Class- X Session - 2022-23

Subject - Science (086)

Sample Question Paper - 29

with Solution

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

General Instructions:

i. *This question paper consists of 39 questions in 5 sections.*
ii. *All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*
iii. ***Section A** consists of 20 objective type questions carrying 1 mark each.*
iv. ***Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.*
v. ***Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words*
vi. ***Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.*
vii. ***Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.*

Section A

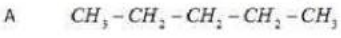
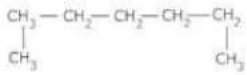
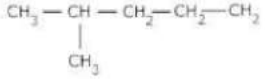
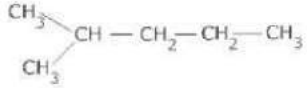
1. What happens when dilute HCl is added to iron fillings? Select the correct answer. **[1]**

   a) Hydrogen gas and iron chloride are produced
   b) Iron salt and water are produced
   c) No reaction takes place
   d) chlorine gas and iron hydroxide are produced

2. Which element is stored in water and which element is stored in kerosene? **[1]**

   a) Calcium and phosphorus respectively
   b) Sodium and phosphorus respectively
   c) Phosphorus and sodium respectively
   d) Magnesium and sodium respectively

3. Which of the following are not straight chain compounds? **[1]**

   A 
   B 
   C 
   D 

   a) A, B and D
   b) C and D
   c) A and B
   d) A and C

4. Match the following with correct response. **[1]**
   (1) Variation

(2) Genetic drift
(3) Sex Cell
(4) Paleozoic Arthropod

(A) Male gamete
(B) New species
(C) Trilobite
(D) New variations

a) 1-C, 2-B, 3-D, 4-A
b) 1-B, 2-D, 3-A, 4-C
c) 1-D, 2-A, 3-C, 4-B
d) 1-A, 2-C, 3-B, 4-D

5. The real image formed by a concave mirror is larger than the object when the object is: **[1]**

a) between focus and centre of curvature
b) at a distance less than the focal length
c) at a distance greater than radius of curvature
d) at a distance equal to radius of curvature

6. The given slides A and B were identified by four students I, II, III and IV as stated below **[1]**

	Slide A	Slide B
I	Binary fission in Amoeba	Daughter cells of Amoeba
II	Budding in Yeast	Buds of Yeast
III	Binary fission in Amoeba	Buds of Yeast
IV	Budding in Yeast	Daughter cells in Amoeba

Of the above mentioned identification of slides A and B, which one is correct?

a) IV
b) I
c) III
d) II

7. A ray passing through the focus and falling on a convex lens will: **[1]**

a) retrace its path
b) will emerge parallel to the principal axis
c) will emerge through a focus on another side
d) will emerge perpendicular to the principal axis

8. The chemical required in the experiment to show that carbon dioxide gas is released during respiration is **[1]**

a) Potassium dichromate
b) Potassium hydroxide
c) Potassium bicarbonate
d) Potassium permanganate

9. The main function of abscisic acid in plants is to [1]

a) promote cell division
b) increase the length of cells
c) promote growth of stem
d) inhibit growth

10. During adolescence, several changes occur in the human body. Mark one change associated with sexual maturation in boys [1]

a) increase in height
b) cracking of voice
c) loss of milk teeth
d) weight gain

11. If the parathyroid gland is damaged, there may be a [1]

a) rise in phosphorus level
b) rise in calcium level
c) fall in calcium level
d) fall in phosphorus level

12. Which oxide will turn blue litmus solution to red? [1]

A. SO_2
B. MgO
C. Na_2O
D. NO_2

a) A and D
b) B and C
c) A and C
d) All of these

13. Match the following with correct response. [1]

Column A	**Column B**
(i) Fragmentation	(a) Bud like protuberance on the parent body
(ii) Multiple Fission	(b) The cell divides and produce many nuclei
(iii) Spore formation	(c) Breaks up into two or more small pieces
(iv) Budding	(d) Threadlike structure

a) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)
b) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
c) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b)
d) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c)

14. The formulae of two organic acids X and Y are $C_{10}H_{21}COOH$ and $C_{19}H_{39}COOH$. Which of them exists in the liquid state at room temperature? [1]

a) Neither X and Y
b) Both X and Y
c) Y
d) X

15. Which of the following compounds contain carboxylic group? [1]

a) $CH_3 - CH_2 - CH_3$
b) CH_3CH_2COOH
c) $CH_3COOC_2H_5$
d) CH_3CH_2OH

16. The reaction between barium chloride and sodium sulphate is classified as [1]

a) Decomposition reaction and precipitation reaction
b) Combination reaction and precipitation reaction
c) Double displacement reaction and precipitation reaction
d) Displacement reaction and precipitation reaction

