

SAMPLE PAPER - 1

Class 10 - Science

Time Allowed: 3 hours

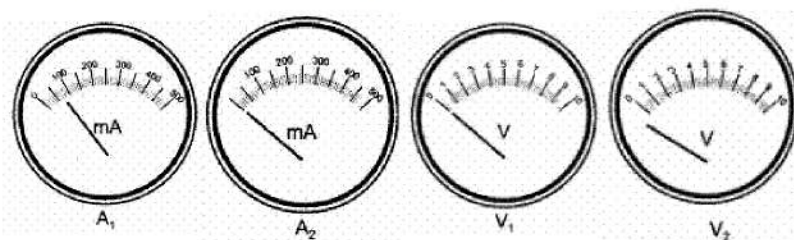
Maximum Marks: 80

General Instructions:

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

Section A

1. The positions of the pointer of the two ammeters A_1 and A_2 , and two voltmeters V_1 and V_2 available in the laboratory are shown in the given figure. For an experiment to study the dependence of the current on the potential difference across a resistor, the student would prefer [1]



- a) ammeter A_2 and voltmeter V_1 b) ammeter A_2 and voltmeter V_2
- c) ammeter A_1 and voltmeter V_1 d) ammeter A_1 and voltmeter V_2
2. The component of a chromosome that controls heredity is [1]
- a) Histones b) Proteins
- c) RNA d) DNA
3. How does a gaseous exchange take place in woody plants? [1]
- a) Epidermal cells b) Stem hair
- c) Lenticels d) Root hair



4. Magnetic field lines determine [1]
a) Only the direction of magnetic field. b) Both the direction and the relative strength of magnetic field.
c) Only the relative strength of the magnetic field. d) The shape of magnetic field.

5. Which of the following property is generally shown by metals? [1]
A. Electrical conduction
B. Sonorous in nature
C. Dullness
D. Ductility
a) A and B b) A and C
c) All of these d) A, B and D

6. Match the following with the correct response: [1]

Column A	Column B
(i) Alcohol	(a) - X
(ii) Aldehyde	(b) - CHO
(iii) Ketone	(c) - OH
(iv) Haloalkane	(d) - CO -

- a) (i) - (b), (ii) - (d), (iii) - (a), (iv) - (c) b) (i) - (a), (ii) - (c), (iii) - (b), (iv) - (d)
c) (i) - (d), (ii) - (a), (iii) - (c), (iv) - (b) d) (i) - (c), (ii) - (b), (iii) - (d), (iv) - (a)
7. Toothpastes are generally [1]
a) natural b) acidic
c) basic d) neutral
8. Syphilis is caused by [1]
a) Mosquito b) Virus
c) Parasite d) Bacteria
9. An aqueous solution with pH-zero is [1]
a) Amphoteric b) Neutral
c) Alkaline d) Acidic
10. Which among the following statements are true for unisexual flowers? [1]
i. They possess both stamen and pistil
ii. They possess either stamen or pistil
iii. They exhibit cross pollination
iv. Unisexual flowers possessing only stamens cannot produce fruits
a) (iii) and (iv) b) (ii), (iii) and (iv)
c) (i) and (iv) d) (i), (iii) and (iv)



11. Two pea plants one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F₁ progeny that have round, yellow (RrYy) seeds. When F₁ plants are selfed, the F₂ progeny will have new combination of characters. Choose the new combination from the following [1]
- Round, yellow
 - Round, green
 - Wrinkled, yellow
 - Wrinkled, green
- (i) and (iv)
 - (i) and (iii)
 - (ii) and (iii)
 - (i) and (ii)
12. How much energy is consumed when a current of 5 ampere flows through the filament of a heater having a resistance of 100 ohms for two hours? Express it in joules. [1]
- 18×10^5 J
 - 18×10^6 J
 - 18×10^7 J
 - None of these
13. When red, blue and green light coming parallel to principal axis fall on a convex lens, they will converge on the axis at: [1]
- one point
 - three different points
 - None of these
 - two different points
14. When iron nail is placed in copper sulphate solution for a few hours the blue colour of solution will [1]
- Remain blue
 - Change to colourless
 - Change to pink
 - Change to green
15. The inner lining of stomach is protected by one of the following from hydrochloric acid. Choose the correct one [1]
- Salivary amylase
 - Pepsin
 - Mucus
 - Bile
16. In a flower, the parts that produce male and female gametes (germ cells) are [1]
- stamen and style
 - filament and stigma
 - anther and ovary
 - stamen and anther
17. **Assertion (A):** A compass needle is placed near a current-carrying wire. The deflection of the compass needle decreases when the compass needle is displaced away from the wire. [1]
Reason (R): Strength of a magnetic field decreases as one moves away from a current-carrying conductor.
- Both A and R are true and R is the correct explanation of A.
 - Both A and R are true but R is not the correct explanation of A.
 - A is true but R is false.
 - A is false but R is true.
18. **Assertion (A):** During electrolysis of a concentrated aqueous solution of sodium chloride, hydrogen is produced at the anode and chlorine gas is produced at the cathode. [1]
Reason (R): Ions get attracted to oppositely charged electrodes.
- Both A and R are true and R is the correct
 - Both A and R are true but R is not the



