

**DESIGN OF QUESTION PAPER**  
**SAMPLE QUESTION PAPER**  
**X - SCIENCE (THEORY)**

**Time : 2½ Hours**

**Max. Marks : 60**

The weightage to marks over different dimensions of the question paper shall be as under:

**A. Weightage to Content/Subject units**

<b>S.No</b>	<b>Content Unit</b>	<b>Marks</b>
1.	Chemical Substances	18
2.	World of living	16
3.	Effects of current	10
4.	Light	8
5.	Natural Resources	8
<b>Total</b>		<b>60</b>

**B. Weightage to forms of Questions**

<b>S.No.</b>	<b>Form of Questions</b>	<b>Marks for each question</b>	<b>No. of questions</b>	<b>Total Marks</b>
1.	Very short answer type (VSA)	01	09	09
2.	Short answer type (SA I)	02	09	18
3.	Short answer type (SA II)	03	06	18
4.	Long answer type (LA)	05	03	15
<b>Total</b>			<b>27</b>	<b>60</b>

**C. Number of Sections**

The question paper will have two sections A & B

**D. Scheme of Options**

There will be no overall choice. However, there is an internal choice in every question of five marks category.

### E. Weightage to difficulty level of questions

S.No.	Estimated difficulty level of questions	Percentage
1.	Easy	15
2.	Average	70
3.	Difficult	15

### F. Typology of Questions

In order to assess different abilities related to the subject, the question paper includes open-ended questions, drawing/illustrations based questions, communication-skill based questions and activity-based questions.

**About 20% weightage has been assigned to questions testing higher order thinking skills of learners.**

**BLUE PRINT I**  
**X SCIENCE (THEORY)**

Form of Questions Unit	VSA (1 Mark)	SA - I (2 Marks)	SA - II (3 Marks)	LA (5 Marks)	Total
Chemical Substances	3(3)	4(2)	6(2)	5(1)	18(8)
World of Living	2(2)	6(3)	3(1)	5(1)	16(7)
Effects of current	1(1)	4(2)	-	5(1)	10(4)
Light	2(2)	-	6(2)	-	8(4)
Natural Resources	1(1)	4(2)	3(1)	-	8(4)
<b>Total</b>	<b>9(9)</b>	<b>18(9)</b>	<b>18(6)</b>	<b>15(3)</b>	<b>60(27)</b>

**SAMPLE PAPER I**  
**X - SCIENCE (THEORY)**

**Time : 2½ Hours**

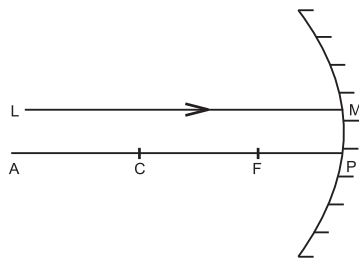
**Max. Marks : 60**

**General Instructions**

1. The question paper comprises of two sections A and B. You are to attempt both the sections.
2. All questions are compulsory.
3. There is no overall choice However, internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.
4. All questions of section A and all questions of section B are are to be attempted separately.
5. Questions 1 to 6 in section A and 17 to 19 in section B are short question. These carry one mark each.
6. Questions 7 to 10 in section A and 20 to 24 in section B are short answer type questions and carry two marks each.
7. Questions 11 to 14 in section A and 25 to 26 in section B are also short answer type questions and carry three marks each.
8. Questions 15 and 16 in section A and question 27 in section B are long answer type questions and carry five marks each.

**SECTION A**

1. A ray of light LM is incident on a mirror as shown in the figure. The angle of incidence for this ray is the angle between it and the line joining two other points in the figure. Name these two points.



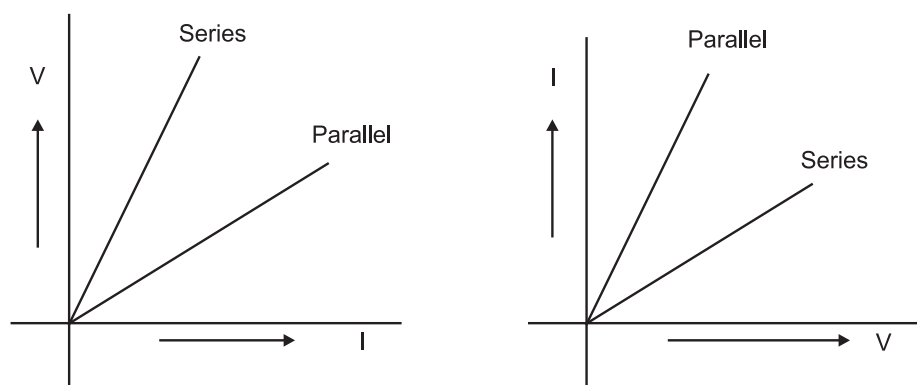
2. Metals generally occur in solid state. Name and write symbol of a metal that exists in liquid state at room temperature.
3. During summer season, a milkman usually adds a very small amount of baking soda to fresh milk. Give one reason.

4. The following table gives the values of refractive indices of a few media.

S.No.	1	2	3	4	5
Medium	Water	Crown Glass	Rock salt	Ruby	Diamond
Refractive Index	1.33	1.52	1.54	1.71	2.42

Use this table to give an example of (i) a medium pair so that light speeds up when it goes from one of these media to another. (ii) a medium pair so that light slows down when it goes from one of these media to another.

- Why potato chips manufacturers fill the packet of chips with nitrogen gas?
- Alloys are used in electrical heating devices rather than pure metals. Give one reason.
- Tooth enamel is one of the hardest substances in our body. How does it undergo damage due to eating chocolates and sweets? What should we do to prevent it?
- A student has been collecting silver coins and copper coins. One day she observed a black coating on silver coins and a green coating on copper coins. Which chemical phenomenon is responsible for these coatings? Write the chemical name of black and green coatings.
- Two students perform the experiments on series and parallel combinations of two given resistors  $R_1$  and  $R_2$  and plot the following V-I graphs.



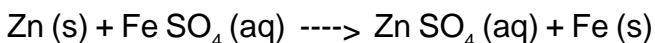
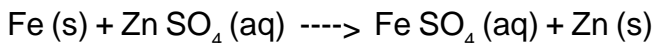
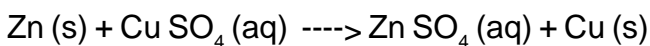
Which of the graphs is (are) correctly labelled in terms of the words 'series' and parallel' Justify your answer.

- Draw the pattern of magnetic field lines of a current carrying solenoid. What does the pattern of field lines inside the solenoid indicate? Write one application of magnetic field of current carrying solenoid.
- A student finds the writing on the blackboard as blurred and unclear when sitting on the last desk in the classroom. He however, sees it clearly when sitting on the front desk at an approximate distance of 2m from the blackboard.

Draw ray diagrams to illustrate the formation of image of the blackboard writing by his eye-lens when he is seated at the (i) last desk (ii) front desk.

Name the kind of lens that would help him to see clearly even when he is seated at the last desk. Draw a ray diagram to illustrate how this lens helps him to see clearly.

12. State which of the following chemical reactions will take place or not, giving suitable reason for each.



13. (a) Two lenses have power of (i) + 2D (ii) - 4D. What is the nature and focal length of each lens?  
 (b) An object is kept at a distance of 100cm from each of above lenses.  
 Calculate the (i) image distance (ii) magnification in each of the two cases.

