BANGALORE SAHODAYA SCHOOLS COMPLEX ASSOCIATION

PRE-BOARD EXAMINATION (2023-2024)

Grade X

Set-1

Date: 8.01.2024 **Max. Marks: 80**

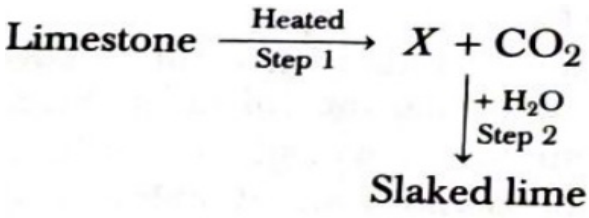
Subject: Science (086) **Time: 3 Hours**

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.*

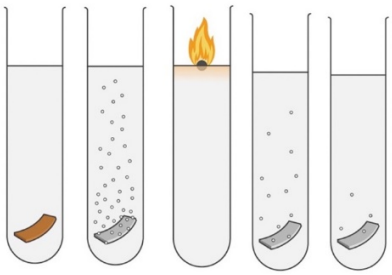
Section-A

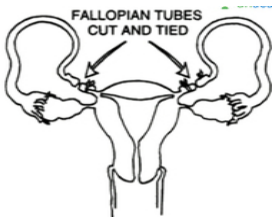
Select and write the most appropriate option out of the four options given for each of the questions 1- 20. There is no negative mark for incorrect response.

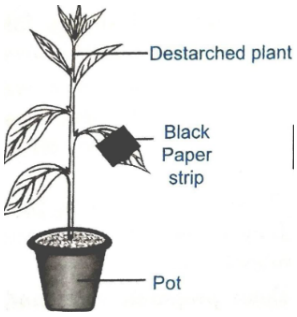
Q. Nos.	Questions	Marks
1	 Identify the correct option from the given table which represent the type of reactions occurring in step 1 and step 2.	1

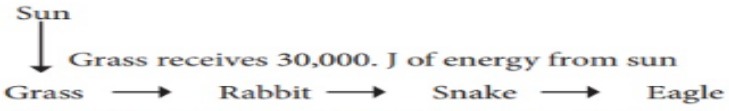
	Step 1	Step 2
a)	Exothermic	Endothermic
b)	Exothermic	Exothermic
c)	Endothermic	Exothermic
d)	Endothermic	Endothermic

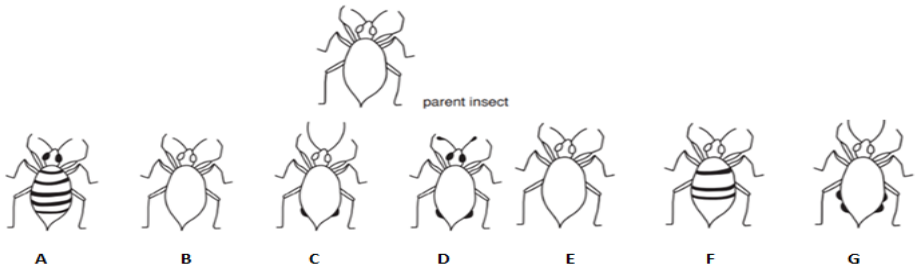
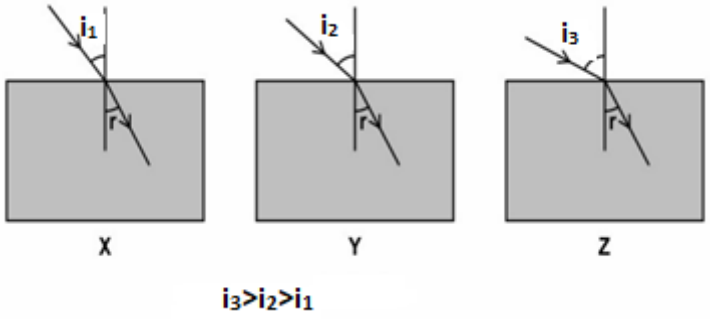
2	On heating green solid 'A', two gases 'C' and 'D' having suffocating odour along with a reddish-brown residue 'B' are obtained. These gases are major air pollutants. When the vapours of these gases are collected and dissolved in water, the solution turns blue litmus to red. A, B, C and D respectively are a) $Pb(NO_3)_2$, PbO, NO_2, N_2O b) $Fe(OH)_2$, FeO, H_2O, H_2O_2 c) $FeSO_4.7H_2O$, Fe_2O_3, SO_2, SO_3 d) $PbSO_4$, Pb_2O_3, SO_2, SO_3	1
3	If 10 mL of H_2SO_4 is mixed with 10mL of $Mg(OH)_2$ of the same concentration, the resultant solution will give which of the following colour with universal indicator? a) Red b) Green c)Yellow d) Blue	1