17. **Assertion (A):** Pure water is neither acidic nor basic. [1]
Reason (R): The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

18. **Assertion (A):** The connecting wires are made of copper. [1]
Reason (R): The electrical conductivity of copper is high.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

19. **Assertion (A):** During the physiology of excretion, deamination does take place in the liver. [1]
Reason (R): Deamination is a process to make use of excess amino acids which cannot be incorporated into protoplasm.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

20. **Assertion (A):** Bronze is an alloy of lead and tin. [1]
Reason (R): Alloys are a heterogeneous mixture of metals with other metals and non-metals.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

Section B

21. What is astigmatism ? How is it corrected ? **[2]**

OR

Explain the phenomenon of dispersion of white light through a glass prism, using suitable ray diagram.

22. What is garbage? What does garbage consist of? What is disposal of waste? **[2]**

23. An object of size 7.0 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can be obtained? Find the size and the nature of the image. **[2]**

24. Give functions of blood. **[2]**

25. Classify the following acids and bases in the categories of weak and strong. **[2]**
(i) H_2CO_3 (ii) NaOH (iii) CH_3COOH (iv) NH_4OH (v) HCl (vi) KOH (vii) H_2SO_4 (viii) $Ca(OH)_2$ (ix) HCN

26. People use a variety of methods to wash clothes. Usually after adding the soap, they 'beat' the clothes on a stone, or beat it with a paddle, scrub with a brush or the mixture is agitated necessary to get clean clothes? **[2]**

Section C

27. 'M' is an element which may be one out of Cu, Fe, Al, Na. It shows the following properties: **[3]**
(i) One of its ore is rich in M_2O_3.
(ii) M_2O_3 is not affected by water.
(iii) It corrodes easily.
(iv) It form to chlorides MCl_2 and MCl_3. Identify 'M'.

28. List the differences between Biotic and Abiotic components of ecosystem. **[3]**

29. Distinguish between real image and virtual image. **[3]**

OR

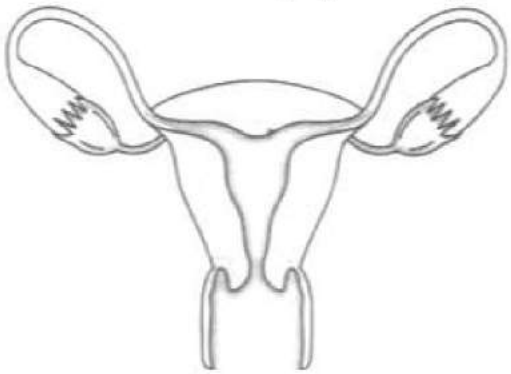
Sudha finds out that the sharp image of window pane of her science laboratory is formed at a distance of 15 cm from the lens. She now tries to focus the building visible of her outside the window instead of the window pane without disturbing the lens. In which direction will she move the screen to obtain a sharp image of the building? What is the approximate focal length of this lens?

30. Observe the following table carefully and match the components of part I with part II of the table. Write them in complete sentences. **[3]**

Part I	Part II
Unicellular organism	Transpiration
Human beings	Diffusion
Plants	Urination

31. Why do we observe difference in colours of the Sun during sunrise, sunset and noon? **[3]**

32. Answer the following by carefully studying the figure: **[3]**



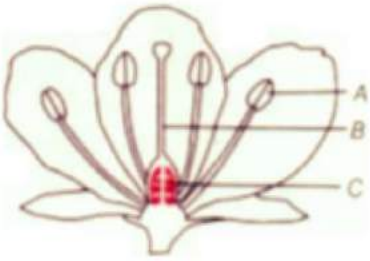
i. Identify the image shown above.

ii. Label in the figure the ovary, oviduct, uterus, vagina.

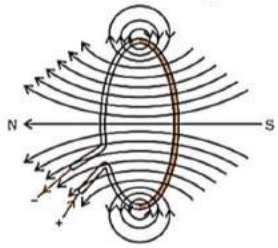
iii. State the functions of the labeled parts in part b.

OR

Name the parts A, B and C shown in the following diagram and state one function of each.