explanation of A.

correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

19. **Assertion (A):** Antheozoids of Funaria show chemotropic movement. [1]

Reason (R): This is a paratonic movement of locomotion.

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):** Animals adopt different strategies to survive in hostile environments. [1]

Reason (R): Praying mantis is green in colour which merges with plant foliage.

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. Write the chemical equations for the following chemical reactions and name the carbonic compound obtained. [2]

i. Reaction of acidified potassium dichromate solution with ethanol on heating.

ii. Reaction of sodium metal with ethanol.

iii. Reaction of concentrated sulphuric acid with ethanol at 443 K.

OR

How would you name the following compounds?

i. $\text{CH}_3\text{-CH}_2\text{-Br}$

ii. $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}=\text{O} \end{array}$

iii. $\begin{array}{cccc} \text{H} & \text{H} & \text{H} & \text{H} \\ | & | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}=\text{C}-\text{H} \\ | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} \end{array}$

22. What are the functions of the relay, motor and sensory neurons in a reflex response? [2]

23. What will happen if we kill all the organisms of one trophic level? [2]

24. Briefly describe the biotic components of an ecosystem. [2]

25. i. In refraction of light through a rectangular glass slab, the emergent ray is parallel to the direction of the incident ray. Why? [2]

ii. What happens when a light ray is incident normally on one of the faces of a rectangular glass slab?

OR

An object is placed at $2F_1$ in front of a convex lens. What is the

i. Position

ii. Size

iii. nature of image?

26. Draw the structures of the following compounds: Bromopentane [2]

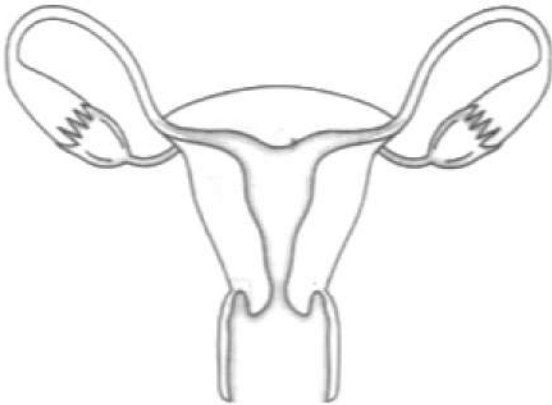
Section C

27. A student adds water to a substance X taken in beaker. He feels the beaker turning hot and a hissing sound is produced. Why does this happen? Write a chemical equation for the reaction. State the type of this reaction. [3]

28. i. Name the spherical mirror used as: [3]
- shaving mirror
 - Rear view mirror in vehicles
 - Reflection in search-light.

ii. Write any three difference between a real and a virtual image.

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



- Identify the image shown above.
- Label in the figure the ovary, oviduct, uterus, vagina.
- State the functions of the labeled parts in part b.

OR

Name one sexually transmitted disease each caused due to bacterial infected and viral infection. How can these prevented?

30. 1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. [3]
2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye.
- A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact.
- If you are asked to participate in this mission how would you contribute in this noble cause?
- State the objective of organising such campaigns.
 - List two arguments which you would give to motivate the people to donate their eyes after death.
 - List two values which are developed in the persons who actively participate and contribute in such programme.

31. State one characteristic each of the chemical reaction which takes place when: [3]
- Dilute hydrochloric acid is added to sodium carbonate.
 - Lemon juice is added gradually to potassium permanganate solution.
 - Dilute sulphuric acid is added to the barium chloride solution.
 - Quick lime is treated with water.
 - Wax is burned in the form of a candle.

