

Class X

Science (Subject Code – 086)

Max. Marks: 80

Time Allowed: 3 hours

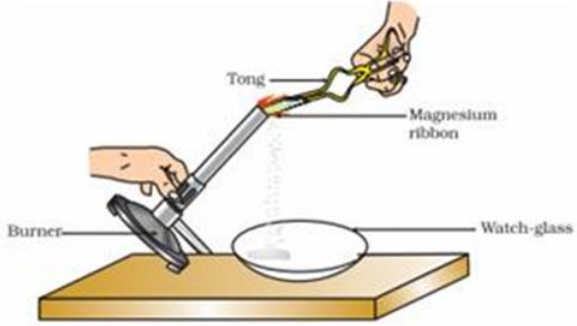
General Instructions:

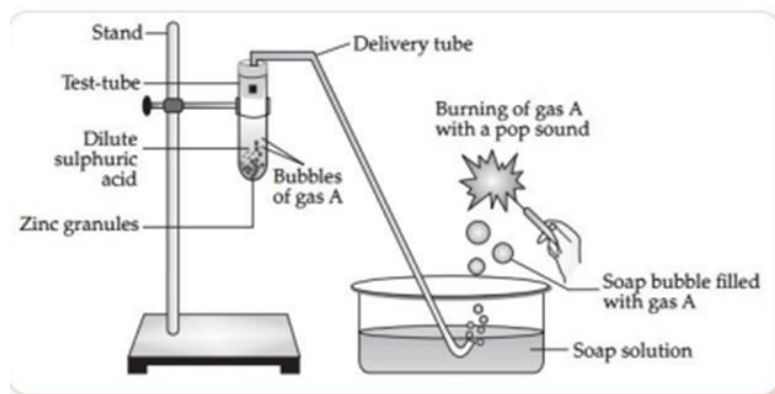
1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. Section A consists of 20 objective type questions carrying 1 mark each.
4. Section 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. Answer 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

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.

Qs no.	Question	Marks
1.	Which of the following statements about the given reaction are correct? $3\text{Fe (s)} + 4\text{H}_2\text{O (g)} \rightarrow \text{Fe}_3\text{O}_4 \text{ (s)} + 4\text{H}_2 \text{ (g)}$ (i) Iron metal is getting oxidised	1

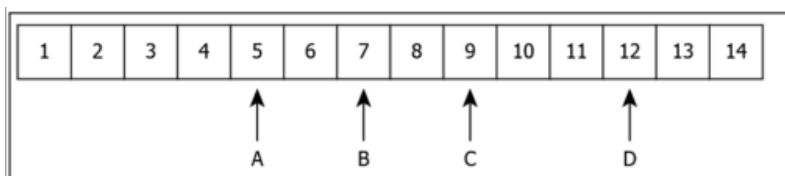
	<p>(ii) Water is getting reduced</p> <p>(iii) Water is acting as reducing agent</p> <p>(iv) Water is acting as oxidising agent</p> <p>(a) (i), (ii) and (iii)</p> <p>(b) (ii) and (iv)</p> <p>(c) (i), (ii) and (iv)</p> <p>(d) (ii) and (iv)</p>	
2.	 <p>Which of the following is the correct observation for the reaction shown in the above setup:</p> <p>a) Magnesium ribbon burns with a dazzling white light.</p> <p>b) Colourless gas which turns lime water milky is evolved.</p> <p>c) Brown powder of magnesium oxide is formed.</p> <p>d) Reddish brown gas with a smell of burning sulphur is evolved.</p>	1
3.	Identify gas A in the following experiment:	1



- (a) Nitrogen
- (b) Carbon dioxide
- (c) Oxygen
- (d) Hydrogen

4. The image shows the pH values of four solutions on a pH scale.

1



Which solutions are alkaline in nature?