14. The following table shows the position of six elements A, B, C, D, E and F in the periodic table.

Groups	1	2	3 to 12	13	14	15	16	17	18
Periods									
2.	A					B			C
3.		D			E				F

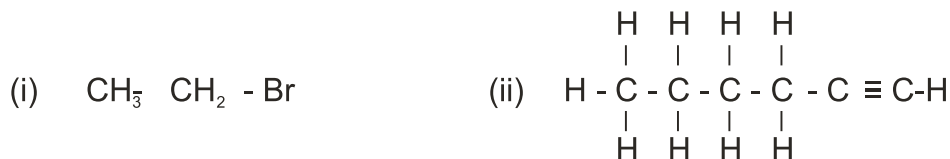
Using the above table answer the following questions :

- (a) Which element will form only covalent compounds?  
 (b) Which element is a metal with valency 2?  
 (c) Which element is a non-metal with valency of 3?  
 (d) Out of D and E, which one has a bigger atomic radius and why?  
 (e) Write a common name for the family of elements C and F.
15. An organic compound 'A' is widely used as a preservative in pickles and has a molecular formula  $\text{C}_2\text{H}_2\text{O}_2$ . This compound reacts with ethanol to form a sweet smelling compound 'B'.
- (i) Identify the compound 'A'  
 (ii) Write the chemical equation for its reaction with ethanol to form compound 'B'.  
 (iii) How can we get compound 'A' back from 'B'?  
 (iv) Name the process and write corresponding chemical equation.  
 (v) Which gas is produced when compound 'A' reacts with washing soda? write the chemical equation.

OR

- (a) Why does carbon form largest number of compounds?  
 (b) Why are some of these called saturated and other unsaturated compounds?

- (c) Which of these two is more reactive?  
 (d) Write the names of the compounds.

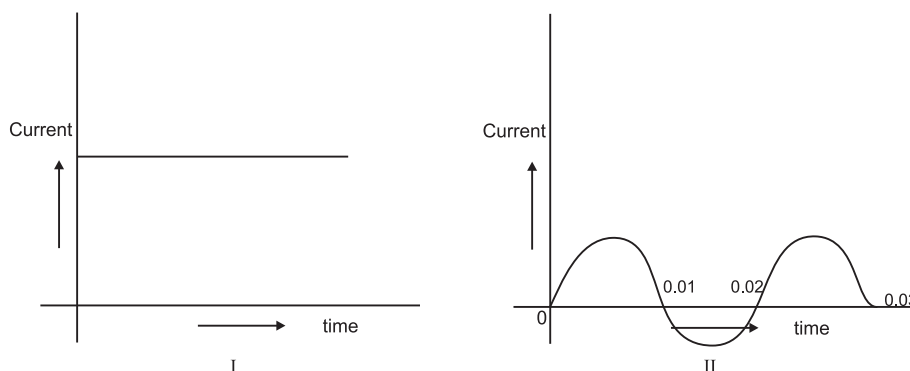


16. In a household electric circuit different appliances are connected in parallel to one another. Give two reasons.

An electrician puts a fuse of rating 5A in that part of domestic electrical circuit in which an electrical heater of rating 1.5kW, 220V is operating. What is likely to happen in this case and why? What change, if any, needs to be made?

OR

You are given following current-time graphs from two different sources:

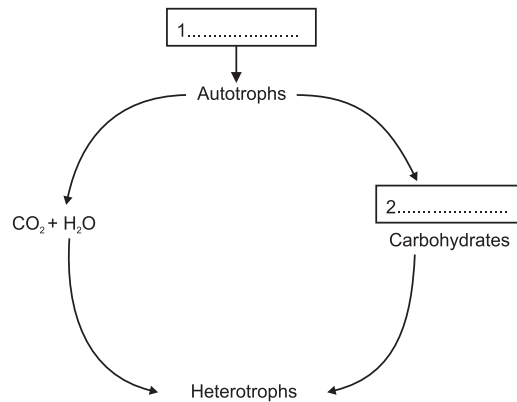


- (i) Name the type of current in two cases.  
 (ii) Identify any one source for each type of these currents.  
 (iii) What is the frequency of current in case II in India?  
 (iv) Use above graphs to write two difference between the current in two cases.

### SECTION B

17. After a vigorous exercise, you may experience cramps in your leg muscles. Why does this happen? 1
18. Which organ secretes a hormone when the blood sugar rises. Name a digestive enzyme released by this organ. 1
19. Name two gases, other than carbon-di-oxide, that are given out during burning of fossil fuel and contribute towards acid rain formation. 1
20. Out of two solar cookers, one was covered by a plane glass slab and the other was left open. Which of the two solar cookers will be more efficient and why? 2

21. In the flow chart given below, fill in the blank spaces with the kind of energy available. 2



22. By comparing the similarity of nucleotide sequences in DNA of different kinds of organisms, evolutionary relationships can be established. Arrange the following according to their evolutionary closeness. (You may use your knowledge of classification also). Whose DNA among these do you think is most similar to that of humans? 2

cockroach, mango tree, gorilla, fish

23. Study carefully the food chains given below:-

Food chain I : grass - grasshopper - frog

Food chain II : wheat - rat - snake - hawk

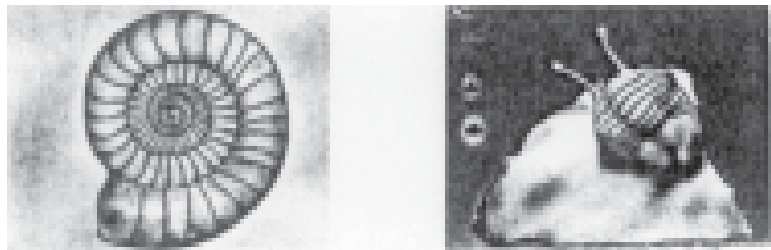
To which of the two consumers, frog or hawk will more energy (percent) be available and why? 2

24. What do the following transport?

- (i) xylem      (ii) phloem      (iii) pulmonary vein      (iv) Vena Cava

25. Give one term caption for the two pictures given here.

Define the term and give its significance in evolution 3



26. Why are environmentalists insisting upon 'sustainable natural resource management'? Give any three reasons

27. Study the given data and answer the questions following the data.



Parental plants cross fertilised & seeds collected	F <sub>1</sub> (first generation off spring)	F <sub>2</sub> (offspring of self pollination of F <sub>1</sub> )
Male parent always bore red flowers. Female parent always had white flowers.	330 seeds sown and observed  All 330 gave red flowers	Out of 44 seeds 33 seeds gave plants with red flowers and 11 seeds gave plants with white flowers

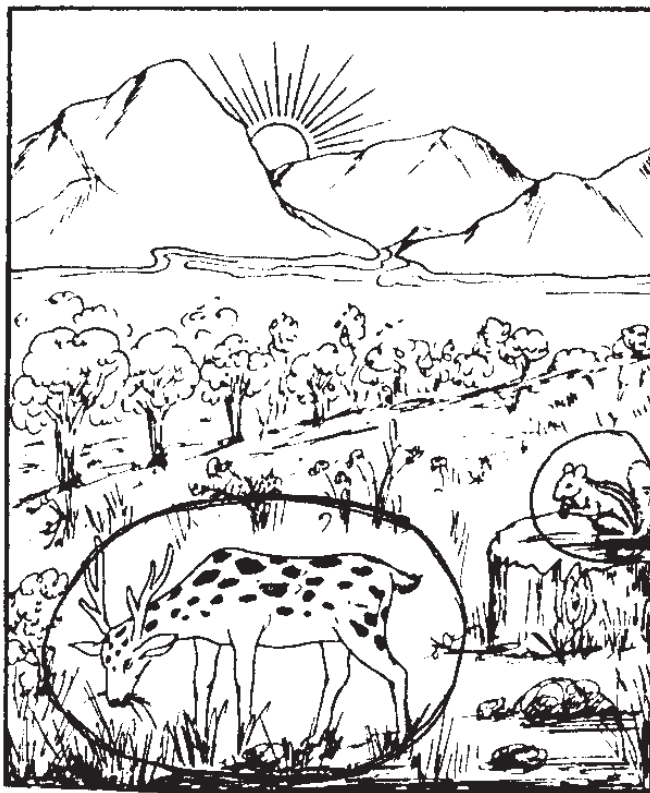
- (i) What is the term for this type of cross?
- (ii) What does the data of the column marked F<sub>1</sub> indicate?
- (iii) Express the genotype of the (a) parents (b) F<sub>1</sub> Progeny and (c) F<sub>2</sub> Progeny 5

OR

Study the picture given below and comment on the encircled organisms with respect to

- (i) the category according to the food they eat.
- (ii) trophic level to which they belong.
- (iii) percentage of energy available at their trophic level.
- (iv) two abiotic components of the ecosystem inhabited by them.
- (v) energy used for food production by the producers.