32. In pea plant, round seed is dominant over the wrinkled. If a cross is carried out between these two plants, give answer to the following questions. [3]
- Mention the genes for the traits of parents.
 - State the trait of F_1 hybrids.

iii. Write the ratio of F_2 progeny obtained from this cross. What is the name of the cross?

OR

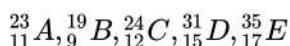
In human beings, the statistical probability of getting either a male or female child is 50:50. Give a suitable explanation for this.

33. A camera in many ways is similar to the human eye, still, there are some basic differences in image formation between the two. Explain. [3]

Section D

34. i. How do you classify elements into metals and non-metals on the basis of their electronic configuration? [5]

Choose metal and non-metal out of the following:



ii. What type of bond will be formed if

- 'A' combines with 'B'?
- 'A' combines with 'E'?
- 'C' combines with 'E'?
- 'D' combines with 'E'?

OR

i. What is meant by the reactivity series of metals? Arrange the following metals in an increasing order of their reactivities towards water : Zinc, iron, magnesium, Sodium

ii. Hydrogen is not a metal but still it has been assigned a place in the reactivity series of metals. Why?

iii. Name one metal more reactive and another less reactive than hydrogen.

iv. Name one metal which displaces copper from copper sulphate solution and one which does not.

v. Name one metal which displaces silver from silver nitrate solution and one which does not.

35. Describe the process of urine formation in kidneys. [5]

OR

Discuss the mechanism of respiration in human beings.

36. a. Name and state the rule to find the direction of force experienced by a current-carrying straight conductor [5]

placed in a magnetic field which is perpendicular to it.

b. Draw a well labelled diagram of an electric motor.

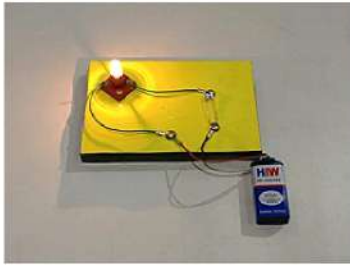
Section E

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

How do we express electric current? Electric current is defined by the amount of charge flowing through a particular area in unit time. In other words, it is the rate of flow of electric charges. In circuits using metallic wires, electrons constitute the flow of charges. However, electrons were not known at the time when the phenomenon of electricity was first observed. So, electric current was considered to be the flow of positive charges and the direction of flow of positive charges was taken to be the direction of electric current.

Conventionally, in an electric circuit, the direction of electric current is taken as opposite to the direction of the

flow of electrons, which are negative charges.



- (i) If a net charge Q , flows across any cross-section of a conductor in time t , then the current I , through the cross-section is given by which formula?
- (ii) What is the SI unit of electric charge? It is equivalent to how many numbers of electrons?

OR

The electric current is expressed in which unit? Define the unit used to measure electric current.

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

[4]

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch.

There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement.



- (i) Write the types of movement.
- (ii) Give an example of a plant hormone that promotes growth.
- (iii) What is the function of the nervous system?

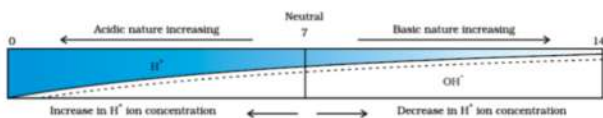
OR

How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light ?

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

[4]

A scale for measuring hydronium ion in a solution is called the pH scale. The pH of a neutral solution is 7. A value of less than 7 on the pH scale represents an acidic solution. As the pH value, increases from 7 to 14 it represents OH^- ion concentration in solution i.e a basic solution.



- (i) What is the pH range of the Human Body?
- (ii) The strength of acid and bases depends on which factor?
- (iii) If the pH of soil X is 7.5 while that of soil Y is 4.5, then which soil should be treated with powdered chalk to adjust its pH?

OR

Tooth decay starts when the pH of the mouth is lower than which pH?



Solution
SAMPLE PAPER - 1
Class 10 - Science
Section A

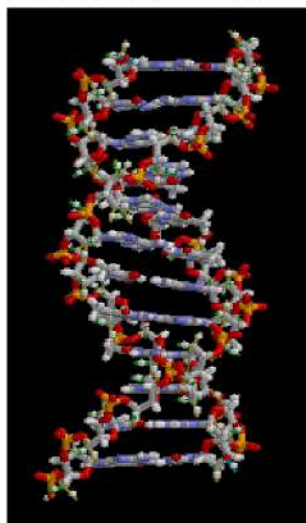
1. (a) ammeter A_2 and voltmeter V_1

Explanation: We should select instruments without any zero error.

