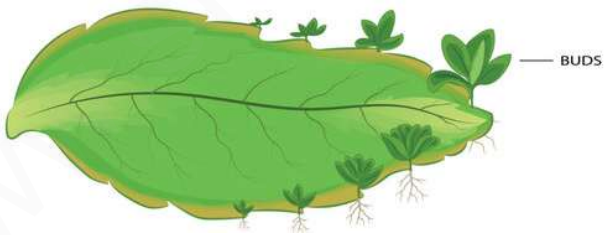
SCIENCE – FULL SYLLABUS
MOCK TEST PAPER - 1 (CBSE BOARD)
CLASS – X (2025-26)

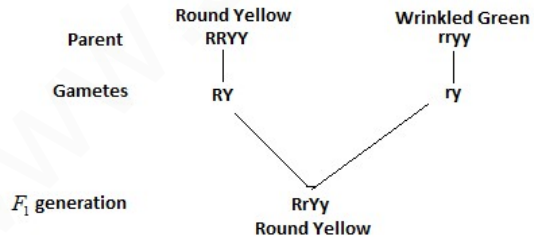
Max. Marks: 80 **Time Allowed: 3 hours**

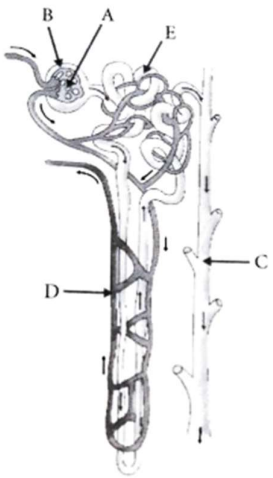
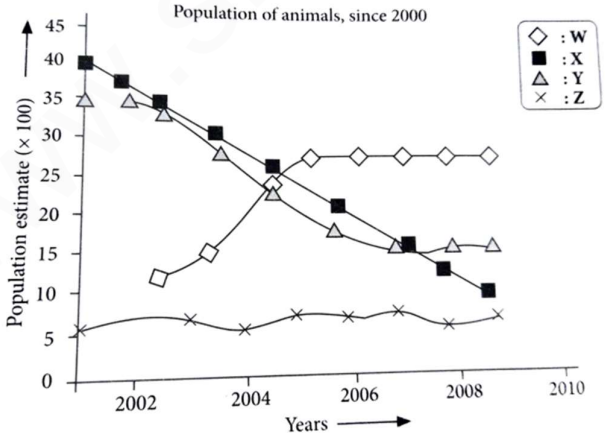
General Instructions:

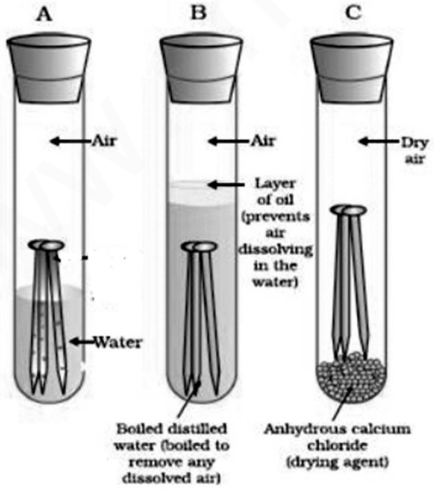
(i) This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.

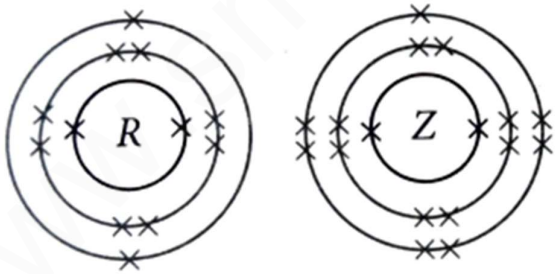
(ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

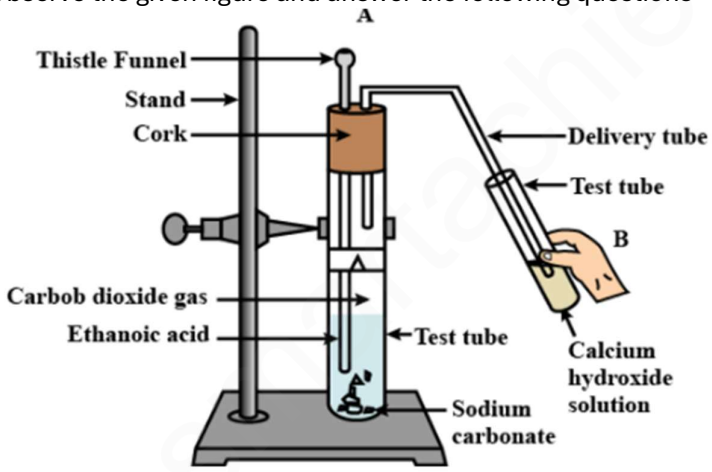
	Section – A	**Marks**
1	In the given equation, Z radiation is $O_2 \xrightarrow{\text{Z radiation}} O + O$ (a) ultraviolet radiation (b) infrared radiation (c) gamma radiation (d) cosmic radiation	1
2	Match the column I with column II and select the correct option **Column I** **Column II** A. Adrenaline (i) Hyposecretion of growth hormone B. Goitre (ii) Emergency hormone C. Dwarfism (iii) Raises blood sugar level D. Glucagon (iv) Swelling in neck (a) A-(ii), B-(iii), C-(i), D-(iv) (b) A-(i), B-(iv), C-(ii), D-(iii) (c) A-(ii), B-(iv), C-(i), D-(iii) (d) A-(ii), B-(i), C-(iii), D-(iv)	1
3	Observe the given figure and select the incorrect statement  (a) Buds are produced only at the leaf margin. (b) The buds are genetically identical to the parent plant. (c) These buds are produced through tissue culture technique artificially. (d) Buds fall on the g round and develop into new plant.	1
4	Read the given statement and identify the correct option for A, B and C. The **A** secretes pancreatic juice which contains enzymes like **B** for digesting proteins and	1