33. Magnetic field lines of the field produced by a current-carrying circular loop are shown in the figure. **[3]**



By analyzing the concept of magnetic field and magnetic field lines answer the following questions:

i. How is the direction of the magnetic field at a point determined?

ii. What is the direction of the magnetic field at the centre of a current-carrying circular loop?

Section D

34. In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by-product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. Identify X and Y giving the chemical equations of the reactions involved. **[5]**

OR

What is water of crystallisation? Write the common name and chemical formula of a commercially important compound which has ten water molecules as water of crystallisation. How is this compound obtained? Write the chemical equation also. List any two uses of this compound.

35. 'Nervous and hormonal systems together perform the function of control and coordination in human beings.' Justify the statement. **[5]**

OR

List the major endocrine glands and state their position in the human body.

36. What is the pattern of magnetic field pattern due to current carrying conductor. **[5]**

Section E

37. **Read the text carefully and answer the questions:** **[4]**

Pea plants can have smooth seeds or wrinkled seeds. One of the phenotypes is completely dominant over the other. A farmer decides to pollinate one flower of a plant with smooth seeds using pollen from a plant with wrinkled seeds. The resulting pea pod has all smooth seeds.

(i) Which crosses will give smooth and wrinkled seeds in the same proportion?

(ii) Which cross can be used to determine the genotype of a plant with a dominant phenotype?

OR

On the crossing of two heterozygous smooth seeded plants (Rr), a total of 1000 plants were obtained in F_1 generation. What will be the respective number of smooth and wrinkled seeds obtained in F_1 generation?

38. **Read the text carefully and answer the questions:** **[4]**

The heating effect of current is obtained by transformation of electrical energy into heat energy. Just as mechanical energy used to overcome friction is covered into heat, in the same way, electrical energy is converted into heat energy when an electric current flows through a resistance wire. The heat produced in a conductor, when a current flows through it is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

The mathematical expression is given by $H = I^2Rt$.

The electrical fuse, electrical heater, electric iron, electric geyser etc. all are based on the heating effect of current.

(i) What are the properties of heating element?

(ii) What are the properties of electric fuse?

(iii) When the current is doubled in a heating device and time is halved, what will be the heat energy produced?

OR

A fuse wire melts at 5 A. It is desired that the fuse wire of same material melt at 10 A. Find the new radius of the wire?

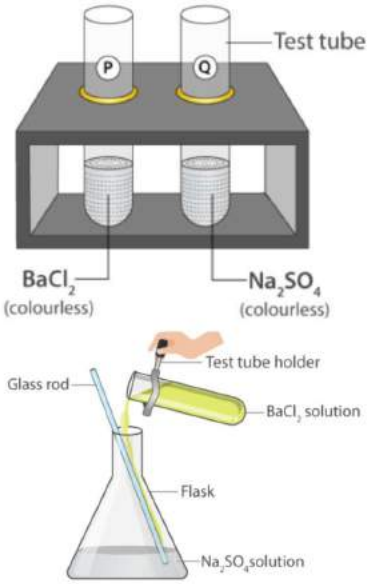
39. **Read the text carefully and answer the questions:** **[4]**

When a more reactive element displaces a less reactive element from its compound, it is called a displacement reaction. The reaction is of two types. Single displacement reaction and double displacement reaction.
Iron being more reactive than copper displaces copper from an aqueous solution of copper sulphate. This is an example of a single displacement reaction.
On adding silver nitrate solution to sodium bromide, a yellow ppt of silver bromide and solution of sodium nitrate is formed. This is an example of a double displacement reaction.

(i) When dil. sulphuric acid is added to pieces of iron sulphide, hydrogen sulphide gas is produced and soluble ferrous sulphate is formed. Which chemical reaction is involved in this process?

(ii) Mention reaction which is used for the preparation of oxygen gas in the laboratory.

(iii) What are the products formed in the double displacement reaction discussed below?



OR

Which elements displace aluminum from its salt?

