>
<tr><td>d)</td><td>√</td><td>√</td><td>√</td><td>X</td></tr>
</table></td><td>1</td></tr>
<tr><td>9</td><td>Which of the following describes a hormone?
a) It’s a chemical messenger from the brain.
b) It’s a nerve signal from the brain.
c) It’s a chemical messenger from a gland.
d) It’s a nerve signal from a gland.</td><td>1</td></tr>
</table>

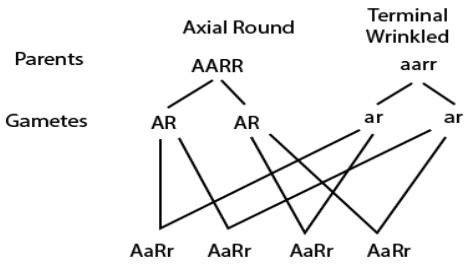
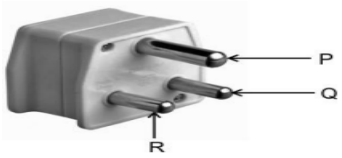
10	The diagram below shows the longitudinal section of some flowers.  Which of the above can be used to represent a hibiscus flower and a papaya flower respectively? a) B and C b) C and C c) A and B d) C and B	1
11	Some examples of responses to hormones are listed. 1. Growth of facial hair. 2. Increased blood pressure and pulse rate. 3. Widened pupils. Which of the above responses are caused by the hormone adrenaline? a) 1 and 2 only b) 1 and 3 only c) 2 and 3 only d) 1, 2 and 3	1
12	A student kept the following set up undisturbed in the lab for 3 hours. A transverse section of the stem after 3 hours revealed the presence of pink colour in the vessels of xylem. What does this observation explain?  a) Eosin solution gets stored in the xylem. b) Water moves through xylem in the plant. c) Xylem reacts with eosin and gives colour. d) Most portion of the plant stem is occupied by xylem.	1

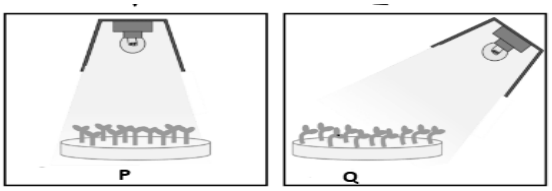
13	A student determines the focal length of a device 'A' by focusing the image of a far off object on a screen placed on the opposite side of the object. The device 'A' is a) Concave lens b) Concave mirror c) Convex lens d) Convex mirror	1
14	When a ray of light passes through a glass prism it suffers two refractions. During these refractions the ray bends a) Away from the base in both cases b) Towards the base in both cases c) Towards the base in first case and away from the base in second case d) Away from the base in first case and towards the base in second case	1
15	Which of the following describes the flow of energy and nutrients respectively in the ecosystem? a) Bidirectional and cyclic b) Unidirectional and cyclic c) Cyclic and bidirectional d) Cyclic and unidirectional	1
16	The primary source of energy in an ecosystem is a) Starch stored in plants. b) Glycogen stored in animals. c) Heat energy from respiration. d) Solar energy.	1
	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: Carbonic acid is a weak acid. Reason: It ionizes completely in water.	1
18	Assertion: A plant can be retained and multiplied indefinitely almost without any change or variation through asexual reproduction.	1

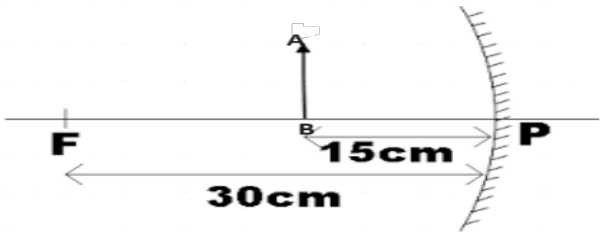
	Reason: Asexual reproduction does not involve reductional cell division and fertilization.	
19	Assertion: AC current is used in household supply. Reason: AC electric power can be transmitted over long distances without much loss of energy.	1
20	Assertion: UV radiation causes photo dissociation of ozone into O_2 and O causing damage to the ozone layer. Reason: The depletion of ozone has been linked to chemicals like CFCs.	1
Section-B **Question No. 21 to 26 are very short answer questions**		
21	A metal salt 'MX' when exposed to light split up to form metal M and gas X_2. Metal M is used to make ornaments and gas X_2 is used in making bleaching powder. Compound MX is used in black and white photography. i) Identify metal M and gas X_2. ii) Write the chemical equation for the reaction when compound MX is exposed to light and mention the type of reaction.	2
22	The diagram shows a fertilized egg dividing into an embryo.  i) What is another name to describe a fertilized egg? Name the type of cell division seen here. ii) Describe the structure that would supply nutrition to the developing embryo.	2
23	Fat is particularly difficult to digest as it is not water soluble. How is the human body adapted to digest fat? **OR** Differentiate between renal artery and renal vein with respect to i) Direction of blood flow ii) Composition of blood	2