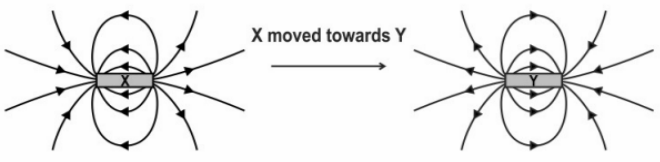
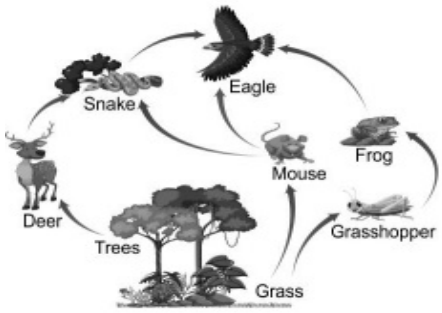
4	Given picture shows the reactions of metals A, B, C, D and E with acid. Based on the observations in the given picture, arrange the metals in increasing order of reactivity.  A B C D E a) A, B, C, D, E b) A, E, D, B, C c) D, A, E, B, C d) E, C, D, B, A	1
5	An element 'X' loses 3 electrons and another element 'Y' gains 1 electron. The chemical formula of the compound formed by the combination of X and Y and the type of compound is a) X_3Y, Ionic b) XY_3, Covalent c) X_3Y, Covalent d) XY_3, Ionic	1

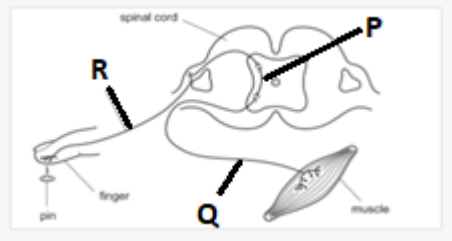
6	The metal which is not refined by electrolytic method is a) Na b) Al c) Zn d) Cu	1
7	Which of the following does not contain any covalent bond? a) HCl b) CaO c) O_2 d) CH_4	1
8	Which of the following are examples of respiration? 1. Humans use oxygen and release carbon dioxide. 2. Plants use carbon dioxide and release oxygen. 3. Burning dry leaves uses oxygen and release carbon dioxide. a) Only 1 b) Only 2 c) Only 1 and 2 d) All 1,2 and 3	1
9	Baburam suffers from a condition due to which his average blood sugar level is 210mg/dL. The average blood sugar in a healthy adult is <140mg/dL. Which of the following could result in Baburam's condition? a) Excess production of insulin b) Insufficient production of insulin c) Excess intake of protein rich food d) Insufficient intake of iodine	1
10	The diagram below represents a certain contraceptive procedure in human females. This could result in which of the following?  a) Menstrual cycle stops. b) Ovulation will not occur. c) Fertilisation cannot take place. d) Hormonal imbalance is created	1

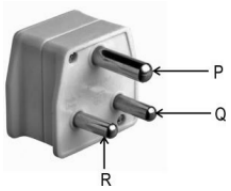
11	Which statement explains why the shoot of a plant bends when exposed to light from one side? a) Diffusion of auxin into cells that are in shade causes cell division of those cells. b) Diffusion of auxin out of the cells that are in shade causes cell division of those cells. c) Diffusion of auxin into cells that are in shade causes elongation of those cells. d) Diffusion of auxin out of the cells that are in shade causes elongation of those cells.	1
12	The following setup was exposed to sunlight for 3 days after which the black strip was removed and the leaf was tested for the presence of starch. The covered part of the leaf tested negative. What was the experiment trying to test?  a) Sunlight is necessary for photosynthesis. b) Carbon dioxide is necessary for photosynthesis. c) Oxygen is released during photosynthesis. d) Chlorophyll is required for photosynthesis.	1
13	The image of a candle flame formed by a lens is obtained on a screen placed on the other side of the lens. According to new cartesian sign convention, if the image is three times the size of the flame, then the lens is a) Concave and magnification is +3 b) Concave and magnification is -3 c) Convex and magnification is -3 d) Convex and magnification is +3	1
14	The sky on the moon appears dark to an astronaut because a) There is no light on the moon b) There is no atmosphere on the surface of the moon c) Moon is a non-luminous object d) The surface of the moon absorbs all the sunlight	1