SOLUTION

Section A

1. **(a)** Hydrogen gas and iron chloride are produced
   Explanation: Metals react with acids to form metal salt and hydrogen gas
2. **(c)** Phosphorus and sodium respectively
   Explanation: Phosphorus and sodium are highly reactive at room temperature. Phosphorus is stored underwater. Sodium reacts with water, hence it is stored under kerosene.
3. **(b)** C and D
   Explanation: A and B are straight chain compounds. A has a straight chain of 5 carbon atoms. B has a straight chain of 7 carbon atoms. C and D are not straight chain compounds.
4. **(b)** 1-B, 2-D, 3-A, 4-C
   Explanation: A) variation causes speciation.
   B) genetic drift cause variations.
   C) male gamete contains male germ cell and is also called sex cell.
   D) paleozoic arthropod is a trilobite.
5. **(a)** between focus and centre of curvature
   Explanation: between focus and centre of curvature
6. **(b)** I
   Explanation: In binary fission of Amoeba, nucleus divides first, then the cytoplasm and daughter cells are formed.
7. **(b)** will emerge parallel to the principal axis
   Explanation: The ray light passing through the principal focus of the convex lens will emerge as parallel to the principal axis after refraction from the convex lens.
8. **(b)** Potassium hydroxide
   Explanation: Potassium hydroxide absorbs carbon dioxide which is released during respiration.
9. **(d)** inhibit growth
   Explanation: The main function of abscisic acid in plants is to inhibit growth. While Auxins increase the length of cells, Cytokinins promote cell division, and Gibberlins promotes the growth of the stem.
10. **(b)** cracking of voice
    Explanation: Cracking of voice in males is brought about by the male hormone testosterone, which is produced after sexual maturation.
11. **(c)** fall in calcium level
    Explanation: In hypocalcemia, the calcium level in blood is too low. A low calcium level may result from a problem with the parathyroid glands, as well as from diet, kidney disorders, or certain drugs.
12. **(a)** A and D
    Explanation: An acidic oxide will turn blue litmus red. Non-metal oxides (Oxides of S and N) are acidic in nature. Metal oxides (Oxides of Mg and Na) are basic in nature.

13. **(a)** (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)
Explanation:
- Fragmentation or clonal fragmentation in multicellular or colonial organisms is a form of asexual reproduction or cloning in which an organism is split into fragments. Each of these fragments develops into mature, fully grown individuals that are clones of the original organism.
- Multiple fission at the cellular level occurs in many protists, e.g. sporozoans and algae. The nucleus of the parent cell divides several times by mitosis, producing several nuclei. The cytoplasm then separates, creating multiple daughter cells.
- A mode of reproduction resembling multiple fission, common among Protozoa, in which the organism breaks up into a number of pieces, or spores, each of which eventually develops into an organism like the parent form. The formation of reproductive cells or spores, as in the growth of bacilli.
- Grafting and budding are horticultural techniques used to join parts from two or more plants so that they appear to grow as a single plant. In grafting, the upper part (scion) of one plant grows on the root system (rootstock) of another plant. In the budding process, a bud is taken from one plant and grown on another.

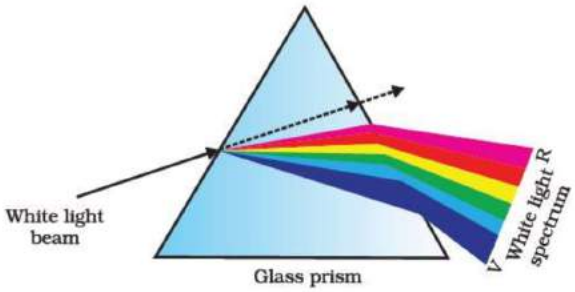
14. **(d)** X
Explanation: $C_{10}H_{21}COOH$: Hendecanoic acid (also known as undecanoic acid, undecylenic acid, and undecylic acid) is a naturally occurring carboxylic acid. It has a melting point in the range of 28 - 31^{o} C. It is a low melting solid.
$C_{19}H_{39}COOH$: Arachidic acid or eicosanoic acid is a white crystalline solid at room temperature (25 ^{o}C). It has a melting point in the range 74 - 76^{o}C.
15. **(b)** CH_3CH_2COOH
Explanation: CH_3CH_2COOH contains a carboxylic group. CH_3CH_2OH contains an alcoholic group. $CH_3COOC_2H_5$ contains the ester group. CH_3 - CH_2 - CH_3 is an alkane.
16. **(c)** Double displacement reaction and precipitation reaction
Explanation: It is double displacement as well as precipitation reaction because two compounds exchange their ions and one of the product formed is insoluble.
$BaCl_2 + Na_2SO_4 \rightarrow BaSO_4 + 2NaCl$
Double decomposition takes place, due to the exchange of ions between the 2 substances. A white precipitate of barium sulphate is formed.
17. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: Pure water is neutral in nature because at 25^{o} C, the concentration of hydrogen ion and hydroxide ion remains equal.
18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Both A and R are true and R is the correct explanation of A.
19. **(c)** A is true but R is false.
Explanation: A is true but R is false.
20. **(d)** A is false but R is true.
Explanation: Bronze is an alloy of copper and tin.