- (a) A and B
- (b) B and C
- (c) C and D
- (d) A and D

5.	<p>2 mL each of concentrated HCl, concentrated HNO<sub>3</sub> and a mixture of concentrated HCl and concentrated HNO<sub>3</sub> in the ratio of 3:1 were taken in test tubes labeled as A, B and C. A small piece of metal was put in each test tube. No change occurred in test tube A and B but the metal got dissolved in test tube C respectively. The metal could be</p> <p>a) Al</p> <p>b) Au</p> <p>c) Cu</p> <p>d) Mg</p>	1
6.	<p>An element X reacts with O<sub>2</sub> to give a compound with a high melting point. This compound is also soluble in water. The element X is likely to be</p> <p>a) Iron</p> <p>b) Calcium</p> <p>c) Carbon</p> <p>d) Silicon</p>	1
7.	<p>The metals that float when treated with water are:</p> <p>a) Manganese and sodium</p> <p>b) Sodium and calcium</p> <p>c) Magnesium and sodium</p> <p>d) Magnesium and calcium</p>	1
8.	<p>After digestion, proteins, carbohydrates and fats are respectively converted into</p> <p>(a) Glucose, fatty acids and glycerols</p> <p>(b) Amino acids, glucose and fatty acids.</p> <p>(c) Amino acids, glucose, fatty acids and glycerol</p> <p>(d) Glucose, glycerol and fatty acids.</p>	1

9.	<p>Which of the following statements is correct about receptors?</p> <p>(a) Gustatory receptors detect taste while olfactory receptors detect smell  (b) Both gustatory and olfactory receptors detect smell  (c) Auditory receptors detect smell and olfactory receptors taste  (d) Olfactory receptors detect taste and gustatory receptors smell.</p>	1				
10.	<p>Potato is grown from</p> <p>(a) Cutting of aerial stems  (b) Cutting of tubers having depressions  (c) Cutting of tubers without depressions  (d) Cutting of roots.</p>	1				
11.	<p>Blue eye colour in humans is recessive to brown eye colour. The expected children of a marriage between blue-eyed woman and brown-eyed man who had a blue-eyed mother are like to be in the ratio of</p> <p>(a) all blue-eyed  (b) three blue-eyed and one brown-eyed  (c) all brown-eyed  (d) one blue-eyed and one brown-eyed.</p>	1				
12.	<p>Identify the correct passage of air from the outside to the lungs -</p> <p>(a) Nostrils → nasal chambers → pharynx → larynx → trachea → bronchi → bronchioles → alveolar duct → alveoli  (b) Nostrils → nasal chambers → larynx → pharynx → trachea → bronchi → bronchioles → alveolar duct → alveoli  (c) Nostrils → nasal chambers → pharynx → larynx → trachea → bronchioles → bronchi → alveolar duct → alveoli  (d) Nostrils → nasal chambers → pharynx → trachea → larynx → bronchioles → bronchi → alveolar duct → alveoli</p>	1				
13.	<p>Which of the following options is correct in case of a concave mirror?</p> <p>a)</p> <table border="1" data-bbox="300 1556 1105 1860"> <tr> <td data-bbox="300 1556 430 1860">Object  position</td> <td data-bbox="430 1556 602 1860">Image  position</td> <td data-bbox="602 1556 824 1860">Image  size</td> <td data-bbox="824 1556 1105 1860">Nature  of image</td> </tr> </table>	Object  position	Image  position	Image  size	Nature  of image	1
Object  position	Image  position	Image  size	Nature  of image			

At C	At C	Equal to object	Real and inverted
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b)

Object position	Image position	Image size	Nature of image
Beyond C	Between F and C	Diminished	Virtual and erect

c)

Object position	Image position	Image size	Nature of image
Between F and C	At infinity	Enlarged	Real and inverted

d)

Object position	Image position	Image size	Nature of image
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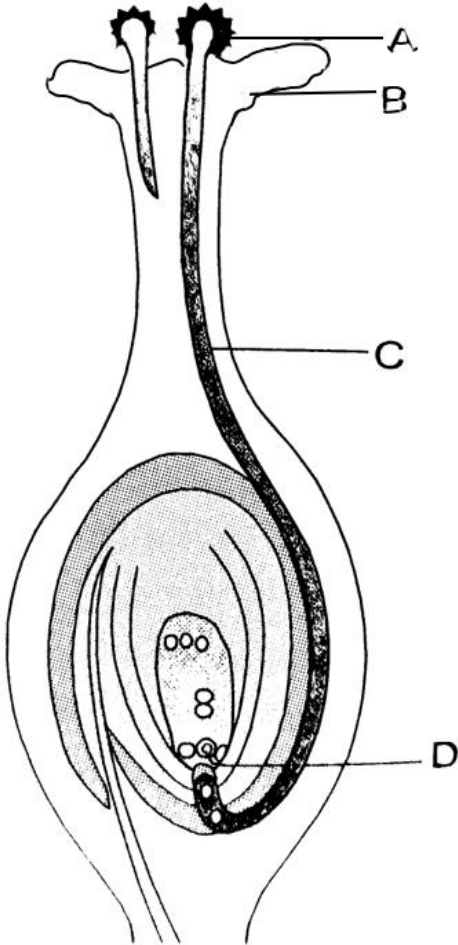
	<table border="1"> <tr> <td>At F</td> <td>At infinity</td> <td>Highly diminished</td> <td>Virtual and erect</td> </tr> </table>	At F	At infinity	Highly diminished	Virtual and erect	
At F	At infinity	Highly diminished	Virtual and erect			
14.	<p>Which of the following statements are correct regarding scattering of light?</p> <p>(i) Scattering is responsible for the bluish appearance of the sky.</p> <p>(ii) Clouds having droplets of water scatter all wavelengths are almost equal and so are generally white.</p> <p>(iii) Advanced sunrise and delayed sunset.</p> <p>a) Only (i) and (ii) are correct.  b) Only (ii) and (iii) are correct.  c) Only (iii) is correct.  d) All (i), (ii) and (iii) are correct.</p>	1				
15.	<p>Suppose the amount of energy available at the fourth trophic level is 2 kJ in a given food chain. What will be the available energy at the producer level?</p> <p>(a) 20 kJ  (b) 2 kJ  (c) 2000 kJ  (d) 200 kJ.</p>	1				