24	i) On entering a medium from air, the speed of light becomes half of its value in air. Find the refractive index of that medium with respect to air. ii) A glass slab made of a material of refractive index $\mathbf{n_1}$ is kept in a medium of refractive index $\mathbf{n_2}$. A light ray is incident on the slab as shown in the image. Is $\mathbf{n_1}$ less than or equal to or greater than $\mathbf{n_2}$? Give reason to support your answer.  	2
25	PQ is a current carrying conductor in the plane of the paper as shown in the figure below.  i) Find the directions of the magnetic fields produced by it at points R and S. ii)State the rule that is used to find the direction of the magnetic field for a straight current carrying conductor. **OR** i)Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal? ii)Which is a better way to connect lights and other electrical appliances in domestic wiring? Give any one reason to support your answer	2
26	Some information about a food chain is listed. Caterpillars are herbivores, Blackbirds eat primary consumers, Eagles eat black birds, Spinach carries out photosynthesis. i) Draw a food chain using the above information. ii) A farmer sprays pesticide on spinach which kills most of the caterpillars. Some caterpillars survive. Discuss the impact on the food chain.	2

	Section-C **Question No. 27 to 33 are short answer questions**	
27	During extraction of metals, electrolytic refining is used to obtain pure metal. Answer the following questions for electrolytic refining of crude silver metal. i)Suggest the material used as anode and cathode and a suitable electrolyte. ii)Draw a well labelled diagram to show electrolytic refining of silver.	3
28	A salt 'X' is used in removal of permanent hardness of water. The aqueous solution of X turns red litmus blue. i) Give chemical formula and common name of X. ii)Write the preparation of X with chemical equations. iii)Is the aqueous solution of salt X acidic or basic? **OR** Salt 'A', which is a white powdered substance is used in making statues and to support fractured bones. i) Write the name and chemical formula of salt A. ii) Write the chemical equation for preparation of A. iii) What happens when this white powder is left exposed to air and why?	3
29	The graph below shows blood glucose levels following a glucose tolerance test  i) Describe the trends shown in the graph with supporting explanation. ii) How is the timing and amount of hormone released regulated in the healthy individual?	3
30	Given below is a schematic diagram showing Mendel's Experiment on garden pea plants having axial flowers with round seeds (AARR) and terminal flowers with wrinkled seeds(aarr). Study the same and answer the questions that follow:	3

	 i) Give the phenotype of F1 progeny. ii) Give the phenotypes of F2 progeny produced by the self-pollination of F1 progeny. iii) Give the phenotypic ratio of F2 progeny. Name and explain the law induced by Mendel on the basis of the above observation.	
31	Define power of a lens. Find the focal length of a lens which should be placed in contact with a lens of focal length 10cm so that the power of the combination is 5 Dioptre.	3
32	Compare the power used in the 2Ω resistor in each of the following circuits. i) A 9V battery in series with 1Ω and 2Ω resistors ii)A 6V battery in parallel with 12Ω and 2Ω resistors	3
33	Sneha had to replace the electrical plug of her iron box. She bought a three-pin plug as shown below. When she removed the old plug, she saw that there were three wires coloured red, black and green. i)Direct contact between which of the three coloured wires will result in a short circuit?  ii) State what happens to the current in the circuit in the case of a short circuit. Give reason for your answer	3
Section-D **Question No. 34 to 36 are long answer questions.**		
34	A compound ‘C’ with molecular formula $C_2H_4O_2$ reacts with sodium metal and evolves a gas which burns with pop sound. Compound ‘C’ on treatment with alcohol ‘A’ in presence of an acid forms a sweet-smelling compound ‘S’ with molecular formula $C_4H_8O_2$. i) Identify C, A and S. ii) Write chemical equation for the reaction of C with sodium metal.	5