2. (d) DNA

Explanation: Heredity is the passing on of traits from parents to their offspring, either through asexual reproduction or sexual reproduction; the offspring cells or organisms acquire the genetic information of their parents.

Heritable traits are known to be passed from one generation to the next via DNA, a molecule that encodes genetic information.



3. (c) Lenticels

Explanation: A lenticel is a porous tissue consisting of cells with large intercellular spaces in the bark of woody stems and roots. These raised pores in the stem of a woody plant that allows gas exchange between the atmosphere and the internal tissues.

4. (b) Both the direction and the relative strength of magnetic field.

Explanation: Magnetic Field is the region around a magnet where other magnetic material will experience a force. A magnetic field can be graphically represented by magnetic field lines which indicates its strength and direction.

5. (d) A, B and D

Explanation: Metals exhibit electrical conductivity (due to free electrons), sonority (production of ringing sound when struck) and ductility (ability to be drawn into wires).

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

Explanation:

- The general formula of an alcohol is $R-OH$.
- The general formula of an aldehyde is $R-CHO$.
- The general formula of a ketone is $R-CO-R'$.
- The general formula of a halo-alkane is $R-X$.

7. (c) basic

Explanation: Toothpaste are generally basic because their function is to react with the excess acid in our mouth and thus prevent tooth decay.

8. (d) Bacteria

Explanation: Syphilis is a sexually transmitted infection caused by the bacterium *Treponema pallidum* subspecies *pallidum*. The signs and symptoms of syphilis vary depending on which of the four stages it presents (primary, secondary, latent, and tertiary).

9. (d) Acidic

Explanation: Lower the pH, greater is the acidity. The solution with $pH = 0$ is highly acidic.

10. (b) (ii), (iii) and (iv)

Explanation: Unisexual flowers have either male or female sexual organs. Therefore, they cannot self-pollinate and, thus, show cross-pollination. The ovary of the female organ develops into a fruit after fertilization, therefore flowers having stamens cannot produce fruits.

11. (c) (ii) and (iii)

Explanation:

The new combination in F_2 progeny will be round, yellow, and wrinkled green. The phenotypic ratio 9:3:3:1 is obtained. This can be shown by following Punette square:

		mother (RrYy) ♂			
		RY	Ry	rY	ry
father (RrYy) ♂	RY	RRYY	RRYy	RrYY	RrYy
	Ry	RRYy	RRyy	RrYy	Rryy
	rY	RrYY	RrYy	rrYY	rrYy
	ry	RrYy	Rryy	rrYy	rryy

12. (b) 18×10^6 J

Explanation: Given,

$$I = 5A$$

$$R = 100 \text{ ohm}$$

$$T = 2 \text{ hours}$$

We know that,

$$\text{Energy consumed} = P \times T = I^2RT$$

Substituting the values,

$$\text{Energy consumed} = 5\text{kWh}$$

$$1\text{kWh} = 3.6 \times 10^6 \text{ J}$$

$$\text{Therefore, } 5\text{kWh} = 5 \times 3.6 \times 10^6 \text{ J} = 18 \times 10^6 \text{ J}$$

13. (b) three different points

Explanation: Red, blue, and green lights have different wavelengths so they will be refracted accordingly. So three points of convergence on the principal axis exist.

14. (d) Change to green

Explanation: When iron nail is placed in copper sulphate solution for few hours the blue colour of the solution will change to green due to displacement of copper by iron. Iron displaces copper from copper sulphate because iron is more reactive than copper. Therefore the colour of the copper sulphate solution changes to green.

15. (c) Mucus

Explanation: A layer of mucus along the inner walls of the stomach is vital to protect the cell linings of that organ from the highly acidic environment within it.

16. (c) anther and ovary

Explanation:

- The anther is part of the stamen (male sex organ) that produce pollen (male gamete).
- The ovary is an inferior part of the pistil (female sex organ) which contains ovule. Female gametophyte develops in the ovule.

17. (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.

18. (d) A is false but R is true.

Explanation: During electrolysis of a concentrated aqueous solution of sodium chloride. Ions get attracted to oppositely charged electrodes, sodium is produced at the anode and chlorine gas is produced at the cathode.

19. (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.

20. (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.