16.	<p>In the following groups of materials, which group(s) contains only non-biodegradable items?</p> <p>I. Wood, paper, leather  II. Polythene, detergent, PVC  III. Plastic, detergent, grass  IV. Plastic, bakelite, DDT</p> <p>(a) III  (b) IV  (c) I and III  (d) II and IV.</p>	1
	<p>Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:</p> <p>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.</p>	
17.	<p><b>Assertion:</b> Anodising is a method to prevent metal from corrosion.  <b>Reason:</b> Anodising is a process of coating iron with a layer of zinc.</p>	1
18.	<p><b>Assertion:</b> In a monohybrid cross, offsprings of F<sub>1</sub> generation express dominant character.  <b>Reason:</b> Dominance occurs only in heterozygous state.</p>	1
19.	<p><b>Assertion:</b> A current carrying straight conductor experiences a force when placed perpendicular to the direction of the magnetic field.  <b>Reason:</b> The net charge on a current carrying conductor is always zero.</p>	1
20.	<p><b>Assertion:</b> There are generally 3 or 4 trophic levels in a food chain.  <b>Reason:</b> Great loss of energy at each trophic level is responsible for shorter food chains.</p>	1



**Section-B**

Question No. 21 to 26 are very short answer questions

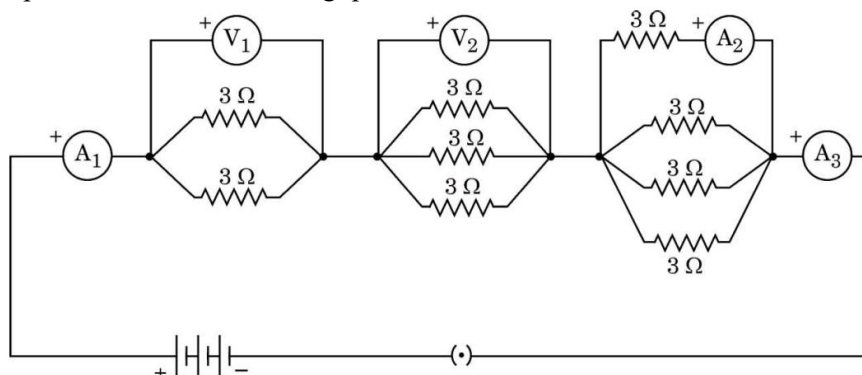
21.	2g of silver chloride is taken in a china dish and it is placed in sunlight for some time. What will be your observation in this case? Write the balanced chemical equation. State the type of chemical reaction.	2
22.	<p>Study the figure below and answer the following questions:</p>  <p>(a) Name the part marked 'A' in the diagram. (b) How does 'A' reach part 'B'? (c) State the importance of part 'C'. (d) What happens to the part marked 'D' after fertilisation is over?</p>	$\frac{1}{2} \times 4 = 2$

23.	<p>(a) “About 180 litres of filtrate is produced each day but only 1.5 litres of urine is excreted out”. State the difference between the glomerular filtrate and urine.</p> <p>(b) The diagram shows a kidney and its associated vessels. Which structures have the most and least urea concentration?</p> <p><b>OR,</b></p> <p>Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds? How is the heart and circulation different from that in fishes?</p>	1+1=2
24.	<p>The speed of light in glass is <math>2 \times 10^8</math> m/s and in water is <math>2.25 \times 10^8</math> m/s.</p> <p>(a) Which one of the two is optically denser and why ?</p> <p>(b) A ray of light is incident normally at the water-glass interface when it enters a thick glass container filled with water. What will happen to the path of the ray after entering the glass ? Give a reason.</p>	1+1=2

25.