## MARKING SCHEME PAPER I



## X - SCIENCE

Q.No.	Value Points	Marks
<b>SECTION A</b>		
1.	M and C	1
2.	Mercury, Hg	1
3.	Being alkaline, it neutralizes the lactic acid present in the milk and prevents its spoilage.	1
4.	(i) Any pair of media from higher refractive index to lower refractive index say medium 2 to 1	
	(ii) Any pair of media from lower to higher refractive index	( $\frac{1}{2} + \frac{1}{2}$ ) = 1
5.	To prevent chips from getting oxidised.	
6.	Alloys have high melting point./ do not oxidise (burn) readily at high temp.	1
7.	Tooth enamel is made up of calcium phosphate which gets corroded when the pH in the mouth is below 5.5. Bacteria present in the mouth produce acids by degradation of sugar and food particles in the mouth after eating. Tooth pastes, which are bases, neutralise the acid.	2
8.	<ul style="list-style-type: none"> <li>• Corrosion</li> <li>• Black coating : Silver sulphide</li> <li>• Green coating : Copper carbonate</li> </ul>	1 $\frac{1}{2}$ $\frac{1}{2}$
9.	Both are correct	
	Resistance $R = \frac{V}{I}$	$\frac{1}{2}$
	Also $\frac{1}{R} = \frac{1}{V}$	$\frac{1}{2}$
	Both the diagrams show the correct result	
10.	<ul style="list-style-type: none"> <li>• Pattern of magnetic field lines</li> <li>• It indicates that the magnetic field is the same at all points inside the solenoid</li> <li>• For making an electromagnet</li> </ul>	$\frac{1}{2}$ 1 $\frac{1}{2}$
11.	Correct Ray Diagrams	$\frac{1}{2} + \frac{1}{2}$
	Concave lens/Correct ray diagram	$\frac{1}{2} + \frac{1}{2}$
12.	(a) Reaction will take place because Zn is above Cu in the activity series	
	(b) Reaction will not take place as Fe is below Zn in the activity series and	

cannot displace Zn from its compounds.

- (c) Reaction will take place as Zn is above Fe in the activity series. 1x3= 3
13. (a) (i) + 50cm, convex lens ½+½  
 (ii) - 25cm, concave lens
- (b) (i)  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$   
 $v = +100\text{cm}, m = 1$  ½+½ 3
- (ii)  $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$   
 $v = -20\text{cm}, m = \frac{+1}{5}$  ½+½
14. (a) E  
 (b) D  
 (c) B  
 (d) D, atomic radius decreases with greater nuclear charge in the same period 1x5= 5  
 (e) Noble Gases / Inert Gases
15. (i) Ethanoic Acid / Acetic Acid 1  
 (ii)  $\text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH} \rightarrow \text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O}$  1  
 (iii) Saponification  
 $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \rightarrow \text{C}_2\text{H}_5\text{OH} + \text{CH}_3\text{COOH}$  ½+½= 1  
 (iv)  $\text{CO}_2$  gas 1  
 $2\text{CH}_3\text{COOH} + \text{Na}_2\text{CO}_3 \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2\text{O} + \text{CO}_2$  1
- OR
- (a) Due to the property of Catenation. Carbon has unique property to form bonds with other carbon atoms. 1
- (b) Saturated compounds are those in which all the valencies of carbon atoms are satisfied by single bond between them.  
 In unsaturated compounds, the valency per carbon atom remains unsatisfied. Thus there is a double bond or triple bond between carbon atoms. 2
- (c) Unsaturated hydrocarbon 1

- (d) (i) Bromoethane  
(ii) Hexyne
16. (i) The appliances can be operated independently.  $\frac{1}{2}$   
(ii) They get the same applied voltage  $\frac{1}{2}$
- The fuse will not blow off even if the current in these devices were to exceed their safe current values. This could damage these devices and even cause fire. 3
- Any fuse of lower amperage needs to be put in the circuit 1

OR

- (i) I : Direct current ; II : Alternating current 1  
(ii) I : Dry cell ; II : Alternating current generator 1  
(iii) I : Zero ; II : 50 cycles per second 1  
(iv) I : Direction remains constant and value of current remains same. 1  
II : In case of a.c. both the value as well as the direction of the current changes. 1

### SECTION B

17. Aerobic respiration/accumulation of lactic acid/non availability of oxygen. 1
18. Pancreas  
Trypsin / Lipase / Amylase 1
19. Sulphur dioxide and Nitric oxide 1
20. The solar cooker with the glass slab; as the heat gets trapped within the cooker and the temperature of the cooker rise. It rises more than the uncovered cooker / Green house effect. 2
21. 1 - light energy.  
2 - chemical energy. 2
22. (i) gorilla, fish, cockroach, mangotree.  
(ii) gorilla 2
23. Snake :  
Snake is a secondary consumer while hawk is a tertiary consumer. At each trophic level some energy is lost to the environment. Hawk is at the 4<sup>th</sup> trophic level and the snake is at the 3<sup>rd</sup> trophic level, so more energy will be available to the snake.
24. (i) xylem - water and minerals  
(ii) phloem - sugar  
(iii) pulmonary vein - Oxygenated blood 2  
(iv) Vena Cava - Deoxygenated blood
25. Fossil.

- All preserved traces of living organisms are called fossils. The studies of extinct species show the evidence of evolution. 3
26. (i) The nonrenewable resources are limited, so we should use them judiciously.  
 (ii) We should encourage the use of renewable resources.  
 (iii) Preserve the environment for future generations.  
 (iv) The benefits of the controlled exploitation should go to the local people  
(any three) 3
27. (i) monohybrid cross.  
 (ii) red colour of flower dominant over white flower  
 (iii) RR, rr (b) Rr (c) RR, Rr and rr 5
- OR
- (i) herbivore  
 (ii) primary consumers  
 (iii) 10%  
 (iv) soil and sunlight  
 (v) solar energy. 5

## X SCIENCE (THEORY)

### BLUE PRINT II

<b>Unit</b> \ <b>Form of Questions</b>	VSA (1 Mark)	SA - I (2 Marks)	SA - II (3 Marks)	LA (5 Marks)	Total
Chemical Substances	3(3)	4(2)	6(2)	5(1)	18(8)
World of Living	2(2)	6(3)	3(1)	5(1)	16(7)
Effects of current	1(1)	4(2)	-	5(1)	10(4)
Light	2(2)	-	6(2)	-	8(4)
Natural Resources	1(1)	4(2)	3(1)	-	8(4)
<b>Total</b>	<b>9(9)</b>	<b>18(9)</b>	<b>18(6)</b>	<b>15(3)</b>	<b>60(27)</b>

**SAMPLE QUESTION PAPER II**  
**X - SCIENCE (Theory)**

**Time : 2½ Hours**

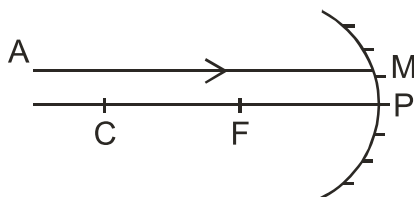
**Max. Marks : 60**

**General Instructions**

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2. All questions are compulsory.
3. There is no overall choice. However, internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.
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5. Questions 1 to 6 in section A and 17 to 19 in section B are short answer questions. These carry one mark each.
6. Questions 7 to 10 in section A and 20 to 24 in section B are short answer type questions and carry two marks each.
7. Questions 11 to 14 in section A and 25 to 26 in section B are also short answer type questions and carry three marks each.
8. Questions 15 and 16 in section A and question 27 in section B are long answer type questions and carry five marks each.