	lipase for digesting **C**. (a) pancreas, protease, starch (b) stomach, cellulase, emulsified fat (c) liver, trypsin, fat (d) pancreas, trypsin, emulsified fat	
The following two questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by 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.		
5	**Assertion (A):** The Bowman's capsule and the tubules together make a nephron. **Reason (R):** The function of tubules is to allow the selective reabsorption of substances like glucose, amino acids, urea, salts and water into the blood capillaries.	1
6	**Assertion (A):** Pea plant is considered ideal for hybridisation experiments. **Reason (R):** Pea is self pollinating plant with short life cycle and bears visible contrasting traits.	1
7	Complete the following table Name of the hormone / Gland which secretes the hormone / Function of the hormone Thyroxine / Thyroid / (i) Growth Hormone / (ii) / Regulates growth and development of the body Insulin / Pancreas / (iii)	2
8	*Students to attempt either option A or B.* **A.** How do *Plasmodium* and *Leishmania* reproduce? Write one difference in their mode of reproduction. **OR** **B.** State the role of following parts in human reproductive system: (i) Ovary (ii) Placenta	2
9	To study inheritance of traits in F_1 and F_2 generation, a cross was made between round yellow and wrinkled green parents.  Analyse the cross and answer the following questions: A. What are the dominant traits in this cross? B. Which type of cross is shown here?	2
10	**A.** Anika is drawing the diagram of a single nephron from a mammalian kidney but she forgot the labelling. Help her to identify the labelled parts **(A–E)**.	3

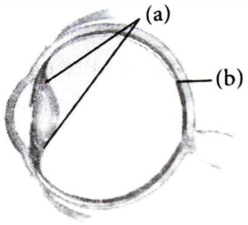
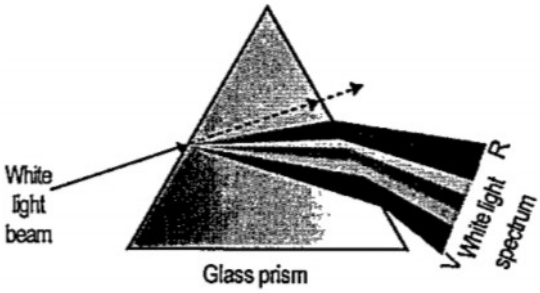
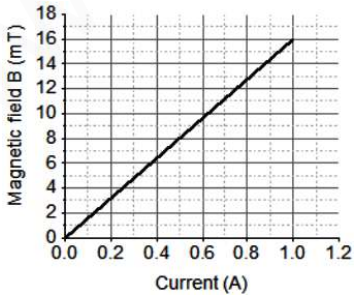
	 Structure of a nephron B. How haemodialysis can be helpful for uremic patients?	
11	*Students to attempt either option A or B.* **A.** (i) "Cross-pollination is the basis of reproduction in unisexual flowers". Explain the given statement. (ii) Mention the site and product of fertilisation in a flower. (iii) Draw labelled diagram of a pistil showing the following parts: Stigma, Style, Ovary, Female germ cell **OR** **B.** Answer the following questions: (i) Name the organ that produces sperms as well as secretes a hormone in human males. Name the hormone it secretes and write its functions. (ii) What is the role of oviducts in the human female reproductive system? (iii) Which part of human female reproductive system nurtures the growing embryo?	3
12	Explain Mendel's experiment with pea plants on inheritance of character considering only one visible contrasting character.	3
13	A group of ecologists studied and monitored the change in population of three animal species **X, Y and Z** over a period of ten years. During their research, they found that a new animal species **W** appeared in the area and its population was also monitored. 	4

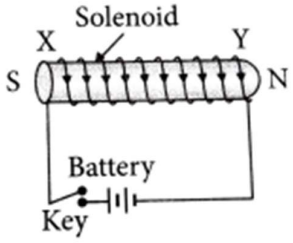
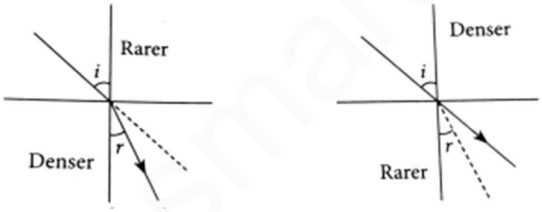
	Attempt either subpart A or B **A.** Which animal species is most likely be the food source of **W**? **OR** **B.** What could be the reason for decline of animal species **X**? **C.** Which animal species will unlikely to be alive in 10 years without some intervention? **D.** What would be the most probable reason for the constant population of **Z**?	
14	*Attempt either option A or B* **A.** (i) Aisha with the help of her teacher in biology lab demonstrated an experiment that sunlight is essential for photosynthesis. What procedure they have followed to conduct this experiment? (ii) Leaves of a healthy potted plant were coated with vaseline to block the stomata. Will this plant remain healthy for long? State three reasons for your answer. (iii) Two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light. Which one will live longer? Give reasons. **OR** **B.** (i) Mention five functions of blood. (ii) "Fishes show single circulation". Give reason. (iii) What is dental caries? How is it produced? What precautions can prevent it?	5
	Section – B	
15	What will be the pH of salt of weak base and strong acid? (a) Equal to 7 (b) More than 7 and 8 (c) Less than 7 (d) Unpredictable	1
16	Absence of tartaric acid in baking powder makes the taste of the cake bitter due to the presence of (a) sodium hydrogen carbonate (b) sodium carbonate (c) sodium metabisulphite (d) sodium sulphate	1
17	Observe the given figure and answer the question that follows  In which of the given test tubes, rusting will take place?	1