Section B

21. The surface of the cornea is nearly spherical. Sometimes, its curvature gets distorted and becomes more in one plane that in the other, so that the focal length of the eye in the two planes at right angles to each other becomes different. This defect generally causes indistinct vision and headache and is called astigmatism. This defect is corrected by the use of suitable cylindrical lens.

OR

Dispersion is the phenomenon of splitting of white light into seven colors.
The band of colored components of seven colors is known as a spectrum.
As light ray travels through a glass prism, different colors of light bend at different angles to the incident ray. The violet light bends the most and the red light bends at least angle. The rays of prism bend along different paths and become distinct.
The ray diagram showing the dispersion of colors through a prism can be shown as follows:



22. The household wastes or rubbish is called garbage. Every household produces a lot of garbage daily. This garbage includes left over food, fruits and vegetable peels, fallen leaves of potted plants, waste papers, wooden objects, ragged clothes, etc.
Disposal of waste means to get rid of unwanted material and may otherwise require space and cause pollution. The method of waste disposal depends on the nature of waste. Biodegradable waste is to be seperated from non-biodegradable waste as together they cannot be treated well such as recycling etc, causing pollution.
23. u = - 27 cm, f = - 18 cm. h_o = 7.0 cm
$1/v = 1/f - 1/u$
$1/v = -1/18 + 1/27 = -1/54$
v = - 54 cm
Screen must be placed at a distance of 54 cm from the mirror in front of it.
$h_i/h_0 = v/u$
$h_i/7 = +54/-27$
$h_i = -2 \times 7 = -14$ cm.
Thus, the image is of 14 cm length and is inverted image.
24. Blood performs a number of functions in the body, the most important of which are as follows:
1) Blood supplies nutrients and oxygen to various organs and cells of the body.
2) It carries the waste matter formed in the cells to the excretory organs.
3) It regulates the temperature of the body.
4) It supplies hormones to different parts of the body.
5) It prevents the body from various diseases by destroying the pathogenic germs.
6) It prevents excessive loss of nutrients from cuts and wound by forming a clot.
25. Strong acid : HCl, H_2SO_4
Weak acid : CH_3COOH, HCN, H_2CO_3

Strong base : KOH, NaOH
Weak base : $Ca(OH)_2$, NH_4OH

26. It is necessary to beat the cloth on stone or beat it with the paddle Scrub it with a brush and mixture is agitated in the washing machine because the dirt particles are trapped in the clothes and to get them out we put the clothes in a water contain soap so the long hydrocarbons part of the missels present in soapy water are attached to the dirt particles and the ionic part of the missels are remain attached to the water. Then we beat the cloth on stone and Scrub it with a brush so that the long hydrocarbons came out with the stubborn dirt particles.

Section C

27. (i) As the metal 'M' forms oxide M_2O_3 it is trivalent. Out of the metals listed, only Fe and Al are trivalent.
(ii) M_2O_3 is not affected by water, so 'M' can be out of Fe or Al.
(iii) Fe and Al both corrode easily.
(iv) Out of Al and Fe, only Fe can form divalent chloride, so the element 'M' is Fe.

28.

Biotic components	Abiotic components
1) Biotic components of an ecosystem are those living substances which are different members of a community.	1) Abiotic components are non-living factors
2) Biotic components of an ecosystem are: i) Producers ii) Consumers iii) Decomposers	2) It includes water, minerals, salts, humidity, light, temperatures, pH wind, topography and background.
3) Biotic factors include plants, bacteria, fungi, birds, worms, animals, etc.	3) Abiotic factors include sunlight, water, air, chemical elements, minerals, soil, temperature, etc.
4) Biotic factors depend on the abiotic factors.	4) Abiotic factors do not depend on biotic factors.
5) Biotic factors adapt to the environment.	5) Abiotic factors do not change or adapt to the environment.

29.