**SECTION A**

1. A ray of light AM is incident on a spherical mirror as shown in the diagram.



- Redraw the diagram on the answer sheet and show the path of reflected ray. Also indicate and mark the angle of reflection in the diagram.
2. A metal M forms an oxide having the formula  $M_2O_3$ . It belongs to 3rd period in the modern periodic table. Write the atomic number and valency of the metal.
  3. The ciliary muscles of a normal eye are in their (i) most relaxed (ii) most contracted state. In which of the two cases is the focal length of the eye-lens more?

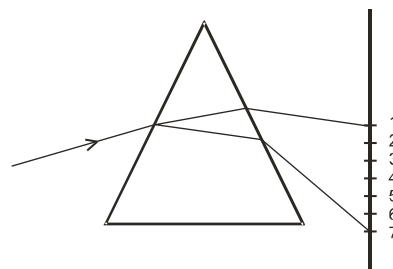
4. Tap water conducts electricity whereas distilled water does not. Why?
5. An electric geyser has the ratings 2000W, 220V marked on it. What should be the minimum rating, in whole number of a fuse wire, that may be required for safe use with this geyser?
6. An organic compound burns with a sooty flame. Is it a saturated or an un saturated compound?
7. Two metallic wires A and B of the same material are connected in parallel. Wire A has length  $l$  and radius  $r$ , wire B has a length  $2l$  and radius  $2r$ . Compute the ratio of the total resistance of parallel combination and the resistance of wire A.
8. A student performs an experiment to study the magnetic effect of current around a current carrying straight conductor. He reports that
  - (i) the direction of deflection of the north pole of a compass needle kept at a given point near the conductor remains unaffected even when the terminals of the battery sending current in the wire are inter changed.
  - (ii) for a given battery, the degree of deflection of a N-pole decreases when the compass is kept at a point farther away from the conductor.

Which of the above observations of the student is incorrect and why?

9. A housewife wanted her house to be whitewashed. She bought 10kg of quick lime from the market and dissolved it in 30 litres of water. On adding lime to water she noticed that the water started boiling even when it was not being heated. Give reason for her observation. Write the corresponding chemical equation and name the product formed.
10. Write the electron - dot structure for sodium and chlorine atoms. How do these form a chemical bond? Name the type of bond so formed. Why does a compound so formed have high melting point?
11. Two carbon compounds A and B have the molecular formula  $C_3H_8$  and  $C_3H_6$  respectively. Which one of the two is most likely to show addition reaction? Justify your answer. Explain with the help of a chemical equation, how an addition reaction is useful in vegetable ghee industry.
12. A beam of white light falling on a glass prism gets split up into seven colours marked 1 to 7 as shown in the diagram.

A student makes the following statements about the spectrum observed on the screen.

- a) The colours at positions marked 3 and 5 are similar to the colour of the sky and the core of a hard boiled egg respectively. Is the above statement made by the student correct or incorrect? Justify.
- b) Which two positions correspond closely to the colour of





- (i) a solution of potassium permanganate?
  - (ii) 'danger' or stop signal lights?
13. Baking soda is used in small amount in making bread and cake. It helps to make these soft and spongy. An aqueous solution of baking soda turns red litmus blue. It is also used in soda acid fire extinguisher.  
Use this information to answer the following questions:
- (i) How does Baking Soda help to make cakes and bread soft and spongy?
  - (ii) How does it help in extinguishing fire?
  - (iii) is the pH value of baking soda solution lesser than or greater than 7?
14. A concave mirror produces three times enlarged image of an object placed at 10 cm in front of it. Calculate the radius of curvature of the mirror.
15. a) What were the two major shortcomings of Mendeleev's periodic table? How have these been removed in the modern periodic table?  
b) Two elements X and Y have atomic numbers 12 and 16 respectively. Write the electronic configuration for these elements. To which period of the modern periodic table do these two elements belong? What type of bond will be formed between them and why?

OR

- a) What were the two achievements of Mendeleev's Periodic table? What was the basis of classification of elements in it ?  
b) An element X (2,8,2) combines separately with  $\text{NO}_3$  and  $(\text{SO}_4)^{2-}$ ,  $(\text{PO}_4)^{3-}$  radicals. Write the formulae of the three compounds so formed. To which group of the periodic table does the element 'X' belong? Will it form covalent or ionic compound? Why?
16. a) The electric power consumed by a device may be calculated by using either of the two expressions  $P = I^2R$  or  $P = V^2/R$ . The first expression indicates that it is directly proportional to R whereas the second expression indicates inverse proportionality. How can the seemingly different dependence of P on R in these expressions be explained?  
b) Explain the following:  
(i) Why is tungsten used almost exclusively for filament of electric lamps?  
(ii) Why are copper and aluminium wires usually used for electricity transmission?

OR

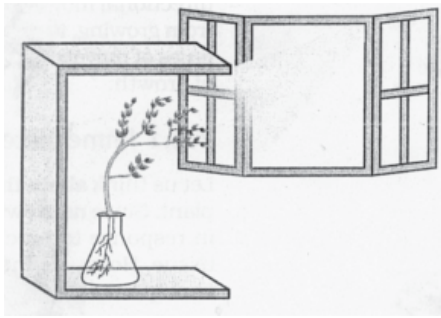
Explain the meaning of the word 'electromagnetic' and 'induction' in the term electromagnetic induction. On what factors does the value of induced current produced in a circuit depend? Name and state the rule used for determination of direction of induced current. State one practical application of this phenomenon in everyday life.

### Section B

17. From the list given below, pick out the items which can be recycled:-  
Used clothes, polythene carry bags, glass bottles, newspaper

1

18.



What does the given experimental set-up demonstrate?