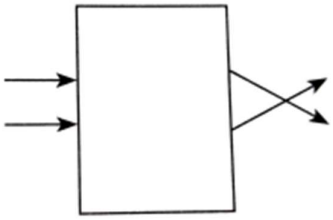
	(a) B and C (b) Only A (c) Only C (d) In all the test tubes	
18	Three beakers labelled as A, B and C each containing 25 mL of water were taken. A small amount of NaOH, anhydrous $CuSO_4$ and NaCl were added to the beakers A, B and C respectively. It was observed that there was an increase in the temperature of the solutions contained in beakers A and B, whereas in case of beaker C, the temperature of the solution falls. Which of the following statements is/are correct? (i) In beakers A and B, exothermic process has occurred. (ii) In beakers A and B, endothermic process has occurred. (iii) In beaker C, exothermic process has occurred. (iv) In beaker C, endothermic process has occurred. (v) In beakers A, B and C, exothermic process has occurred. (a) Only (v) (b) (ii) and (iv) (c) (i) and (iv) (d) (ii) and (iii)	1
19	The table shows information on the reaction at the inert electrode and the product obtained, when a molten ionic compound is electrolyzed. **Electrode** | **Reaction at the electrode** | **Product** (A) Anode | $X^- + e^- \rightarrow X$ | Metal (B) Anode | $2X^- \rightarrow X_2 + 2e^-$ | Non-metal (C) Cathode | $2X^- \rightarrow X_2 + 2e^-$ | Non-metal (D) Cathode | $2X^- + 2e^- \rightarrow X_2$ | Metal The correct information is given in (a) A (b) B (c) C (d) D	1
20	The diagrams show the electronic structures of the elements R and Z:  What is the chemical formula of the compound formed when R and Z react? (a) RZ (b) R_2Z (c) RZ_2 (d) R_2Z_3	1
21	The correct equation involved in removal of hardness from water is (a) $CaCl_2(aq) + Na_2CO_3(aq) \rightarrow CaCO_3(s) + 2NaCl(aq)$ (b) $2NaCl(aq) + K_2CO_3(aq) \rightarrow 2KCl(aq) + Na_2CO_3(aq)$	1

	(c) $2KCl(aq) + Na_2CO_3(aq) \rightarrow K_2CO_3(aq) + 2NaCl(aq)$ (d) all of these.	
The following two questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by 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.		
22	**Assertion (A):** When rain is accompanied by a thunderstorm, the collected rain water will have pH value slightly lower than that of rain water without thunderstorm. **Reason (R):** Temperature increases due to thunderstorm and so $[H^+]$increases.	1
23	Tooth enamel is the hardest substance in our body. Name the compound of which it is made up of. At what pH of the mouth it gets corroded? State the role of bacteria present in the mouth. Suggest a method to prevent tooth decay.	2
24	When ethanol reacts with ethanoic acid in the presence of conc. H_2SO_4, a substance with fruity smell is produced. Answer the following: (i) State the class of compounds to which the fruity smelling compounds belong. (ii) Write the chemical equation for the reaction and write the chemical name of the product formed. (iii) State the role of conc. H_2SO_4 in this reaction.	3
25	Enlist three points of difference between electrolytic reduction and reduction with carbon	3
26	Observe the given figure and answer the following questions  **A.** (i) What change would you observe in the calcium hydroxide solution taken in tube B? If ethanol is given instead of ethanoic acid, would you expect the same change? (ii) Write the reaction involved in test tubes A and B respectively. *Attempt either subpart B or C* **B.** What happens when ethanoic acid reacts with ethanol? Explain giving reaction. **OR** **C.** How can a solution of lime water be prepared in the laboratory?	4
27	**A.** Calcium carbonate, when heated strongly, decomposes to a solid residue **(Q)** and a colourless gas **(R)**. (i) Identify the solid **(Q)** and the colourless gas **(R)**. (ii) What is the chemical reaction known as? How does this chemical reaction take place? Give one more example of such type of reaction.	5