Section B

21. i. Reaction of acidified potassium dichromate solution with ethanol on heating gives Ethanoic acid.
 $\text{CH}_3\text{-CH}_2\text{-OH} + 2[\text{O}] \longrightarrow \text{CH}_3\text{-COOH} + \text{H}_2\text{O}$

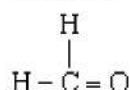
ii. Ethanol when react with sodium gives Sodium ethoxide and Hydrogen gas is evolved.
 $2\text{CH}_3\text{-CH}_2\text{-OH} + 2\text{Na} \longrightarrow 2\text{C}_2\text{H}_5\text{-ONa} + \text{H}_2$

iii. When ethanol is treated with concentrated sulphuric acid at 443 K, ethene is formed.
 $\text{CH}_3\text{-CH}_2\text{-OH} \longrightarrow \text{CH}_3 = \text{CH}_2 + \text{H}_2\text{O}$

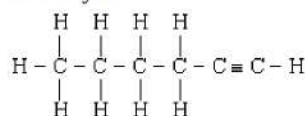
OR

i. $\text{CH}_3\text{-CH}_2\text{-Br}$: Bromoethane

ii. Methanal:



iii. Hex-1-yne:



22. i. **Relay neuron:** It connects neurons within the central nervous system (CNS).

ii. **Motor neuron :** Motor neurons carry message from the brain or spinal cord to the muscles or glands (effector).

iii. **Sensory neuron:** Sensory neurons carry information from the sensory organs to brain or spinal cord i.e. central nervous system (CNS).

23. If all organisms of one trophic level are killed then the food chain would end and ecological balance would be affected-

(a) If the herbivores are killed, then the carnivores would not able be to get food and would die.

(b) If carnivores are killed, then the population of herbivores would increase to unsustainable level.

(c) If producers are killed, then the nutrient cycle in the area would not be completed.

24. **Biotic components of ecosystem are-**

(a) **Producers-** All the green plants have a unique capab ility to synthesis organic substance such as sugar and starch by the p rocess of photosynthesis. Therefore, they are called producer s.

(b) **Consumers-** These are the living organisms which dep end directly or indirectly on plants for their food. Consumers may be herbivore, carnivores, and omnivores.

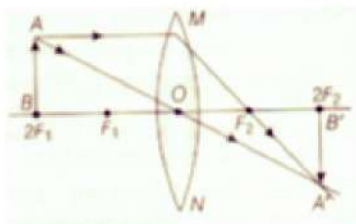
(c) **Decomposers-** Decomposers are the organisms which de pend upon the dead and decaying organisms their waste material. T hey form important link between living and non-living components.

25. i. Since refracting surfaces in the glass slab are parallel and the ray inside the glass falls at **angle r (angle of refraction)** due to which the emergent emerges at **angle i (angle of incidence)**. Therefore the emergent ray is parallel to the incident ray.

ii. The light ray goes undeviated along the same straight line means **no refraction occurs**.

OR

When object is placed at $2F_1$.



i. Image is formed at $2F_2$.

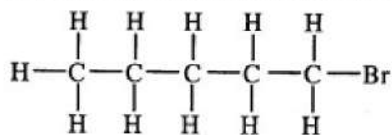
ii. Same size of image as that of the object.

iii. Real and inverted.

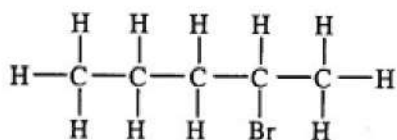


26. Bromopentane.

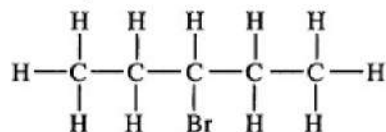
There are eight structural isomers possible for bromopentane