1

19. A particular hormone requires iodine for its synthesis. Name the endocrine gland which secretes this hormone and state its location in the human body. 1

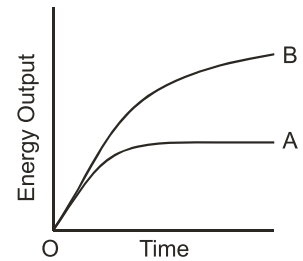
20. Why are many thermal power plants set up near coal or oilfields? 2

21. Name those parts of the flower which serve the same function as the following do in the animals:-

- (i) testis (ii) ovary (iii) eggs (iv) sperms

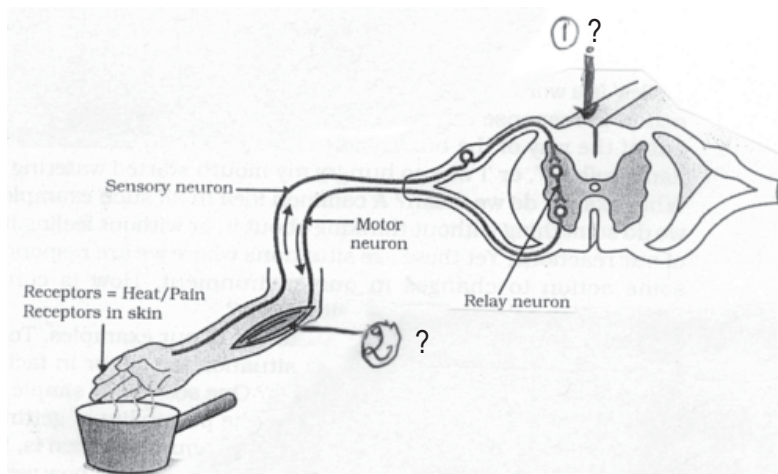
2

22. A graph was plotted to show the energy output of two types of respiration. Identify the types of respiration denoted by curves A and B. 2



23. How did the 'Chipko andolan' ultimately benefit the local population? Give any two benefits. 2

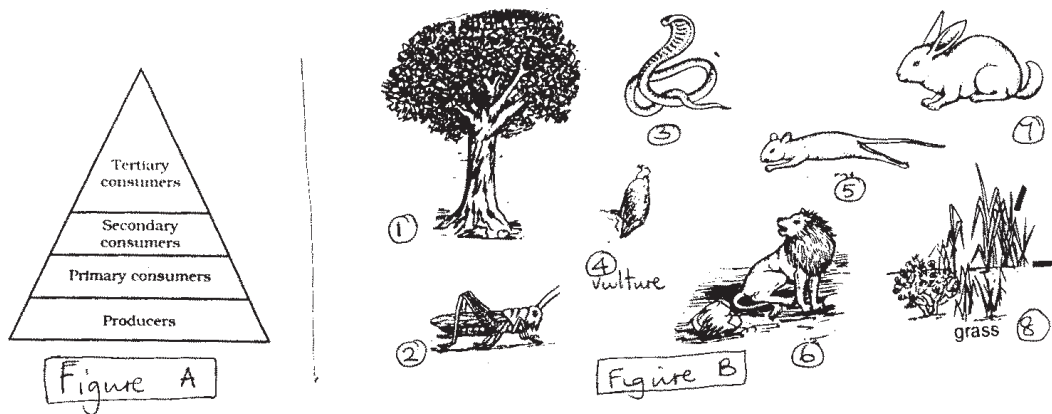
24.



(i) Label the two parts indicated by question marks and labelled 1 and 2 in the above diagram.

(ii) Suggest a suitable caption or heading for the above diagram. 2

25. Write the number given to any six of the organisms shown in Figure B against their relevant Trophic levels given in figure given below. 3

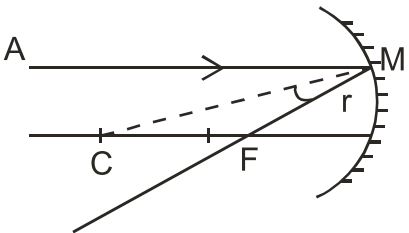


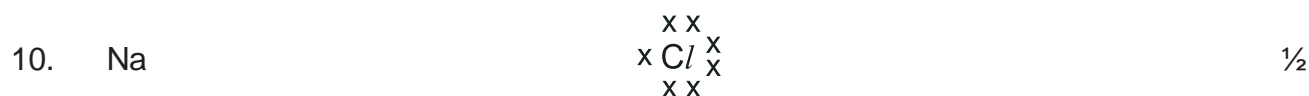
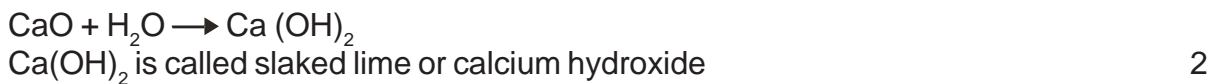
26. The genotype of green stemmed tomato plants is denoted as GG and that of purple-stemmed tomato plants as gg. When these two are crossed,
- What colour of stem would you expect in their  $F_1$  progeny?
  - Give the percentage of purple-stemmed plants if  $F_1$  plants are self pollinated.
  - In what ratio would you find the genotypes GG and Gg in the  $F_2$  progeny? 3
27.
  - Draw the diagram of heart and label its four chambers
  - Construct a table to show the functions of these four chambers. 5

OR

Plants absorb water from the soil. How does this water reach the tree tops? Explain in detail

**MARKING SCHEME**  
**SAMPLE QUESTION PAPER II**  
**X SCIENCE (THEORY)**

<b>Q.No.</b>	<b>Value Point</b>	<b>Marks</b>
1.		1
2.	The atomic number of the metal is 13. The valency of the metal is 3.	1
3.	In the first case	1
4.	Tap water contains dissolved salts and minerals which ionise in water and hence conducts electricity. Distilled water is a covalent compound so it does not conduct electricity.	1
5.	10 A	1
6.	Unsaturated	1
7.	$R = \rho \cdot \frac{l}{A}$ $R_A = \rho \cdot \frac{l}{\pi r^2}$ $R_B = \rho \cdot \frac{2l}{\pi(2r)^2} = \frac{\rho \cdot 2l}{4\pi r^2} = \frac{\rho \cdot l}{2\pi r^2}$ $\frac{1}{R_p} = \frac{1}{R_A} + \frac{1}{R_B} = \frac{\pi r^2}{\rho l} + \frac{2\pi r^2}{\rho l} = \frac{3\pi r^2}{\rho l}$ $R_p = \frac{\rho \cdot l}{3\pi r^2}$ $\frac{R_p}{R_A} = \frac{1}{3} = 1:3$	        1/2        1        1/2
8.	<ul style="list-style-type: none"> <li>• Observation (i) is incorrect.</li> <li>• When the direction of flow of current is changed, the direction of the magnetic field and hence the direction of force also changes.</li> </ul>	    1    1
9.	The reaction of lime with water is an exothermic reaction in which lot of heat is evolved.	1

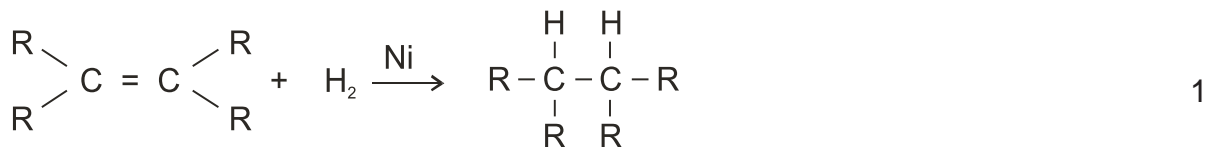


Sodium atom loses one electron to attain octet configuration and forms sodium ion. Chlorine atom has 7 electrons in the outermost shell, so it gains the electron lost by the sodium ion to form the chloride ion. The two oppositely charged ions are held together by strong electrostatic force of attraction to form the ionic bond. 1



Ionic compounds have high melting points because a considerable amount of energy is required to break the strong inter ionic attraction. 2

11.  $\text{C}_3\text{H}_6$  will show addition reaction  $\text{C}_3\text{H}_6$  is an unsaturated compound with a double bond. Vegetable oils have long unsaturated carbon chains which on addition of hydrogen in the presence of catalyst nickel, change into saturated carbon chains. This is called hydrogenation of oils. 2