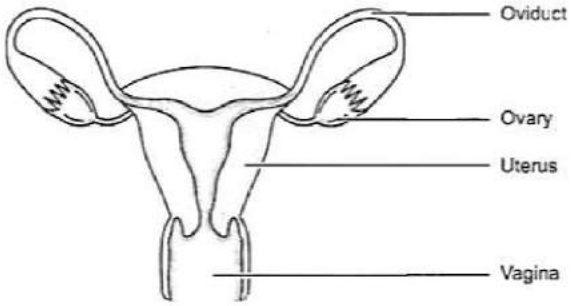
Real Image	Virtual Image
1. It is formed by the actual meeting of reflected (or refracted) ray.	1. It is formed when reflected (or refracted) rays appear to meet when produced backward
2.It can be obtained on the screen.	2.It cannot be obtained on the screen.
3.It is always inverted.	3.It is always erect.
4.It is formed by concave mirror or convex lens.	4.It is formed by concave, convex and plane mirror(or concave and convex lens.)

OR

Let us assume that the window pane is between F2 and infinity from this lens and this is a convex lens. We know that when the object is between infinity and F_2, its inverted and real images is formed between 2F and $2F_2$.

Now, the distant building is at infinity from the lens. Its image would be formed at 2F. So, the screen needs to be moved towards the lens in order to get a sharp image. Its approximate focal length is 10 cm (less than image distance in earlier case).

30. i. **Unicellular organisms:** excrete out wastes accumulated in body through the process of diffusion eg: amoeba
    ii. **Human beings:** excrete out nitrogenous wastes generated by various metabolic activities through urination.
    iii. **Plants:** remove excess water through transpiration, the process by which moisture is carried through plants from roots to small pores on the underside of leaves, where it changes to vapor and is released to the atmosphere.
31. This is because of scattering of light near the horizon, most of the blue light and shorter wavelengths are scattered away by the particles present in the atmosphere during sunrise and sunset. So, the light that reaches our eyes is of longer wavelength (e.g. red). This gives rise to the reddish appearance of the sky. But during the day sun appears white as sun is near the surface of earth nearly overhead, thus the sunlight passes through much smaller distance and thus the scattering is much less and sun appears white.
32. i. The figure represents the female reproductive system.
    ii. The figure with labelled part is as shown.



    iii. The ovary is the female primary sex organ that produces ova or eggs. They secrete female hormones oestrogen and progesterone. The oviduct receives the egg released from the ovum and it is the site of fertilisation. The uterus is a muscular organ where implantation of zygote occurs and it takes care of the developing embryo. The vagina is a muscular tube-like structure which receives the sperms and through which the baby is delivered.

OR

Part	Function
A- Anther	Formation of pollen grains and storing it till pollination starts.
B- style	Connecting stigma to ovary. Where pollen grains stuck to stigma, grows it's pollen tube to facilitate the movement of 2 male gametes.
C- Ovary	Contains ovule which develop into seeds after fertilization of male and female gamete, while ovary forms the fruit.

33. i. The direction of the magnetic field at a point can be found by placing a small magnetic compass at that point. The north end of the needle of a compass indicates the direction of magnetic field at a point where it is placed.

ii. The direction of magnetic field at the centre of a current-carrying circular loop is perpendicular to the plane of the loop.

Section D

34. In the manufacture of sodium hydroxide (Chlor-alkali process), hydrogen gas and chlorine gas are formed as by-products. The chemical equation for the reaction is as follows:-

$2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$

Gas 'X', which is formed as by-product and which also reacts with lime water (calcium hydroxide) to form calcium oxy-chloride is thus, chlorine. Gas X is not hydrogen. Calcium oxy-chloride is used as a bleaching agent in the chemical industry. The chemical equation for the formation of calcium oxy-chloride is as follows:-

$Ca(OH)_2(s) + Cl_2(g) \rightarrow CaOCl_2(s) + H_2O(l)$

Therefore, gas **'X'** is **chlorine gas** (Cl_2) and **'Y'** is **calcium oxy-chloride** (bleaching powder).

OR

The water molecules which form the part of the structure of a crystal of salt are water **of crystallization.** The common name for the compound is **washing soda** and the chemical formula is **$Na_2CO_3 .10H_2O$**

Preparation: A cold and concentrated solution of Brine is reacted with ammonia and carbon dioxide to obtain sodium hydrogen carbonate which is further separated by filtration, dried and heated. On heating, sodium hydrogen carbonate decomposes to form sodium carbonate which is recrystallized with water to form washing soda crystal.

$NaCl + H_2O + CO_2 + NH_3 \rightarrow NH_4Cl + NaHCO_3$

$2NaHCO_3 + Heat \rightarrow Na_2CO_3 + CO_2 + H_2O$

$Na_2CO_3 + 10H_2O \rightarrow Na_2CO_3.10H_2O$

Uses:

- It is used to remove permanent hardness of water.
- it is used in manufacturing of glass.