	(iii) The residue **(Q)** is cooled and then dissolved in distilled water to produce solution **(S)**. Identify the solution **(S)** and write the chemical equation involved. **B.** A strip of metal P is dipped in blue coloured solution of QSO_4. After sometime a layer of metal Q from the salt solution is formed on the surface of metal P. Metal P is used for galvanisation and metal Q is used in making electric wires	
Section - C		
28	An object 4 cm high is placed at a distance of 15 cm in front of a convex mirror having a radius of curvature of 10 cm. Then the image formed is at a distance of (a) 7.5 cm behind the mirror (b) 3.75 cm in front of the mirror (c) 7.5 cm in front of mirror (d) 3.75 cm behind the mirror	1
29	A soft iron bar is introduced inside a current carrying solenoid. The magnetic field inside the solenoid (a) will increase (b) will remain unaffected (c) will become zero (d) will decrease	1
30	In a metallic conductor, electric current thought to be due to the movement of (a) ions (b) amperes (c) electrons (d) protons	1
31	A person standing in front of a mirror finds his image thinner but with normal height. This implies that the mirror is (a) convex and cylindrical with axis vertical (b) convex and cylindrical with axis horizontal (c) convex and spherical (d) concave and spherical	1
32	The magnetic field lines inside a current carrying solenoid are (a) circular and they do not intersect each other (b) circular at the ends but they are parallel to the axis inside the solenoid (c) along the axis and parallel to each other (d) perpendicular to the axis and equidistant from each other	1
The following two questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by 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.		
33	**Assertion (A):** Heater wire must have high resistance and high melting point. **Reason (R):** If resistance is high, the electric conductivity will be less.	1
34	A. (i) The above figure shows the human eye. Label (a) and (b) in the figure and trace the sequence of events which occur when a bright light is focused on your eyes.	2

	 (ii) Write about power of accommodation of human eye. **OR** B. The figure shows dispersion of light through  How will you use two identical glass prisms so that a narrow beam of white light incident on one prism emerges out of the second prism as white light? Draw and label the ray diagram. prism.	
35	The cartoon below shows electric short circuit.  Fuse acts like watchman in an electric circuit. Justify this statement. Also, mention usual current rating of fuse wire in lights and in appliances of 2 kW or more power.	2
36	A. State the function of each of the following parts of human eye; Cornea, Iris and Pupil B. Why cannot we read a printed page by holding it very close to out eyes?	3
37	Anisha obtained the following graph while doing an experiment to see the variation of the magnetic field with respect to the current in the solenoid. The unit of magnetic field as given in the graph attached is in milli-Tesla (mT) and the current is given in Ampere.  **A.** What type of energy conversion is observed in a linear solenoid?	3

	B. What analysis Anisha can draw from the graph she obtained? **C.** State three factors on which the strength of magnetic field produced by a current carrying solenoid depends.	
38	An insulated conducting wire wound on a cylindrical cardboard tube such that its length is greater than its diameter is called a solenoid. When an electric current is passed through the solenoid, it produces a magnetic field around it. This magnetic field is similar to the magnetic field produced by a bar magnet. The magnetic field lines inside the solenoid are in the form of parallel straight lines. The strong magnetic field produced inside a current-carrying solenoid can be used to magnetise a piece of magnetic material like soft iron, when placed inside the solenoid. The strength of magnetic field is directly dependent on the number of turns and flow of current in the solenoid. We have used solenoid in washing machine, icemakers, central humidifiers, door locking, vending machines, remote access system and in many more electrical equipments.  **A.** What is a solenoid and what type of magnet is it? *Attempt either subpart B or C* **B.** Draw the pattern of magnetic field lines of the magnetic field produced by a solenoid through which a steady current flows. What is the strength of magnetic field inside infinite solenoid? **OR** **C.** What happens when we increases number of turns in solenoid?	4
39	A. The above figure shows bending of light when it passes one medium to another medium. Answer the following questions.  (i) How is speed of light in a medium related to its refractive index? (ii) State Snell's law of refraction of light. (iii) When a ray of light travelling in air enters obliquely into a glass slab, it is observed that the light ray emerges parallel to the incident ray but it is shifted sideways slightly. Draw a labelled ray diagram to illustrate it. **OR** B. The diagram shows the use of an optical device to perform an experiment of light.	5



(i) As per arrangement shown, what is the name of optical device used?
(ii) Describe and illustrate with a diagram, how we should arrange two converging lenses so that a parallel beam of light entering one lens emerges as a parallel beam after passing through the second lens.
(iii) An object is placed at a distance of 3 cm from a concave lens of focal length 12 cm. Find the position of the image formed.
(iv) What is the nature of image formed?

SCIENCE – Code no. 086
SAMPLE QUESTION PAPER - SOULTION
CLASS – X (2025-26)

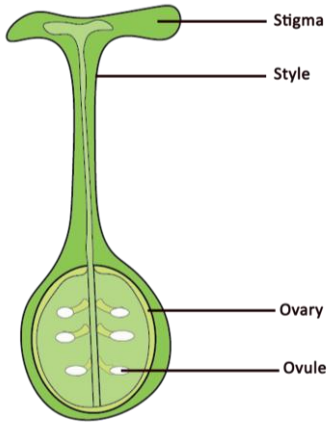
Max. Marks: 80 **Time Allowed: 3 hours**

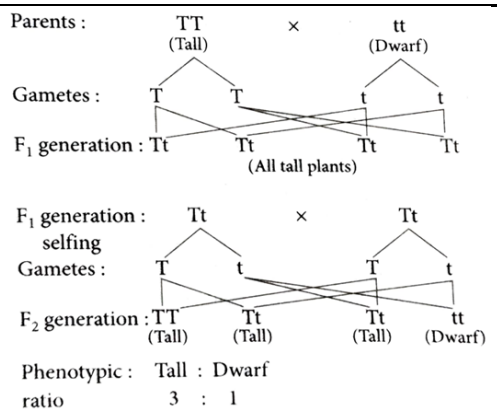
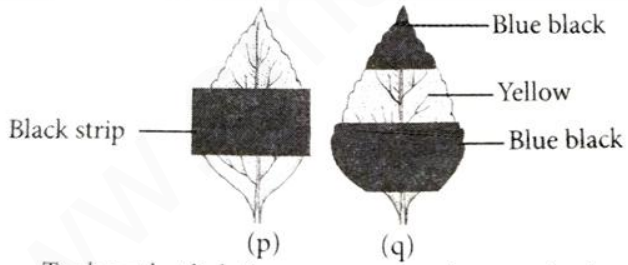
General Instructions:

(i) This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.