12. (a) Incorrect. The student is stating the nature of colours in reverse order.  
 (b) (i) Colour marked 7  
 (ii) Colour marked 1

13. (i) On heating, baking soda gives out  $\text{CO}_2$  which makes cakes and bread rise up, so they become soft and spongy. 1  
 (ii)  $\text{CO}_2$  being heavier than air settles down and forms a layer between the burning substance and the air, thus cutting off the supply of oxygen. 1  
 (iii) Its pH value is greater than 7. 1

14.  $\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$  1/2

$$\frac{-v}{-u} = 3$$
1/2

$$\frac{1}{-30} + \frac{1}{-10} = \frac{1}{f}$$

$$\frac{-1-3}{30} = \frac{1}{f}$$

$$\frac{-4}{30} = \frac{1}{f}$$

1

$$f = \frac{-30}{4} = \frac{-15}{2} \text{ cm} = -7.5 \text{ cm}$$

radius of curvature of the mirror = 15 cm

- 15 (a) The major shortcomings of Mendeleev's periodic table were.
- wrong order of atomic masses.
  - Position of hydrogen.
  - Position of isotopes. (any two)
- In the modern periodic table, the elements are arranged in the increasing order of their atomic numbers instead of atomic masses.
- (b) Atomic number  
 X, Z = 12, 2, 8, 2  
 Y, Z = 16 2, 8, 6  
 They belong to the third period.  
 They will form ionic bond because X is a metal and Y is a non-metal. X loses 2 electrons which will be gained by Y. 5

**OR**

- (a) Atomic mass was the basis of classification of elements in Mendeleev's periodic table.  
 Period means - a periodic reoccurrence of physical and chemical properties.
- (b)  $X_3(PO_4)_2$   
 $X(NO_3)_2$   
 $XSO_4$   
 X belongs to Group II in the periodic table.  
 It will form ionic compounds because it will readily lose 2 electrons.
16. (a) Both the expressions are correct. In the first case, I remains constant whereas the second expression is true when V remains constant. 2
- (b) (i) Melting point of tungsten is very high 1  
 (ii) • Specific Resistance is low  
 • comparatively light in weight 2
- OR**
- (i) Meaning of the terms 1  
 (ii) Rate of change of magnetic flux 1  
 (iii) Fleming's Right Hand Rule 1  
 (iv) Statement of the Rule 1  
 (v) Electric Generator 1

**SECTION B**

17. Polythene carry bags, newspapers 1  
 18. Phototropism the shoot of the plant bends towards light 1  
 19. Thyroid gland; neck region 1

20. Coal or petroleum is required to heat water to produce steam for running the turbines in thermal plants. Cost of transportation is reduced if the thermal plants are near coal / oil fields. 2
21. (i) Stamen / anther / androecium  
(ii) ovary  
(iii) ovules  
(iv) pollen grains / pollen
22. A - Anaerobic  
B - Aerobic
23. (i) The locals benefited from the forest produce.  
(ii) The wildlife and nature were conserved. (any two)  
(iii) The quality of air and soil was preserved. 2
24. (i) Spinal cord  
(ii) effector = muscle in the arm.  
(iii) Reflex action / Reflex arc. 2
25. Producers - 1 and 8  
Primary consumers - 2, 5 and 7. (any two)  
Secondary consumer - 3, 6  
Tertiary consumer - 4 3
26. (i) green stemmed  
(ii) 25%  
(iii) GG - 1  
Gg - 2 or GG : Gg = 1:2 3
27. Diagram with correct labelling 3  
Table to show heart and functions.

Chambers of the heart	Functions
Right Atrium	Receives deoxygenated blood.
Right Ventricle	Sends deoxygenated blood.
Left Atrium	Sends deoxygenated blood to the lungs.
Left Ventricle	Sends oxygenated blood to aorta for transporting to the body

2

OR

Xylem (vessels) of roots, stems and leaves are interconnected to form a continuous column. Roots also take up mineral salts actively, water moves in as a result creating pressure. The root pressure pushes the water up. Stomatal transpiration creates suction force pulling up the water from root xylem / transpiration pull. 5

## X SCIENCE (THEORY)

### BLUE PRINT III

<b>Unit</b> / <b>Form of Questions</b>	<b>VSA</b> (1 Mark)	<b>SA - I</b> (2 Marks)	<b>SA - II</b> (3 Marks)	<b>LA</b> (5 Marks)	<b>Total</b>
Chemical Substances	2(2)	2(1)	9(3)	5(1)	18(7)
World of Living	2(2)	6(3)	3(1)	5(1)	16(7)
Effects of current	3(3)	4(2)	3(1)	-	10(6)
Light	1(1)	2(1)	-	5(1)	8(3)
Natural Resources	1(1)	4(2)	3(1)	-	8(4)
<b>Total</b>	<b>9(9)</b>	<b>18(9)</b>	<b>18(6)</b>	<b>15(3)</b>	<b>60(27)</b>



**SAMPLE PAPER III**  
**X SCIENCE (THEORY)**

**Time : 2½ Hours**

**Max. Marks : 60**

**General Instructions**

1. The question paper comprises of two sections A and B. You are to attempt both the sections.
2. All questions are compulsory.
3. There is no overall choice However, internal choice has been provided in all the three questions of five marks category. Only one option in such questions is to be attempted.
4. All questions of section A and all questions of section B are to be attempted separately.
5. Questions 1 to 6 in section A and 17 to 19 in section B are to be attempted separately.
6. Questions 7 to 10 in section A and 20 to 24 in section B are short answer type questions and carry two marks each.
7. Questions 11 to 14 in section A and 25 to 26 in section B are also short answer type questions and carry three marks each.
8. Questions 15 and 16 in section A and question 27 in section B are long answer type questions and carry five marks each.

**SECTION A**

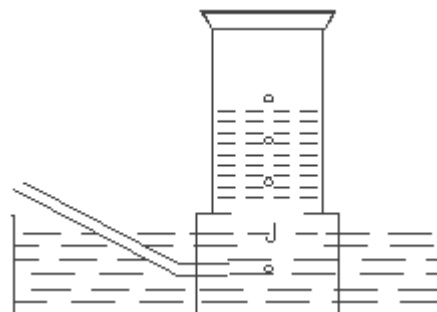
1. Dry Hydrogen Chloride gas does not turn blue litmus red whereas Hydrochloric acid does. Give one reason.
2. Identify the substance oxidised and reduced in the chemical reaction :  
$$\text{MnO}_2 + 4\text{HCl} \longrightarrow \text{MnCl}_2 + \text{Cl}_2 + 2\text{H}_2\text{O}$$
3. You are give three resistors of  $10\ \Omega$ ,  $10\ \Omega$  and  $20\ \Omega$ , a battery of emf 2.5V, a key, an ammeter and a voltmeter. Draw a circuit diagram showing the correct connections of all given components such that the voltmeter gives a reading of 2.0V.
4. Sketch magnetic field lines around a current carrying straight conductor.
5. The electrical resistivity of few materials is given below in ohm-meter. Which of these materials can be used for making element of a heating device?

A	$6.84 \times 10^{-8}$
B	$1.60 \times 10^{-8}$
C	$1.00 \times 10^{-4}$
D	$2.50 \times 10^{12}$
E	$4.40 \times 10^{-5}$
F	$2.30 \times 10^{17}$
6. Refractive index of media A, B, C and D are

A	1.33
B	1.52
C	1.44
D	1.65

In which of the four media is the speed of light (i) maximum (ii) minimum.?

7. A metal is treated with dilute sulphuric acid. The gas evolved is collected by the method shown in the figure. Answer the following.