Consider the following electrical circuit diagram in which nine identical resistors of 3 ohm each are connected as shown. If the reading of the ammeter  $A_1$  is 1 ampere, answer the following questions :

1+1=2



a) What is the relationship between the readings of  $A_1$  and  $A_3$  ? Give reasons for your answer.

b) Determine the reading of the voltmeter  $V_1$ .

OR

a) Explain the meaning of overloading of an electrical circuit.

b) How is the type of current used in household supply different from the one given by a battery of dry cells?

26.

It is said that there is a need to put a complete ban on the products containing aerosols. Why is there a demand to put a ban on them?

2

### Section-C

Question No. 27 to 33 are short answer questions

27.

A non-metal A is an important constituent of our food and forms two oxides B and C. Oxide B is toxic whereas C causes global warming. Study of Element A is done as a separate branch of chemistry.

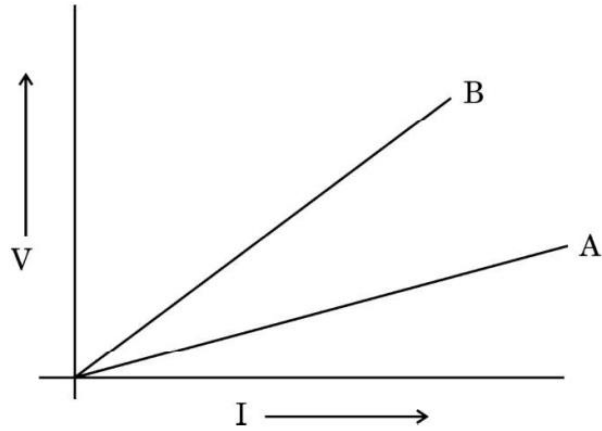
3

a) Identify A, B and C.

b) State the nature of the oxides formed- acidic or basic?

c) Mention one role of A in the extraction of metals in the middle of reactivity series. Justify with a chemical equation.

28.	<p>a) Distinguish between roasting and calcination.</p> <p>b) Write a chemical equation to illustrate the use of Aluminium for joining cracked railway lines.</p> <p>c) Name the electrolyte, anode and cathode used in the electrolytic refining of impure copper.</p> <p style="text-align: center;"><b>OR</b></p> <p>Account for the following:</p> <p>a) For storing sodium metal it is kept immersed in kerosene.</p> <p>b) Hydrogen gas is not evolved when a metal reacts with nitric acid.</p> <p>c) Silver and copper lose their shine when they are exposed to air.</p>	3
29.	<p>(a) How are the components of the central nervous system protected?</p> <p>(b) What happens at the synapse between two neurons?</p>	1+2= 3
30.	<p>Mention the total number of chromosomes along with the sex chromosomes that are present in a female and a human male.</p> <p>Explain how in sexually producing organisms the number of chromosomes in progeny remains the same as that of the parents.</p>	1+2= 3
31.	<p>a) A concave mirror is made by cutting a portion of a hollow glass sphere of radius 24 cm. Find the focal length of the mirror.</p> <p>b) What is the distance between a real object and its real image in the case of a concave mirror, when the object is placed at the centre of curvature?</p> <p>If an incident ray passes through the centre of curvature of a concave mirror, what happens to the reflected ray? Give a reason.</p>	1+2=3
32.	<p>a) V- I graph for two conducting wires A and B are shown below. If both wires are the same length and same diameter, which of the two is made of a material of high resistivity. Give reason to justify your answer.</p>	2+1=3



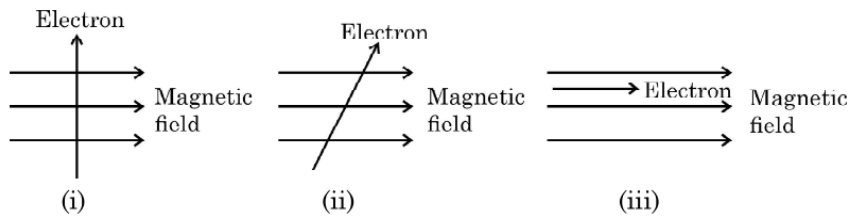
b) State the difference between kilowatt and kilowatt hour.