35. The working together of various organs of human being in a systematic, controlled and efficient way to produce a proper response to various stimuli is known as coordination.

In human beings, the control and coordination is brought about by both nervous system and endocrine system. Nervous system consists of receptors that receive the stimulus from surrounding environment and send the message received by them to the spinal cord and brain in form of electrical impulses through the sensory nerves. The motor nerves then transmit the response to the effector. The effectors are mainly the muscles and glands of our body. Thus, endocrine glands secreting hormones are directly or indirectly controlled by the nervous system. For example, when an emergency stimulus is detected by the nervous system, the stimulus is detected by the nervous system , the stimulus is received and analysed by central nervous system that send message to effectors to provide proper response. At the same time, the sympathetic nervous system activates adrenal gland to release adrenaline that prepares body by increasing heart rate, blood pressure,respiration and dilates pupil

etc.

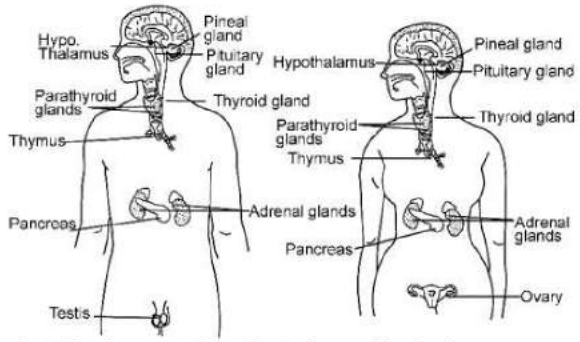
Hence, control and coordination in humans (or animals) depend on two things for transmitting information, i.e. chemical signals of hormones and nerve impulses.

If they depended only on nerve impulses through nerve cells, only a limited range of tissues would be stimulated. Since, they get additional chemical signals as well, a large number of tissues are stimulated. This is why animals can show a wide range of response to stimulus.

OR

The major endocrine glands in the human body are:

i. Pituitary gland
ii. Thyroid gland
iii. Parathyroid gland
iv. Adrenal gland
v. Islets of Langerhans present in Pancreas
vi. Gonads (Testis and Ovary)
vii. Thymus gland
viii. Pineal gland.
ix. Mucosa of stomach and intestine



i. Pituitary gland: It is called the master gland as it not only controls the body functions but also controls the functions of other endocrine glands.
It is a small oval shaped gland situated at the base of the brain.
Generally, it is divided into anterior lobe and posterior lobe.

ii. Thyroid gland: It is situated in the neck region extending from thyroid cartilage of larynx to fourth tracheal cartilage. It is bilobed structure and the two lobes are connected by the straight structure called isthmus from which sometimes arises a pyramidal lobe.

iii. Parathyroid glands: These are four small oval glands and lie closely with the thyroid.

iv. Adrenal gland: It is attached on the upper side of each kidney. So, it is also known as suprarenal gland. It is yellow in colour and the size is larger in female than male.

v. Islets of Langerhans: Pancreas acts both as a digestive gland and as an endocrine gland. The endocrine glandular part of pancreas i.e Islets are not connected with pancreatic ducts and so pour their secretion directly in blood vessels.

vi. Gonads: Testis and ovary are sex organs. These, in addition to their normal functions, produce hormones and act as endocrine glands.

vii. Thymus gland: It is bilobed gland and is situated just above the heart. After sexual maturity, it regresses and act and its place is taken by fatty and fibrous connective

tissue.

viii. Pineal gland: It is situated on the roof of the third ventricle. It is covered by capsule from which many septa or trabeculae extend towards the centre dividing it into may lobules.

ix. Mucosa of stomach and intestine: The pyloric part of stomach and mucous lining of duodenum act as endocrine glands.