- Name the gas.
- Name the method of collection of the gas.
- Is the gas soluble or insoluble in water?
- Is the gas lighter or heavier than air?

8. A household uses the following electric appliances :

- Refrigerator of rating 400W for ten hours each day.
- Two electric fans of rating 80W each for twelve hours each day.
- Six electric tubes of rating 18W each for 6 hours each day.

Calculate the electricity bill of the household for the month of June if the cost per unit of electric energy is Rs. 3.00.

9. What is the meaning of the term 'frequency' of an alternating current? What is its value in India?

Why is an alternating current considered to be advantageous over direct current for long range transmission of electric energy?

10. A person is able to see objects clearly only when these are lying at distances between 50cm and 300cm from his eye.

- What kind of defects of vision he is suffering from?
- What kind of lenses will be required to increase his range of vision from 25cm to infinity? Explain briefly.

11. A student dropped few pieces of marble in dilute Hydrochloric acid contained in a test tube. The evolved gas was passed through lime water. What change would be observed in lime water? Write balanced chemical equations for both the changes observed.

12. Atomic number is considered to be a more appropriate parameter than atomic mass for classification of elements in a periodic table. Why?

How does atomic size of elements vary on moving from

- left to right in a period.
- from top to bottom in a group.

Give reasons for your answers.

13. Why does a current carrying conductor kept in a magnetic field experience force? On

what factors does the direction of this force depend? Name and state the rule used for determination of direction of this force.

14. Answer the following:

- Why is Plaster of Paris written as  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ ? How is it possible to have half a water molecule attached to  $\text{CaSO}_4$ ?
- Why is Sodium Hydrogen Carbonate an essential ingredient in antacids.?
- When electricity is passed through an aqueous solution of sodium chloride, three products are obtained. Why is the process called chlor-alkali?

15. Four metals A, B, C and D are, in turn, added to the following solutions one by one. The observations made are tabulated below:

Metal	Iron (II) Sulphate	Copper (II) Sulphate	Zinc Sulphate	Silver Nitrate
A	No reaction	Displacement	—	—
B	Displacement	—	No reaction	—
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Answer the following questions based on above information.

- Which is the most active metal and why?
- What would be observed if B is added to a solution of copper (II) sulphate and why?
- Arrange the metals A, B, C and D in order of increasing reactivity.
- Container of which metal can be used to store both zinc sulphate solution and silver nitrate solution.
- Which of the above solutions can be easily stored in a container made up of any of these metals?

OR

You are given the following materials:

- Iron nails
- Copper sulphate solution
- Barium chloride solution
- Copper powder
- Ferrous sulphate crystals
- Quick Lime

Identify the type of chemical reaction taking place when.

- Barium chloride solution is mixed with copper sulphate solution and a white precipitate is observed.
- On heating copper powder in air in a China dish, the surface of copper powder turns black.
- On heating green coloured ferrous sulphate crystals, reddish brown solid is left

and smell of a gas having odour of burning sulphur is experienced.

- (d) Iron nails when left dipped in blue copper sulphate solution become brownish in colour and the blue colour of copper sulphate fades away.
- (e) Quick lime reacts vigorously with water releasing a large amount of heat.

16. Draw ray diagrams to show the formation of a three times magnified (i) real image (ii) virtual image of an object kept in front of a converging lens. Mark the positions of object, F, 2F, O and position of image clearly in the diagram.

An object of size 5 cm is kept at a distance of 25cm from the optical centre of a converging lens of focal length 10cm. Calculate the distance of the image from the lens and size of the image.

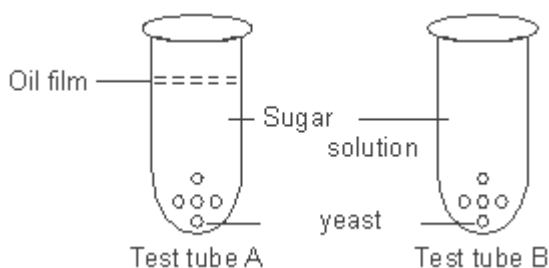
OR

Give reasons for the following:

- (i) The sky appears to be blue during day time to a person on earth.
- (ii) The sky near the horizon appears to have a reddish hue at the time of sunset and sunrise.
- (iii) The sky appears dark instead of blue to an astronaut.
- (iv) The stars appear to twinkle.
- (v) The planets do not twinkle.

### (SECTION B)

17. Justify in one sentence that hydropower (hydel electricity) is a renewable source of energy. 1
18. 'Malarial parasite' divides into many daughter individuals simultaneously through multiple fission. State an advantage the parasite gets because of this type of reproduction. 1
19. The human hand, cat paw and the horse foot, when studied in detail show the same structure of bones and point towards a common origin.
- (i) What do you conclude from this?
  - (ii) What is the term given to such structures? 1
20. In the test tubes A and B shown below, yeast was kept in sugar solution. Which products of respiration would you expect in tubes A and B?



2

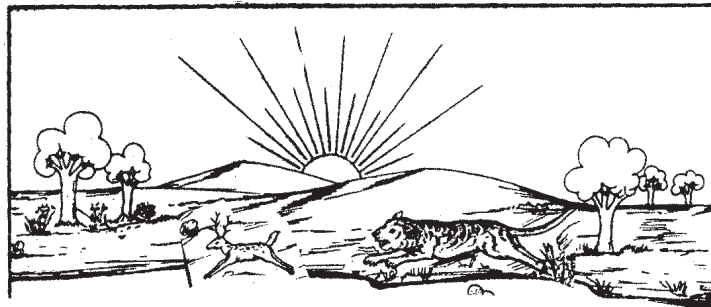
21. Write one feature which is common to each of the following pairs of terms / organs.  
 (i) glycogen and starch ; (ii) chlorophyll and haemoglobin  
 (iii) gills and lungs (iv) arteries and veins 2

22. The given experimental set up tests the response of different parts of plant towards gravity. Use scientific terms for the conclusions. 2



23. Select the biodegradable items from the list given below.  
 Polythene bags, old clothes, wilted flowers, pencil shavings, glass bangles, bronze statue vegetable peels. 2

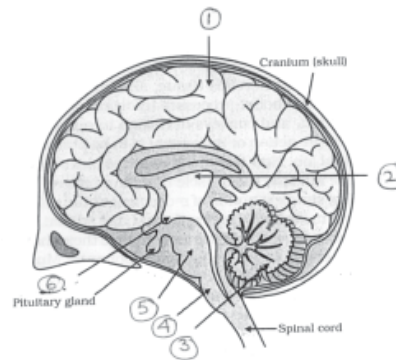
24. 2



Given above is a picture of an ecosystem. Identify any two abiotic components and any two biotic components of this ecosystem. 2

25. Quote three instances where human intervention saved the forests from destruction. 3

26. Label parts 1 to 6 in the given figure of the brain



27. Explain that it is a matter of chance whether a couple will give birth to a boy or a girl. 5

OR

Which hormone is released into blood when its sugar level rises? Name the organ which produces the hormone and its effect on blood sugar level. Also name one digestive enzyme that this organ secretes and the function of this enzyme.