33.

a) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field.

b) Given below are three diagrams showing the entry of an electron in a magnetic field. Identify the case in which the force will be i) maximum, ii) minimum respectively. Give reason for your answer.

1+2= 3



**Section-D**

Question No. 34 to 36 are long answer questions.

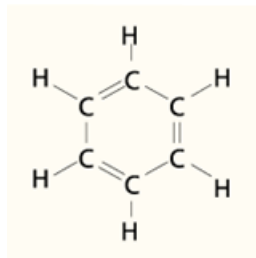
अर्पिता आर भट्टाचार्य, शिफा आलम, सोमा बैनरजी  
अध्यापक, श्री शिक्षायतन स्कूल

34.

a) Name:

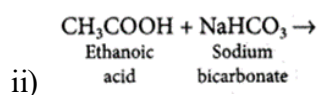
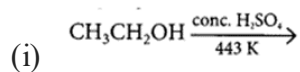
1+2+2

i)  $\text{CH}_3\text{-CH}_2\text{-CH=CH}_2$



ii)

b) Complete the following reaction:



c) Draw the structure of ethanol and propanone.

**OR**

a) Draw two structural isomers of butane.

b) What is an esterification reaction? Write one use of esters.

c) Give reasons for the following:

i) The element carbon forms a very large number of compounds.

ii) Soaps are not considered suitable for washing with hard water.



### 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.

Read the following passage carefully and answer the questions.

1+1+2=4

Homologous series is a series of compounds with similar chemical properties and some functional groups differing from the successive member by  $\text{CH}_2$ . Carbon chains of varying lengths have been observed in organic compounds having the same general formula.

All the members belonging to this series have the same functional groups. They have similar physical properties that follow a fixed gradation with increasing mass.

The properties of  $\text{CH}_3\text{OH}$ ,  $\text{C}_2\text{H}_5\text{OH}$ , and  $\text{C}_3\text{H}_7\text{OH}$  are similar and follow a gradual change with increasing molecular mass of the successive members of the series.

The formula of four organic compounds are given below:

A	B	C	D
$\text{C}_2\text{H}_4$	$\text{CH}_3\text{COOH}$	$\text{C}_2\text{H}_5\text{OH}$	$\text{C}_2\text{H}_6$

i) Which of these compounds A,B,C or D is a saturated hydrocarbon?

ii) Name the functional group present in compound B.

iii) Give the molecular formula of any homologous of C.

Show the reaction of C with sodium metal.

**OR**

Why is it that the chemical properties of homologous series are always the same?

Write the chemical reaction of A with hydrogen gas in the presence of Ni.



38.	<p>Read the following passage carefully and answer the questions</p> <p>Pea plants can have smooth seeds or wrinkled seeds. One of the phenotypes is completely dominant over the other. A farmer decides to pollinate one flower of a plant with smooth seeds using pollen from a plant with wrinkled seeds. The resulting pea pod has all smooth seeds.</p> <p>(a) What conclusion do you draw from the above result?  (b) What was the probable genotype of the smooth seeded plant obtained in the above cross?  (c) Design a cross between two plants so that smooth and wrinkled seeded plants are obtained in the same proportion. On crossing of two heterozygous smooth seeded plants (Rr), a total of 1000 plants were obtained in F<sub>1</sub> generation. What will be the respective number of smooth and wrinkled seeds obtained in F<sub>1</sub> generation?</p> <p style="text-align: center;"><b>OR,</b></p> <p>(c) If two pea plants having round and green seeds (RRGg) are crossed, identify the percentage of the following with respect to the F<sub>1</sub> generation:</p> <p>(i) offspring having the same genotype as the parents  (ii) offspring having the same phenotype as the parents</p>	1+1+2= 4
39.	<p>Read the following passage carefully and answer the questions -</p> <p>Whenever a current is passed through a conductor it becomes hot after some time. This means that the electric energy is converted into heat energy. This if it is called the heating effect of current</p> <p>i) Name two electrical appliances based on the heating effect of current.  ii) Is heating always desirable? Give reason for your answer.  iii) What do you mean by Joule's law of heating?</p> <p style="text-align: center;"><b>OR</b></p> <p>Why does the cord of an electric heater not glow while the heating element does?</p>	1+1+2=4