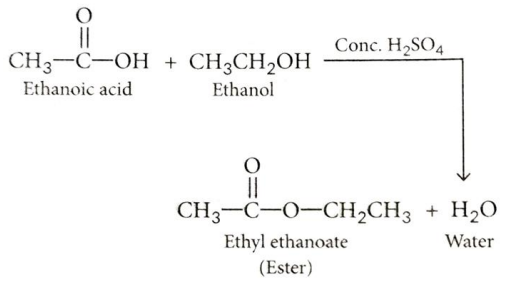
(ii) All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

	Section – A	**Marks**
1	**(a)**	1
2	**(c)**	1
3	**(c):** The buds produced on the leaves of *Bryophyllum* are produced naturally and not artificially through tissue culture technique.	1
4	**(d)**	1
5	**(c):** The function of tubules of nephron is to allow the selective reabsorption of the useful substances like glucose, amino acids, salts and water into the blood capillaries. The waste materials like urea remains behind the tubule. It does not get reabsorbed into blood capillaries.	1
6	**(a):** Mendel chose pea plants for studying inheritance because of number of reasons. Pea plants are self pollinating which enables them to produce next generation of plants easily, also purelines could be easily obtained. Due to short life cycle, many generations of pea plants can be produced in a comparatively short span of time. Also pea plant shows a number of clearly visible contrasting traits like tall and dwarf height, round and wrinkled seeds, etc.	1
7	(i) Regulation of carbohydrates, proteins and fat metabolism. (ii) Pituitary (iii) Regulate the conversion of glucose to glycogen, i.e., it lowers blood glucose level.	2
8	**A.** *Plasmodium* and *Leishmania* reproduce by the process of fission which is an asexual mode of reproduction. *Plasmodium* reproduces by multiple fission. About 1000 daughter cells are produced by the multiple fission of a *Plasmodium*. *Leishmania* reproduces by the process of binary fission. In *Leishmania*, the splitting of parent cell takes place in a definite plane (longitudinally) with respect to flagellum at its end to produce two daughter cells. **OR** **B. (i)** Ovary is the primary sex organ of human female. It produces female gametes, i.e., ova and secretes female sex hormones, i.e., estrogen and progesterone. **(ii)** Placenta is an intimate connection between fetus and uterine wall of the mother to exchange the materials. It is a disc shaped structure embedded in the uterine wall. It contains villi on embryo's side and blood spaces towards mother's side. Blood spaces surround villi. All nutritive elements from maternal blood pass into the fetus through placenta. It also helps in respiration and excretion.	2
9	**A.** Dominant traits are round shape and yellow colour of seed. **B.** Given cross is Mendelian dihybrid cross.	2
10	**A.** The labelled part in the figure are as follows : A – Glomerulus, B – Bowman's capsule, C – Collecting duct,	3

	D – Capillaries, E – Tubular part of nephron **B.** The blood urea level rises abnormally (uremia) in patients suffering from renal failure. In uremic patients, an artificial kidney is used for removing accumulated waste products like urea from the blood by a process called haemodialysis. During the process, the patient's blood is made to pass through the dialysis machine which filters out the waste material from blood and the blood is again transfused into the patient's body. Dialysers work exactly on the principle of kidney. Haemodialysis performed twice or thrice a week can save and prolong the life of uremic patients.	
11	**A. (i)** The flowers in which only a single sex organ, either male or female, is present (e.g., papaya, watermelon), are called unisexual flowers. The transfer of pollen grains from the anther of a flower of one plant to the stigma of a flower of another plant of the same species is called cross pollination. Cross pollination occurs in unisexual as well as bisexual flowers. In unisexual flowers, cross pollination is the only method for reproduction as they contain either stamen or carpel. **(ii)** Fertilisation takes place in the ovary of a female flower. Inside the ovary, the ovule is fertilised by pollen. After the process of fertilisation, the ovary in the flower thickens and enlarges to form the fruit, whereas the ovule becomes the seed containing the embryo. **(iii)** The labelled diagram of a pistil is as follows :  **B. (i)** The two testes in male are the sites where male gametes, i.e., sperms are formed. Testes also produce the male sex hormone called testosterone Two roles of testosterone are : (a) It plays a key role in development of male secondary sex organs such as prostate, etc. (b) It promotes the secondary sexual characteristics in males such as increased muscle and bone mass, growth of body hair, etc. **(ii)** In human females, the oviducts or fallopian tubes carry egg from ovary for fertilisation. **(iii)** The uterus prepares itself every month to receive and nurture the growing embryo. The uterine lining thickens and is richly supplied with blood to nourish the growing embryo.	3
12	Mendel conducted experiments with garden pea plants using a number of contrasting visible characters. He studied (pure) plants of tall (TT) and short (tt) varieties. He crossed them and obtained F_1 progeny. He found that in F_1 progeny all plants were tall (Tt). He selfed the (hybrid) plants of F_1 progeny (Tt) and found that in F_2 progenies tall as well as short plants were obtained. The three quarter plants were tall and one quarter was short. This can be illustrated as follows:	3