36. Take a straight conducting wire AB which passes through a horizontal cardboard. The ends of the wire are connected to a battery as shown in fig. When the key is closed, the current flows through the wire from B to A as shown in fig. (a), it produces magnetic field around it

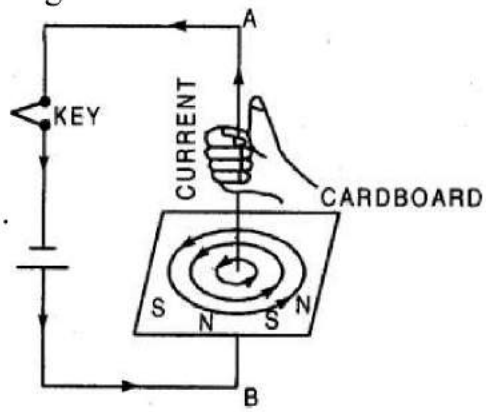
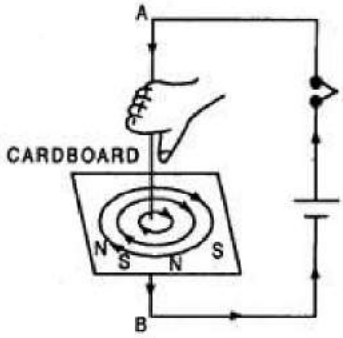
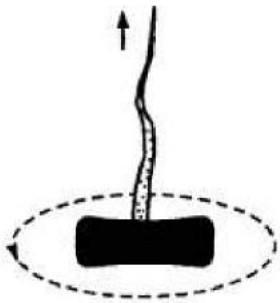


fig. (a)

The magnetic lines of force can be drawn with the help of a compass needle. The magnetic lines of force can also be visualized by sprinkling iron filings on the cardboard. On tapping the cardboard sheet, the iron filings arrange themselves in circles around the wire. The direction of the field is indicated by compass needle (a) The direction of magnetic field is given by right hand grip rule and by right hand cork screw rule.

Right hand grip rule is stated below : Grasp the wire in the right hand so that the thumb points along the wire in the direction of current, the fingers will then point in the direction of magnetic field.





Right hand cork-screw rule : Imagine a right handed cork-screw to be lying with its direction coinciding with the conductor carrying current and to be revolved so that it travels in the direction in which thumb rotates gives the direction of lines of force.

Section E

37. **Read the text carefully and answer the questions:**

Pea plants can have smooth seeds or wrinkled seeds. One of the phenotypes is completely dominant over the other. A farmer decides to pollinate one flower of a plant with smooth seeds using pollen from a plant with wrinkled seeds. The resulting pea pod has all smooth seeds.

(i) Rr × rr

(ii) Rr × rr

OR

The crossing between two heterozygous smooth seeded (Rr) plants would give phenotypic ratio of 3 smooth seeded plant: 1 wrinkled seeded plant. If plants obtained were 1000, then the number of smooth and wrinkled plants will be closed to 750 and 250 respectively.

38. **Read the text carefully and answer the questions:**

The heating effect of current is obtained by transformation of electrical energy into heat energy. Just as mechanical energy used to overcome friction is covered into heat, in the same way, electrical energy is converted into heat energy when an electric current flows through a resistance wire. The heat produced in a conductor, when a current flows through it is found to depend directly on (a) strength of current (b) resistance of the conductor (c) time for which the current flows.

The mathematical expression is given by $H = I^2Rt$.

The electrical fuse, electrical heater, electric iron, electric geyser etc. all are based on the heating effect of current.

(i) Low resistance, high melting point.

(ii) High resistance, low melting point

Electric Fuse is based on the principle of the heating effect of Electric current.

(iii) Given: $H = I^2Rt$

So, $H' = (2I)^2 \cdot \frac{R}{2}t = 2\ H$

OR

Given: I = 5 A, resistance = R. Let r be the new radius.

Now, $H = i^2Rt$ ...(a)

Also $H' = I^2R't$ ...(b)

From (a) and (b), $5^2 \times \rho\frac{L}{\pi r^2}t = 10^2 \times \rho\frac{L}{\pi r'^2} \cdot t$

$\frac{25}{r^2} = \frac{100}{r'^2} \Rightarrow \frac{r'}{r} = 2 \Rightarrow$ r' = 2r

39. **Read the text carefully and answer the questions:**

When a more reactive element displaces a less reactive element from its compound, it is called a displacement reaction. The reaction is of two types. Single displacement reaction and double displacement reaction.

Iron being more reactive than copper displaces copper from an aqueous solution of copper sulphate. This is an example of a single displacement reaction.

On adding silver nitrate solution to sodium bromide, a yellow ppt of silver bromide and solution of sodium nitrate is formed. This is an example of a double displacement reaction.

(i) Double displacement reaction

(ii) $2KClO_3 \xrightarrow[Catalyst]{Heat} 2KCl\ (s) + 3O_2\ (g)$

It is a decomposition reaction and endothermic in nature.

(iii) Barium Sulphate, Sodium Chloride

OR

Ca elements displace aluminium from its salt.