15	What is the ratio of the amount of energy absorbed by the primary consumer to the amount of energy absorbed by the secondary consumer in the following food chain?  a) 1:2 b) 2:1 c)1:10 d) 10:1	1
16	Which statement shows the interaction of an abiotic component with a biotic component in an ecosystem? a) A grasshopper feeding on a leaf. b) Rainwater running down a lake. c) An earthworm making a burrow in the soil. d) Mice fighting among themselves for food.	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: Reaction between barium chloride and sodium sulphate takes place in solid state. Reason: Precipitation reactions are possible only when ions become free.	1
18	Assertion: Offsprings produced by sexual reproduction show variation. Reason: Each offspring produced by sexual reproduction inherits all the genes from single parent.	1
19	Assertion: A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the compass needle is moved away from the wire. Reason: Strength of magnetic field decreases as one moves away from a current carrying wire.	1
20	Assertion: Flow of energy in an ecosystem is unidirectional. Reason: Energy captured by autotrophs does not revert back to the solar input but is passed onto the primary consumers.	1

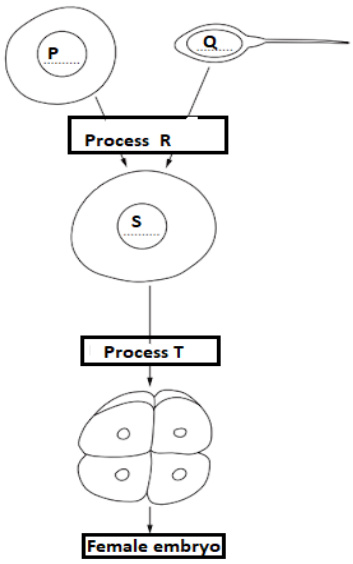
	Section-B **Question No. 21 to 26 are very short answer questions**	
21	State one example each characterized by the following observations with a balanced chemical equation: i) Evolution of gas ii) Formation of precipitate.	2
22	Some insects produce both asexually and sexually. Given below is a parent insect with her offsprings named A to G.  i) Identify two offsprings that were produced **asexually**. State the term that is defined as the observable feature of an organism. ii) Insect D was a result of sexual reproduction. Use information from the diagram to support this statement.	2
23	Human beings exhibit double circulation. Trace the flow of blood through the different **chambers of the heart** during the two types of circulation. **OR** Blood is filtered by our kidneys. Trace the flow of blood in and out of the **nephron.**	2
24	The image shown below shows the refraction of light in three transparent rectangular blocks X, Y and Z, made of different materials when they are placed in air. The angle of incidence is different in each case but angle of refraction is same in all the three blocks.  $i_3 > i_2 > i_1$ Compare the speed of light in the three blocks. Justify your answer.	2

25	The figure shows two magnets X and Y kept near each other. Their poles are not marked, but magnetic field lines are shown in the figure.  If magnet X is moved towards magnet Y as indicated by the arrow, will the two magnets attract or repel each other? Justify. **OR** State the factors on which heat produced in a current carrying conductor depends. Give one practical application of this effect.	2
26	Study the food web given below  i) Identify and write the food chain from the web shown, in which the eagle will receive the highest percentage of energy from the producers. ii) Which organism will be most affected in the above web when a non-biodegradable pesticide is introduced in the soil? What is the phenomenon called?	2
	Section-C **Question No. 27 to 33 are short answer questions**	
27	A compound of metal 'X', on treating with dilute hydrochloric acid releases a gas which turns lime water milky. Metal 'X' is used in galvanization of iron articles. i) Identify the compound of metal X. ii) Explain the extraction of metal X from its compound with suitable chemical equations.	3
28	A compound 'X' is an important ingredient of baking powder and is mildly basic in nature.	3

	i) Mention the chemical name and chemical formula of Compound X. ii) Explain the preparation of X with the help of a balanced chemical equation. iii) Suggest one application of X other than baking with chemical equation. **OR** Electrolysis of a saturated solution of an ionic compound X, give two gases Y and Z. Gas Y is used in conversion of vegetable oils to saturated fats and gas Z is used in preparation of bleaching powder. i) Identify Y and Z. ii) Write the chemical equation for electrolysis of X. iii) Write the chemical equation for the preparation of bleaching powder using gas Z.	
29	The diagram shows a reflex arc with parts labeled P, Q and R  i) What are the functions of P, Q and R? ii) There is a small gap between R and P. Name this gap and describe the events at this point.	3
30	Consider a pea plant that is recessive for plant height. Its genotype is tt and phenotype is dwarf. i) Assuming that the gene for plant height obeys Mendel's law of inheritance, indicate the **genotype** and **phenotype** of ALL the possible parent pairs that could have dwarf offsprings. ii) Using any of the parent pairs mentioned by you in 'i', perform a cross to show the genotype of the offspring that might arise in the next generation.	3
31	Define 1 Dioptre of power of a lens. Two thin lenses of focal length +10cm and -5cm are kept in contact. What is the focal length and power of the combination?	3
32	i) Consider a conductor of resistance 'R', length 'L', thickness 'd' and resistivity 'ρ'. Now this conductor is cut into four equal parts. What will be the new resistivity of each of these parts? Why?	3

	ii) Find the resistance if all of these parts are connected in: (a) Parallel (b) Series.	
33	Asha 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) To which pin on the plug should she connect the green wire? ii) To which part of the iron box is the green wire connected? iii) State the function of the green wire.	3