		
13	A. When population W appears in the area, there is decline in population of X and Y but as X is continuously decreasing and W becomes somewhat constant, this implies that W is not feeding on X. On the other hand, as population of Y is becoming constant, population W also shows constant numbers. This shows that species W is likely to feed on species Y. **OR** **B.** The decline of species X could be because of following reasons: (i) There could be more than one predator of X prevailing in the community. (ii) There is food scarcity for X. **C.** As population of X is declining constantly, it is most unlikely to be alive in next 10 years. **D.** As the population of Z is nearly constant, this may due to the nearly equal ratio of death and birth rate.	4
14	**A. (i)** Experiment which demonstrates that light is necessary for photosynthesis is as follows: 1. Take a potted plant and keep it in dark for about 36 hours to destarch the leaves. Cover a part of a leaf with black strips on both the surfaces as shown in figure (p). 2. Now place the plant in sunlight for 6 hours. 3. Pluck the leaf, remove the strip and test the leaf for starch. 4. On applying iodine, the part which was covered by black strip remains yellow while the sunlight exposed part becomes blue black. This shows that only part which was exposed to light can synthesise food. Hence, we can conclude that light is necessary for photosynthesis.  To show that light is necessary for photosynthesis: (p) destarched leaf covered with black strip (q) covered portion does not turn blue black while tested with iodine **(ii)** Due to blockage of stomata, the plant will not remain healthy for long. This is because of the following reasons: 1. Gaseous exchange takes place through stomata. On applying coating of vaseline, stomata get blocked. This will lead to failure of gaseous exchange. As a result, plant will not be able to respire. This will lead to death of the plant. 2. Because of the blocked stomata, plant will not be able to take carbon dioxide and thus, incapable to perform photosynthesis. Because of this plant will not remain healthy.	5

	3. Transpiration also takes place through stomata. If stomata are blocked, transpiration will be affected which in turn affect the absorption and transport of water by the plant. **(iii)** If two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light, the later will live longer because it will perform photosynthesis. During photosynthesis, O_2 will be released which will be utilised by the plant for respiration. **OR** **B. (i)** Functions of blood are as follows: (a) Plasma transports food, carbon dioxide and nitrogenous wastes in dissolved form. (b) Red blood cells carry oxygen to each and every cell. (c) White blood cells act as soldiers of our body and kill germs. (d) Platelets help in blood clotting, plugs the leakage. (e) Blood maintains our body temperature. **(ii)** Fishes have only two chambers in their heart, the blood is pumped to the gills to get oxygenated blood and from there it passes directly to rest of the body. Thus, the blood goes only once through the heart during one cycle of passage through the body. This type of circulation is termed as single circulation. **(iii)** Dental caries is the tooth decay that causes gradual softening of enamel and dentine. It is caused when bacteria act on sugars and produce acids that softens or demineralises the enamel. It happens when masses of bacterial cells (*Streptococcus mutans*) together with food particles stick to the teeth to form dental plaque. As plaque cover the teeth, saliva cannot reach the teeth surface to neutralise the acid. Brushing the teeth after eating removes the plaque before the bacteria produces acids	
	Section – B	
15	**(c):** A salt of weak base and strong acid is acidic in nature hence the pH of the solution will be less than 7. e.g., e.g., $NH_4OH + HCl \longrightarrow NH_4Cl + H_2O$ Weak base — Strong acid — Salt — Water	1
16	**(b):** Baking powder is a mixture of potassium hydrogen tartarate and sodium hydrogen carbonate. On baking, sodium hydrogen carbonate decomposes to sodium carbonate which is neutralised by tartaric acid. Absence of tartaric acid means persistance of sodium carbonate which gives a bitter taste.	1
17	**(b):** Iron nails rust in test tube A, but they do not rust in test tubes B and C. In the test tube A, the nails are exposed to both air and water. In the test tube B, the nails are exposed to only water, and the nails in test tube C are exposed to dry air	1
18	**(c):** In beakers A and B, exothermic reactions have occurred. Dissolution of NaOH and anhydrous $CuSO_4$ are exothermic reactions, hence there is increase in temperature. Dissolution of NaCl results in decrease in temperature hence, endothermic reaction takes place in beaker **C**.	1
19	**(b):** X^- represents an anion (negatively charged ion). Anions are oxidized (lose electrons) at the anode (positive electrode) to form a non-metal, e.g., $2Cl^-_{(aq)} \longrightarrow Cl_{2\ (g)} + 2e^-$ X^+ represents a cation (positively charged ion). X^+ will be discharged at the cathode and not at the anode. Anions (X^- ions) are discharged at the anode (not cathode) to form a non-metal. Cations (X^+ ions) are discharged at the cathode to form metal X (not X_2).	1
20	**(c):** The electronic configuration of R is 2, 8, 2. The electronic configuration of Z is 2, 8, 7. When R reacts with Z, R forms R^{2+} ion and Z forms Z^- ion. Hence, the formula of the compound is RZ_2.	1

<table>
<tr><td>21</td><td>(a): Hardness of water is due to chlorides and sulphates of Ca^{2+} and Mg^{2+} ions.</td><td>1</td></tr>
<tr><td>22</td><td>(a)</td><td>1</td></tr>
<tr><td>23</td><td>Tooth enamel is made up of calcium phosphate. It gets corroded when the pH in the mouth is below 5.5. Bacteria present in the mouth produce acid. Toothpastes are used for neutralizing the excess acid.</td><td>2</td></tr>
<tr><td>24</td><td>(i) When ethanol reacts with ethanoic acid in presence of conc. H_2SO_4, ethyl ethanoate is formed which belongs to the class of ester compounds, having fruity smell.
(ii)
 