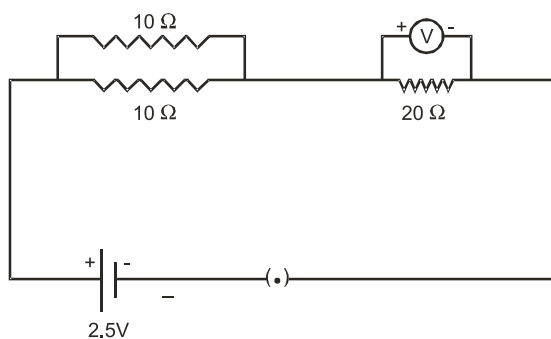
# MARKING SCHEME

## PAPER III SCIENCE – X

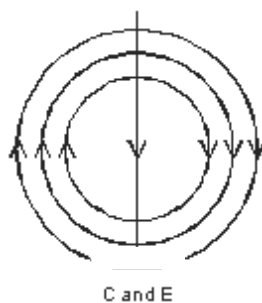
Q.No.	Value Points	Marks
1.	Acids produce $H^+(aq)$ Hydrogen ions in solution which are responsible for blue litmus turning red. Dry HCl does not give $H^+$ ions in the absence of water.	1

2.	HCl is oxidised $MnO_2$ is reduced	1
----	---------------------------------------	---

3.



4.



5.	C and E
----	---------

6.	(i) A
----	-------

	(ii) D
--	--------

7.	(i) The gas is hydrogen.
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	(ii) The method is downward displacement of water.
--	--

	(iii) The gas is insoluble in water.
--	--------------------------------------

	(iv) The gas is lighter than air.
--	-----------------------------------

2

8. Electric Energy consumed per day  
 =  $400 \times 10 + 2 \times 80 \times 12 + 6 \times 18 \times 6$   
 = 6568 wh 1
- Total Energy per month =  $\frac{6568 \times 30}{1000} = 197.040 \text{ kWh}$   $\frac{1}{2}$
- Total Cost =  $197.040 \times 3 = \text{Rs } 591$  (Approx.)  $\frac{1}{2}$
9. The frequency of an alternating current is the no. of times the direction of electric current changes in one second. 50 cycles/second.  $\frac{1}{2} + \frac{1}{2} = 1$   
 At very high voltage, the transmission losses are minimised. At the receiving station, the voltage is stepped down for use. 2
10. (a) Both myopia and hypermetropia  $\frac{1}{2}$   
 (b) Bifocal lenses  $\frac{1}{2}$   
 (c) The upper portion (concave lens) facilitates distant vision and the lower portion (convex lens) facilitates near vision. 1
11. • Lime water turns milky. 1  
 •  $\text{CaCO}_3(\text{s}) + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$  2  
     (Marble)                                      (calcium chloride)  
 •  $\text{Ca}(\text{OH})_2(\text{aq}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s}) + \text{H}_2\text{O}$  3
12. The properties of the elements could be predicted more precisely when elements are arranged on the basis of increasing atomic number. The atomic number is equal to the number of protons = the number of electrons. It is the number of electrons which decide the properties of the element. 1
- (i) Decreases : This is due to an increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduce the size of the atom. 1
- (ii) Increases : This is because new shells are being added as we go down the group. It increases the distance between the nucleus and the valence shell. 1
13. • A current carrying inductor has a magnetic field associated with it. The two magnetic fields, one due to the magnet and the other due to current in the conductor, interact. This produces a force on the conductor.  $\frac{1}{2}$   
 • The strength of electric current and the strength of the magnetic field.  $\frac{1}{2}$   
 • Fleming's left hand rule statement  $\frac{1}{2}$   
 • Statement of the rule. 1

14. (a) It is written in this form because two formula units of  $\text{CaSO}_4$  share one molecule of water.
- (b) Being alkaline, it neutralises excess acid in the stomach and provides relief.
- (c) Because of the products formed (Sodium hydroxide, chlorine and Hydrogen) Chlor stands for chlorine and alkali stands for sodium hydroxide.
15. (i) B is the most reactive metal because it could displace iron sulphate which no other metal could.
- (ii) B will displace copper from copper sulphate solution because it is more active than copper.
- (iii)  $D < C < A < B$
- (iv) Container of metal D could be used for storing zinc sulphate and silver nitrate solution.
- (v) Zinc sulphate can be stored easily in a container made up of any of these metals. 5

OR

- (a) Double Displacement Reaction
- (b) Oxidation Reaction / Combination Reaction
- (c) Decomposition Reaction
- (d) Displacement Reaction
- (e) Combination Reaction 5
16. • Real Image ray diagram 1
- Virtual Image ray diagram 1
- $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$  1
- Correct Substitution and calculation,  $v = 16.67\text{cm}$  (Approx.) 1½
- Size of the image = 3.33 (Approx.) cm 1

OR

- (i) Scattering of blue colour in sunlight by earth's atmosphere. 1
- (ii) Light has to pass through thicker layers of air and large distance. Shorter wavelengths are scattered away. Only larger wavelength (red) of light reaches us. 1
- (iii) No atmosphere, no scattering of light. 1
- (iv) Due to atmospheric refraction of starlight and physical conditions of earth's atmosphere not being stationary

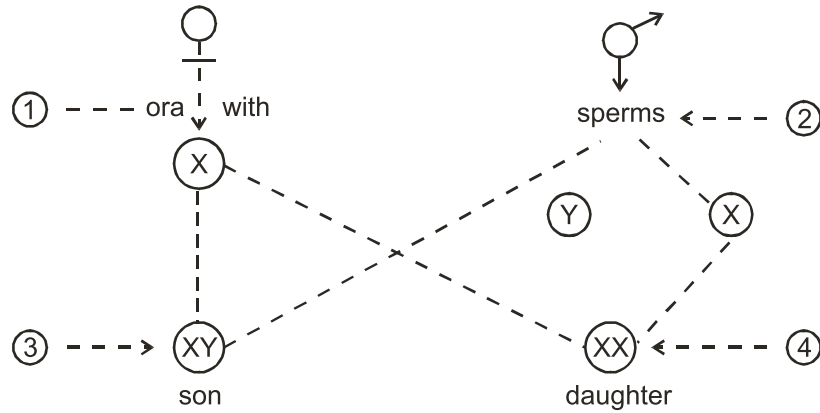


- (v) Planets are much closer to earth and are seen as extended sources. 1

### SECTION B

17. Hydropower uses water from the reservoir / lake for generating electric current. The reservoir again gets filled up whenever it rains or through the rivers. 1
18. Several daughter individuals are reproduced from a single parent and out of them many would find a host. 1
19. (i) Human, cats and horses have evolved from common ancestors.  
(ii) Homologous organs or structures. 1
20. In test tube A - carbon dioxide + alcohol  
In test tube B - carbon dioxide + water 1
21. (i) carbohydrates / storage products.  
(ii) pigments / found in living organisms.  
(iii) respiratory organs / for exchange of gases.  
(iv) Vessels (blood) part of the circulatory system 2
22. The shoot is positively phototropic / negatively geotropic.  
The root is positively geotropic / negatively phototropic. 2
23. Old clothes, wilted flowers, pencil shavings, vegetable peels.
24. abiotic components - soil and sunlight  
biotic components - trees / grass / deer / tiger. 2
25. Chipko movement contribution  
Contribution of Bishnoi movement  
Building National Parks (any three)  
Encouraging wild life sanctuaries. 3
26. 1. cerebrum  
2. mid brain  
3. cerebellum  
4. medulla  
5. pons  
6. hypothalamus 3

27.



Women have a perfect pair of sex chromosomes xx while men are xy. As the figure shows half will be boys and half will be girls. All children will inherit x chromosome from their mother whether boys or girls. The sex will be determined as to what they inherit from their father. A child who inherits x chromosome from the father will be a girl and one who inherits Y chromosome from the father will be a boy. 5

OR

Insulin.

Pancreas - it reduces the blood sugar level / converts sugar into glycogen.

Trypsin - for digesting proteins - it breaks down proteins into peptides.

Lipase - for digesting fats.

Amylase - for breaking down starch

5