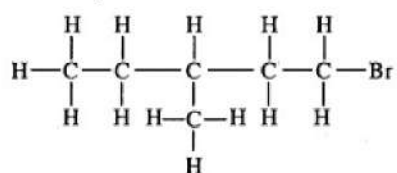
1- Bromopentane



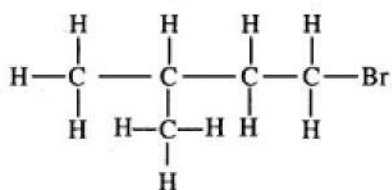
2-Bromopentane



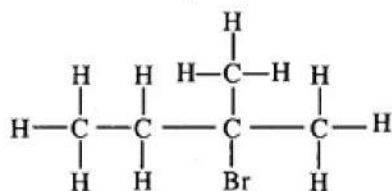
3-Bromopentane



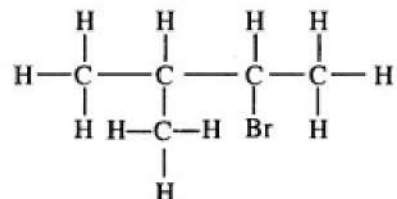
1-Bromo-2-methylbutane



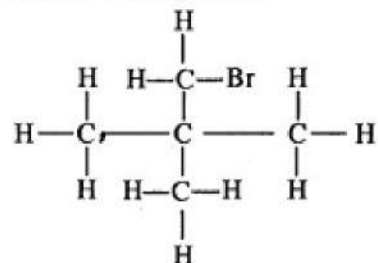
1 - Bromo-3-methylbutane



2-Bromo-2-methylbutane



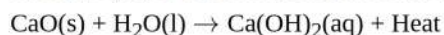
2-Bromo-3-methylbutane



1-Bromo-2, 2-dimethyl propane

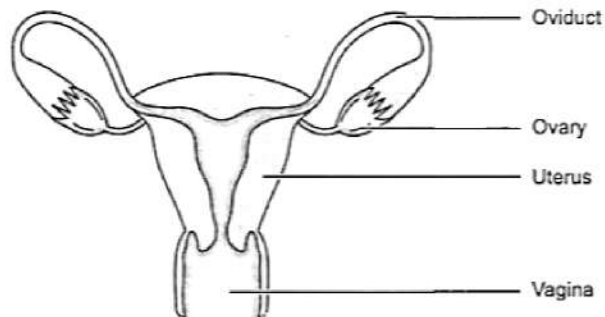
Section C

27. Calcium oxide reacts with water to form calcium hydroxide, liberating a large amount of heat. This makes the beaker warm. The substance, X, is therefore, Calcium oxide (CaO).



This is a type of a Combination reaction.

28. i. a) Shaving mirror- Concave mirror
b) Rear view mirror - Convex mirror
c) Reflection in search-lights - Concave mirror.
- ii. The three differences are:
a) Real image can be obtained on screen but a virtual image cannot be obtained.
b) Reflected/Refracted rays actually meet where the real image is formed while for virtual they only appear to meet.
c) A Real image is always inverted while the virtual image is always erect.
29. 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

Sexually transmitted disease caused due to

- Bacterial infection is gonorrhoea, and
 - Viral infection is AIDS (Acquired Immune Deficiency syndrome). These disease can be prevented by responsible sexual behaviour such as use of condom during intercourse, etc.
30. 1. Functions of following parts of human eye are given below :
1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.
 2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
 3. Crystalline lens - It helps to focus light on retina for image formation.
 4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.
2. 1. The objective of organising such compaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.
1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.
 2. As eye is one of the most valuable sense organs through which an individual can achieve so many things in his/her life, so try to realise the situation that these people are sufferinng from.
 3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.
31. i. When dilute hydrochloric acid is added to sodium carbonate - Evolution of carbon dioxide gas takes place.
ii. Lemon juice is added gradually to potassium permanganate solution - Change its colour from purple to colourless.
iii. When dilute sulphuric acid is added to the barium chloride solution - Formation of white precipitate of barium sulphate.
iv. Quick lime is treated with water - change in temperature.
v. Wax is burned in the form of a candle - Change in state from solid to liquid and gas.
32. i. RR for homozygous pure round. And rr for homozygous pure wrinkle pea plant.
ii. Rr (hybrid) - heterozygous. All are round since round is dominant over wrinkled.
iii. 3:1 (phenotypic ratio), 1:2:1 (genotypic ratio) The name of this cross is monohybrid cross.

OR

In the male, half number of the sperms have X-chromosomes and the other half have Y-chromosome, i.e. (22 + X) and (22 + Y), both in equal numbers. But in females, all eggs have X chromosome only. Now, there are only two chances: sperm with X chromosome fusing with egg with X chromosome giving a baby girl (XX) or sperm with Y chromosome fusing with egg with X chromosome giving a baby boy (XY). Thus, making the statistical probability 50-50.

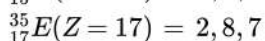
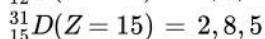
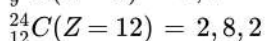
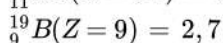
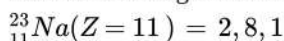
33. A camera in many ways is similar to the human eye as both eye and camera has convex lens. But, there are some basic differences in image formation between the two as follows:

- In camera, the distance between the lens and the screen can be adjusted but not the focal length of the lens. However, in eye, the ciliary muscles adjust the focal length keeping the distance between the lens and the retina constant.
- The image formed on the retina is temporary and its impression is recorded in the brain as memory. However, the image formed on the film of camera is a permanent record.