(iii) The above reaction is called esterification which occurs in presence of conc. H_2SO_4 which acts as a dehydrating agent and helps in the removal of water. Conc. H_2SO_4 also acts as a catalyst to speed up the reaction.</td><td>3</td></tr>
<tr><td>25</td><td>
<table>
<tr><th>S. No.</th><th>Reduction with carbon</th><th>Electrolytic reduction</th></tr>
<tr><td>1.</td><td>Carbon is used as a reducing agent.</td><td>Electrolysis process is used for reduction.</td></tr>
<tr><td>2.</td><td>Oxides of moderately reactive metals (e.g., Zn, Fe, Cu, Ni) are reduced by carbon.</td><td>Oxides and chlorides of highly reactive metals (e.g., Al, Na, K, Mg, Ca) are reduced by this process.</td></tr>
<tr><td>3.</td><td>In this process, the metal oxide is mixed with carbon (coke) and heated in a furnace.
$ZnO + C \rightarrow Zn + CO$
Zinc oxide, Carbon, Zinc, Carbon monoxide</td><td>In this process, molten metal oxide is electrolyzed in an electrolytic cell where the cathode acts as a powerful reducing agent by supplying electrons to reduce metal ions into metal.
$Al^{3+} + 3e^- \xrightarrow[\text{Reduction}]{\text{Electrolytic}} Al$
Aluminium ion (from molten Al_2O_3), Electrons (from cathode), Aluminium metal</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>26</td><td>A. (i) Calcium hydroxide or lime water will turn milky. Ethanol does not react with sodium carbonate hence, there will be no change.
(ii) In test tube A,
$2CH_3COOH + Na_2CO_3 \rightarrow 2CH_3COONa + H_2O + CO_2$
In test tube B,
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$</td><td>4</td></tr>
</table>

If CO_2 is passed for a long time,

$$CaCO_3 + H_2O + CO_2 \longrightarrow \underset{\text{(Milkiness disappears)}}{Ca(HCO_3)_2}$$

B. Sweet smelling substance ester is produced.

$$CH_3COOH + CH_3CH_2OH \rightleftharpoons \underset{\text{ester}}{CH_3C(=O)-C_2H_5} + H_2O$$

OR

C. Lime water can be prepared by dissolving calcium oxide (lime) in water and taking the clear supernatant liquid.

27 **A.** (i) Q – Calcium oxide; R – Carbon dioxide — 5

$$\underset{\text{Calcium carbonate}}{CaCO_3} \xrightarrow{\text{Heat}} \underset{\text{Calcium oxide } (Q)}{CaO} + \underset{\text{Carbon dioxide } (R)}{CO_2}$$

(ii) Thermal decomposition. The compound was broken down into two simpler substances due to the presence of heat.

$2Pb(NO_3)_{2\,(s)} \xrightarrow{\text{heat}} 2PbO_{(s)} + 4NO_{2\,(g)} + O_{2\,(g)}$

(iii) The solution **(S)** is slaked lime.

$$\underset{\substack{\text{Calcium oxide}\\(Q)}}{CaO} + \underset{\text{Water}}{H_2O} \longrightarrow \underset{\substack{\text{Slaked lime}\\(S)}}{Ca(OH)_2}$$

OR

B. (i) P = Zn, Q = Cu

(ii) The substance that oxidises another substance is called an oxidising agent. While the substance which reduces others is called reducing agent.

$$\underset{\text{Oxidation}}{Zn_{(s)}} + CuSO_{4(aq)} \rightarrow ZnSO_{4(aq)} + \underset{\text{Reduction}}{Cu_{(s)}}$$

So in this reaction, $CuSO_4$ is the oxidising agent and Zn is the reducing agent.

(iii) It is a displacement reaction as more reactive metal zinc displaces less reactive copper metal from its salt solution.

$Zn_{(s)} + CuSO_{4\,(aq)} \longrightarrow Cu_{(s)} + ZnSO_{4\,(aq)}$

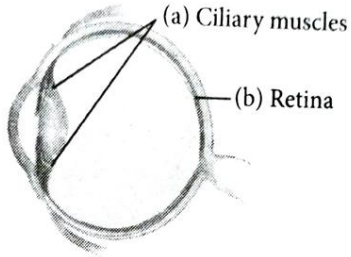
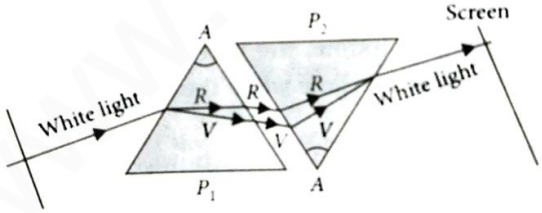
$Pb_{(s)} + CuCl_{2\,(aq)} \longrightarrow PbCl_{2\,(aq)} + Cu_{(s)}$

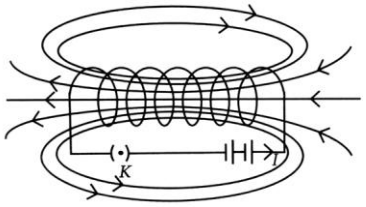
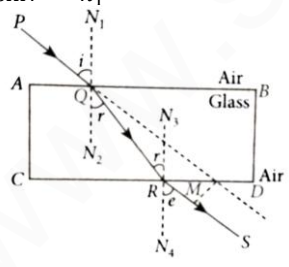
Section - C