	Section-D **Question No. 34 to 36 are long answer questions**	
34	i) An organic compound A of molecular formula C_2H_4 on reduction gives another compound B of molecular formula C_2H_6. B on reaction with chlorine in presence of sunlight gives C. (a) Give IUPAC names of A, B and C (b) Write chemical equation for conversion of B to C and name the type of reaction. ii) Draw the structures of benzene and cyclohexane and mention one difference between them. **OR** i) A compound 'C' with molecular formula $C_2H_4O_2$ reacts with sodium bi carbonate and evolves a colourless, odourless gas which turns moist blue litmus paper red. Compound 'C' on treatment with alcohol 'A' in presence of an acid forms a sweet-smelling compound 'S' with molecular formula $C_3H_6O_2$. (a) Identify C, A and S. (b) Write balanced chemical equation for the reaction of C with sodium metal. (c) Write chemical equation for reaction of C with alcohol A. ii) Draw the structures of all the isomers with the molecular formula C_4H_{10} and write their IUPAC names.	5

35	The figure given below represents the early stages in the development of a female embryo.  i) Name processes R and T. ii) Describe the genetic makeup (including sex chromosome) of P and Q. iii) Explain the changes in the uterus both prior and post implantation till childbirth. **OR** Adrenaline is secreted to prepare our body for extreme sports like bungee jumping. i) Draw a diagram to indicate the position of the gland that secretes adrenaline. ii) How is the above gland different from the liver? iii) Explain the changes that adrenaline brings about in your body.	5
36	i) A security mirror used in a big showroom has radius of curvature 5m. If a customer is standing at 20m from the cash counter, find the position of the image formed in the security mirror. ii) Neha visited a dentist in his clinic. She observed that the dentist was holding a instrument fitted with a mirror. State the nature of this mirror and draw the ray diagram for image formation in this case. **OR** Rishi went to a palmist to show his palm. The palmist used a special lens for this purpose. i) State the nature of lens and reason for its use. ii) Draw a ray diagram to show image formation in the case of Rishi. iii) If the focal length of this lens is 10cm and the lens is held at a distance of 5cm from the palm, find the position of the image.	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

In organic chemistry, a homologous series is a sequence of compounds with the same functional group and similar chemical properties in which the members of the series differ by molecular formula of CH_2 and molecular mass of 14u.

Given below are homologous series of some compounds:

I	II	III
CH_4	X	CH_3OH
C_2H_6	C_3H_4	Y
C_3H_8	C_4H_6	C_3H_7OH
C_4H_{10}	C_5H_8	C_4H_9OH

i) Identify X and Y.

ii) Write IUPAC names of C_4H_6 and C_3H_7OH.

iii) Mention the general name and general formula of series I and II.

OR

iii) Arrange the compounds of III series in increasing order of their boiling points and give reason for the same.

4

38

Fluffy and Puffy are two guinea pigs. Fluffy has white fur while her parents and brother have black fur. Fluffy's partner Puffy has black fur. Puffy's mother has white fur while his father has black fur.

i) On the basis of the above information, is white fur a dominant or recessive trait? Justify your answer.

ii) What is the possible genetic makeup of Fluffy's brothers fur colour?

iii) What is the probability that the offspring of Fluffy and Puffy will have white fur? Also show the inheritance of fur colour in the offspring with the help of a suitable cross.

OR

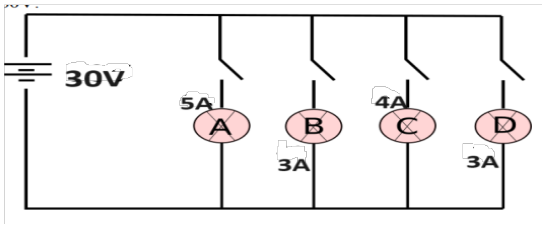
iii) 50% of the offsprings of Fluffy's brother have white fur. With the help of a cross show how this is possible.

4

39

Rahul constructed a circuit that operates four lamps A, B, C and D connected with a battery of 30V in the school exhibition. Based on the demonstrated circuit, answer the following questions.

4



i) What kind of combination are the lamps arranged in (series or parallel)?

ii) Explain with reference to your above answer, what are the advantages (any two) of this combination of lamps.

iii) Explain with proper calculations which lamp glows the brightest.

OR

iii) Calculate the total energy consumed in the above circuit in 60s.

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