Section D

34. i. Elements which contain 1 to 3 electrons in their outermost shell are metals. Elements containing 4 to 7 electrons in their valence shell are non-metals.

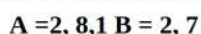
Electronic configurations:



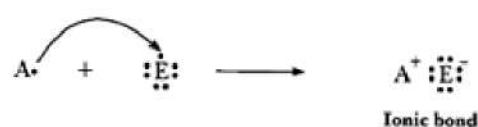
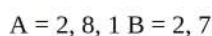
Hence A and C are metals whereas, B, D and E are non-metals.

ii. Type of bonds

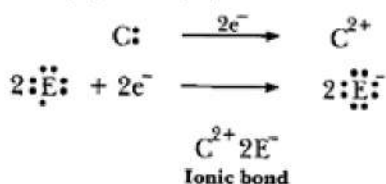
a. 'A' is metal and 'B' is non-metal, so the bond formed will be ionic.



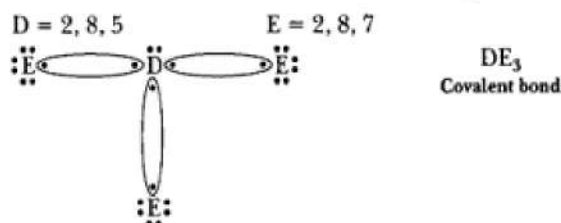
b. 'A' is metal and 'E' is non-metal, so the bond formed is ionic.



c. 'C' is metal and 'E' is non-metal, so the bond formed is ionic.



d. 'D' is a non-metal and 'E' is also a non-metal, so the bond formed will be covalent.



OR

- The arrangement of metals in the order of decreasing reactivities is called reactivity series. Increasing order of reactivity of metal toward water: Iron < zinc < magnesium < sodium
- Hydrogen can lose electrons and forms positive ions like metals. Therefore, it has been placed in the reactivity series of metals.
- Lead is more reactive than hydrogen and copper is less reactive than hydrogen.
- Zinc displaces copper from copper sulphate solution and mercury does not displace copper from copper sulphate solution.

v. Copper displaces silver from silver nitrate solution and gold does not displace silver from silver nitrate solution.

35. Urine is formed in the nephron of kidneys. Nephron is the structural and functional unit of the kidney. Blood at high pressure travels into these tubules by the tuft of blood capillaries called glomerulus contained in Bowman's capsule.

The following steps are involved in the process:

- i. **Filtration:** Blood enters the glomerulus through the afferent arterioles. It passes under high pressure that results in the filtration of blood. Water and small molecules are forced out of glomerular capillary walls and Bowman's capsule. Large molecules remain in the blood of the glomerulus.
- ii. **Selective reabsorption:** Some molecules are selectively reabsorbed into the blood. The glomerular filtrate flows through the proximal convoluted tubule, the U-shaped Henle's loop and distal convoluted tubule. The useful substances such as glucose, amino acids and salts which require energy are reabsorbed by a process called selective reabsorption. Hence, the filtrate now contains urea, some salts and water. Reabsorption of solutes increases the water concentration of the filtrate. Water is then reabsorbed into the blood by osmosis.
- iii. **Tubular secretion:** Some nitrogenous waste products like creatinine and some other substances like K^+ are removed from the blood by DCT (Distal Convolved Tubule) and are passed to blood. The urine thus formed is collected in the urinary bladder.

OR

Mechanism of Respiration - It occurs in following steps

a) Breathing - Taking in oxygen and expelling carbon dioxide out is called breathing. It involves following steps:-

(i) Inhalation - It is taking in oxygen. It occurs due to contraction of muscles attached to ribs. This lifts ribs and flattens the diaphragm, which increases the volume of the thoracic cavity. Hence the pressure inside the thoracic cavity decreases and air rushes inside the lungs.