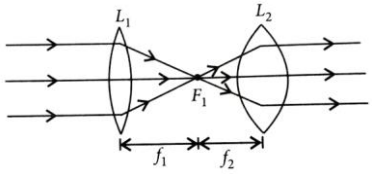
28 **(d):** $\frac{1}{u}+\frac{1}{v}=\frac{1}{f} \Rightarrow -\frac{1}{15}+\frac{1}{v}=\frac{1}{5}$ — 1

$\therefore\ v = \frac{15}{4}$ cm = 3.75 cm

$\left[\therefore\ f = \frac{R}{2}, \text{ i.e., } f = 5 \text{ cm}\right]$ (behind the mirror).

29	**(a)**	1
30	**(c):** Current flow can be due to movement of ions or electrons. But in a metallic conductor, electric current is due to flow of free electrons	1
31	**(a):** Convex and cylindrical mirror gives thinner image and of normal height.	1
32	**(c):** The magnetic field lines inside the solenoid are nearly straight and parallel to its axis	1
33	**(b):** Heater wire must have high resistance and high melting point, because in series current remains same, therefore, according to Joule's law of heating $H = i^2Rt,$ heat produced is high if $R$is high. Melting point must be high, so that wire may not melt with increase in temperature.	1
34	A. (i) When a bright light enters the eye, then most of the refraction for the light rays entering the eye occurs at the outer surface of the cornea. Then, the crystalline lens merely provides the finer adjustment of focal length required to focus object at different distances on the retina. The pupil regulates and controls the amount of light entering the eye. At retina, the light-sensitive cells get activated upon illumination and generate electric signals. These signals are sent to the brain via the optic nerves. The brain interprets these signals and finally, processes the information so that we perceive objects as they are.  **OR** **B.** Newton was the first to use a glass prism to obtain the spectrum of a white light. He then placed a second identical prism in an inverted position with respect to the first prism. This allowed all the colours of the white light to pass through the second prism combining to form a white light emerging from the other side of the second prism. This made him believe that white light was composed of different colours.  	2
35	When an unduly high electric current flows through the circuit, the fuse wire melts due to joule heating effect and breaks the circuit. Hence, it keeps an eye on the amount of current flowing and also stops the current if exceeds the maximum value. So, fuse acts like a watchman in an electric circuit. (i) A fuse of rating 5 A is usually used for lights and fans. (ii) A fuse of rating 15 A is usually used for appliance of 2 kW or more power.	2

36	**A. Cornea :** It is a transparent bulge on the front surface of eyeball which refracts most of the light rays entering the eye. **Iris :** Iris is a dark muscular diaphragm that controls the size of the pupil. **Pupil :** It controls the amount of light entering into the eye. **B.** When we hold a printed page very close to our eyes (at distances less than 25 cm, which is least distance of distinct vision of normal eye), we may see a blurred image and also feel strain in the eyes. This is because focal length of eye lens cannot be decreased below a certain minimum limit.	3
37	**A.** A linear solenoid converts electrical energy into a mechanical pushing or pulling force. **B.** From given graph, Anisha can deduce that magnetic field varies linear with current. **C.** Strength of magnetic field produced by a current carrying solenoid depends upon the following factors: (i) number of turns in the coil (ii) amount of current flowing through it (iii) radius of coil (iv) material of core of the solenoid	3
38	**A.** A coil of many circular turns of insulated copper wire wrapped closely is a shape of cylinder is called a solenoid. Solenoid is a temporary magnet. It act as a magnet only as long as the current passes through it.  **B.** Magnetic field inside infinite solenoid is uniform. Hence, it is same at all points. **OR** **C.** With increase in number of turns in solenoid the magnetic field is also increases because $B \propto n$, where $n$is number of turns.	4
39	**A.** (i) Speed of light is inversely proportional to its refractive index. (ii) According to Snell's law of refraction, the product of refractive index of sine of angle of incidence at a point in a medium is constant. It implies that when light travels from medium 1 to medium 2, then $n_1 \sin i = n_2 \sin r$ $\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = \mu_{21}$  **OR** B. (i) The optical device is a convex lens as rays are converging after passing through it. (ii) Suppose we have two converging lens of focal lengths $f_1$and f_2. We will keep the two converging lens at a distance of $f_1 + f_2$so that a parallel beam of light entering one lens emerges as a parallel beam after passing through the second lens	5



Here the focus of the two lenses should coincide.

(iii) Focal length of concave lens, $f = -12$cm

Object distance, $u = -3$cm

Image distance, $v =$?

Using lens formula,

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ or $\frac{1}{v} = \frac{1}{f} + \frac{1}{u}$

$\frac{1}{v} = \frac{1}{-12} + \left(\frac{1}{-3}\right) = -\frac{1}{12} - \frac{1}{3} \Rightarrow \frac{1}{v} = \frac{-1-4}{12} = \frac{-5}{12}$

So, $v = \frac{12}{-5} = -2.4$ cm

So, the image is formed at 2.4 cm from the concave lens.

(iv) Using magnification formula, $m = \frac{v}{u} = \frac{-2.4}{-3} = +0.8$

Since $m$is +ve and magnitude of $m$is less than 1, so the image formed is virtual and diminished.