	iii) Write chemical equation for reaction of C with alcohol A. iv) What happens when compound S reacts with NaOH? Write chemical equation and mention the type of reaction. **OR** An organic compound 'A' with molecular mass 46u is a constituent of many medicines. On reacting with alkaline $KMnO_4$, compound A is oxidized to compound 'B'. Also, compound A on treating with conc. H_2SO_4 gives compound 'C'. i) Identify A, B and C. ii) Write chemical equation for the oxidation of A to B. iii) Write chemical equation for conversion of A to C. iv) Write chemical equation for reduction of compound C in presence of Nickel as catalyst. Mention one application of this reaction.	
35	The figure below shows the male reproductive system and part of the urinary system.  i) Identify X, justify its location.Mention two characteristics of the cells produced by X. ii) Name the surgical procedure in which a blockage is created in Y.Would this have an effect on the functions of X? Why or why not? iii) How are the contents of Z different in human males and females? **OR** The experimental setup below shows the growth of seedlings on exposure to light.  i) Explain your observations in set up P and Q. ii) How is the movement of leaves in a sensitive plant different from the movement shown above? iii) Name a plant growth inhibitor and its effect on the plant.	5

36	i) Complete the following ray diagram to show the position of the image formed.  ii) Find the position and nature of the image formed in the above diagram using suitable formula. **OR** A concave lens of focal length 60cm is used to form an image of an object of height 9cm kept at a distance of 30cm from it. i) Determine the position and nature of the image formed. ii) Draw a labelled diagram to show the image formation in the above case.	5

SECTION - E

Question No. 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 Given table is showing boiling points of some ionic and covalent compounds. 4

Ionic Compound	**Boiling Point(K)**	**Covalent Compound**	**Boiling Point(K)**
NaCl	1686	Methane (CH_4)	111
LiCl	1600	Chloroform ($CHCl_3$)	334
$CaCl_2$	1900	Carbon tetrachloride (CCl_4)	349.5
CaO	3120	Ethanol(C_2H_5OH)	351
$MgCl_2$	1685	Ethanoic acid (CH_3COOH)	391

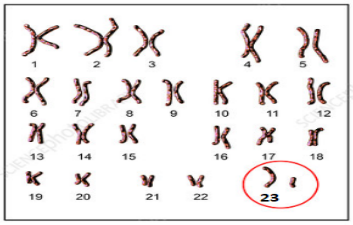
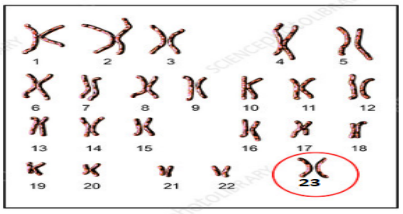
i) What is your interpretation of the given data about ionic and covalent compounds?

ii) Give reason for the interpretation.

iii) Compare the boiling points of ethanol with methanol and ethanoic acid with methanoic acid. Give reason to support your answer.

OR

iii) Should ethane have higher or lower boiling point than methane? Give reason to support your answer.

38	The 23rd pair of chromosomes in humans is known as the sex chromosomes, because they decide if the individual born will be a male or female. A picture of all 46 chromosomes in their pairs is called a karyotype. The following figure shows the karyotype of two individuals P and Q.  P  Q i) Based on your observations identify the male and female individual giving reasons. ii) If P and Q have children, what are the chances of them having a boy or a girl? Show with the help of a cross. iii) If the blood group of the father is AB and that of the mother is O. What is the probability of the children having blood group A? Justify your answer. **OR** iii)The father has blood group A and the mother has blood group O. Their daughter has blood group O. Is this information enough to determine if blood group A or O is dominant? Why or why not?	4
39	Ohm's law forms the starting point in the study of electrical networks. It states that the potential difference V, across the ends of a given metallic wire in an electric circuit is directly proportional to the current flowing through it, provided its temperature remains constant. Ohm obtained this result both experimentally and theoretically. i) If a graph is plotted between V and I, show the nature of graph obtained. ii) What is meant by the statement that 'the resistance of a conductor is one ohm'? iii) The potential difference between the terminals of an electric heater is 60V, when it draws a current of 4A from the source. What current will the heater draw if the potential difference is increased to 120V. **OR** iii) Show how would you join three resistors each of resistance 9Ω so that the equivalent resistance of the combination is 6Ω.	4

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