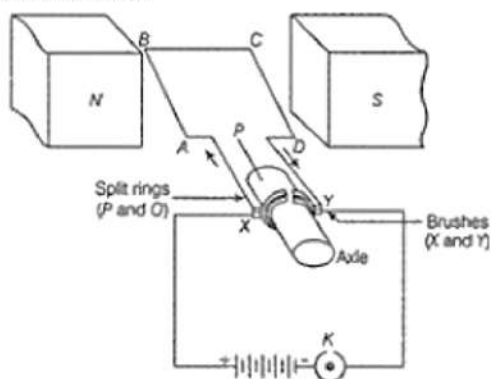
(ii) Exhalation - It is expelling of carbon dioxide. It occurs due to relaxation of muscles attached to ribs and diaphragm is dome shaped. This decreases the volume of the thoracic cavity and decreases air pressure and expels CO_2 out of the lung.

b) Exchange of gases - It takes place between the alveoli of lungs and surrounding blood capillaries.

c) Transport of gases in blood - Haemoglobin present in the blood transport. O_2 and CO_2 in blood. Oxygen is transported from the lungs to the body cells in the form of oxyhaemoglobin.

d) Oxidation of food - Break down of glucose molecules which produce energy. It occurs in mitochondria.

36. a.
 - Fleming's left-hand rule.
 - Adjust your hand in such a way that the forefinger points in the direction of magnetic field and the centre finger points in the direction of current, then thumb gives the direction of force acting on the conductor
- b. Electric motor.

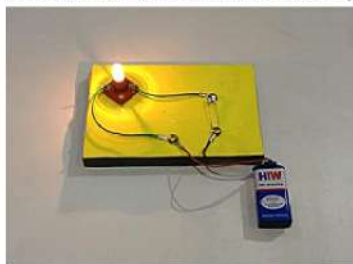


Section E

37. Read the text carefully and answer the questions:

How do we express electric current? Electric current is defined by the amount of charge flowing through a particular area in unit time. In other words, it is the rate of flow of electric charges. In circuits using metallic wires, electrons constitute the flow of charges. However, electrons were not known at the time when the phenomenon of electricity was first observed. So, electric current was considered to be the flow of positive charges and the direction of flow of positive charges was taken to be the direction of electric current. Conventionally, in an electric circuit, the direction of electric current is taken as opposite to the

direction of the flow of electrons, which are negative charges.



- (i) If a net charge Q , flows across any cross-section of a conductor in time ' t ', then the current ' I ', through the cross-section is given by $I = Q/T$
- (ii) The SI unit of electric charge is the coulomb (C), which is equivalent to the charge contained in nearly 6×10^{18} electrons.

OR

The electric current is expressed by a unit called ampere (A). One ampere is constituted by the flow of one coulomb of charge per second.

38. Read the text carefully and answer the questions:

Animals have a nervous system for controlling and coordinating the activities of the body. But plants have neither a nervous system nor muscles. So, how do they respond to stimuli? When we touch the leaves of a chui-mui (the 'sensitive' or 'touch-me-not' plant of the Mimosa family), they begin to fold up and droop. When a seed germinates, the root goes down, the stem comes up into the air. What happens? Firstly, the leaves of the sensitive plant move very quickly in response to touch.

There is no growth involved in this movement. On the other hand, the directional movement of a seedling is caused by growth. If it is prevented from growing, it will not show any movement.



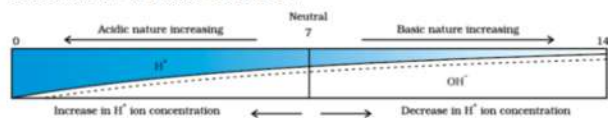
- (i) There are two types of movement:
 - a. dependent on growth
 - b. independent on growth.
- (ii) Auxin is a plant hormone that promotes growth.
- (iii) The function of the nervous system is to control and coordinate the activities of the body.

OR

The movements of the leaves of the sensitive plant are touch sensitive and independent of growth while the movement of the shoot towards light is growth related and known as phototropism.

39. Read the text carefully and answer the questions:

A scale for measuring hydronium ion in a solution is called the pH scale. The pH of a neutral solution is 7. A value of less than 7 on the pH scale represents an acidic solution. As the pH value, increases from 7 to 14 it represents OH^- ion concentration in solution i.e a basic solution.



- (i) The pH range of the Human Body is 7 to 7.8.
- (ii) The strength of acids and bases depends on the number of H^+ ions produced and the number of OH^- ions produced.
- (iii) Soil Y is acidic. Hence, it should be treated with powdered chalk to reduce its acidity.

OR

When the pH in the mouth falls below 5.5, tooth decay starts. Bacteria present in the mouth produce acid by degradation of sugar and food particles which remain in the mouth after eating.