

Class- X Session - 2022-23

Subject - Science (086)

Sample Question Paper - 3

with Solution

Max. Marks: 80

Time Allowed: 3 hours

General Instructions:

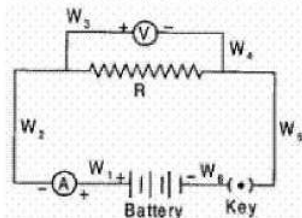
- i. This question paper consists of 39 questions in 5 sections.
- ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
- iii. **Section A** consists of 20 objective type questions carrying 1 mark each.
- iv. **Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be 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 be 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. A cross between a tall plant (TT) and short pea plant (tt) resulted in progeny that were all tall plants because [1]

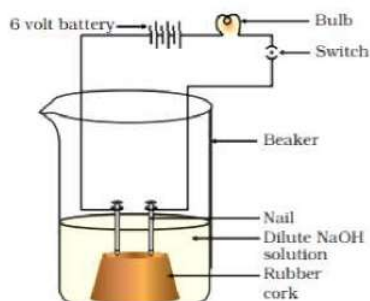
- | | |
|---|------------------------------------|
| a) height of pea plant is not governed by gene 'T' or 't' | b) tallness is the recessive trait |
| c) shortness is the dominant trait | d) tallness is the dominant trait |

2. A student sets up the circuit, for studying the dependence of current (I) flowing, on the applied potential difference (V), in the manner shown. The ammeter and the voltmeter, in his circuit, have been checked and found to be correct. On closing the key K, he observes a deflection in the ammeter but no deflection in the voltmeter. This could be due to a loose connection, or break, in the wire : [1]



- | | |
|-------------|-------------|
| a) W5 or W6 | b) W6 or W1 |
| c) W1 or W2 | d) W3 or W4 |
3. An electron enters a magnetic field at right angles to it, as shown in Fig. The direction of force acting on the electron will be [1]

correct?



- i. Bulb will not glow because electrolyte is not acidic
- ii. Bulb will glow because NaOH is a strong base and furnishes ions for conduction
- iii. Bulb will not glow because circuit is incomplete
- iv. Bulb will not glow because it depends upon the type of electrolytic solution

- a) (iv) only
- b) (ii) and (iv)
- c) (ii) only
- d) (i) and (iii)

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

- (1) Transmission of characters from parent to offspring
- (2) Differences among the individual of same species
- (3) Branch of science deals with heredity and variation
- (4) Development of new organism by modifications in pre existing ones

- (A) Hereditary
- (B) Genetics
- (C) Variation
- (D) Evolution

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

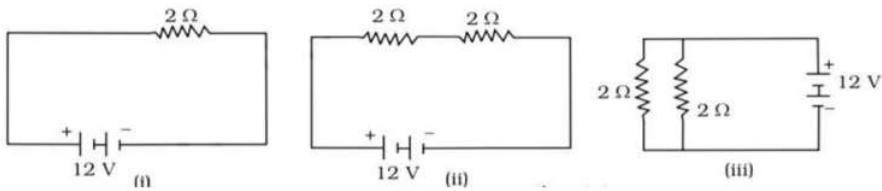
11. Where does the embryo develop in a human female? [1]

- a) Seminal vesicles
- b) Fallopian tube
- c) Vagina
- d) Uterus

12. Which colour of light has the longest wavelength? [1]

- a) Violet
- b) Green
- c) Yellow
- d) Red

13. In the following circuits (Figure), heat produced in the resistor or combination of resistors connected to a 12 V battery will be [1]



- a) Minimum in case (i)
- b) Same in all the cases
- c) Maximum in case (iii)
- d) Maximum in case (ii)

14. The composition of aqua-regia is [1]

- a) Dil.HCl : Dil.HNO₃
3 : 1
- b) Conc.HCL : Conc. HNO₃
3: 1
- c) Conc.HCl : Dil. HNO₃
3 : 1
- d) Dil.HCl : Conc. HNO₃
3 : 1

15. Chlamydia is related to: [1]

- a) Urethra
- b) Syphilis
- c) Gonorrhoea
- d) HIV

16. A factor not affecting photosynthesis is [1]

- a) Carbon dioxide concentration in air
- b) Temperature
- c) Light intensity
- d) Wind velocity

17. **Assertion (A):** A solenoid tends to expand, when a current passes through it. [1]
Reason (R): Two straight parallel metallic wires carrying current in same direction attract each other.

- 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):** Our body maintains blood sugar levels. [1]
Reason (R): Pancreas secretes insulin which helps to regulate blood sugar levels in the body.

- 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):** Aquatic food chain is the food chain present in water bodies. [1]
Reason (R): The example of an aquatic food chain is:
 phytoplankton → zooplankton → fish → shark

- a) Both A and R are true and R is
- b) Both A and R are true but R is

the correct explanation of A.

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):** On adding H_2SO_4 to water the resulting aqueous solution gets corrosive. [1]

Reason (R): Hydronium ions are responsible for corrosive action.

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 of the reaction of ethanoic acid with the following: [2]
- Sodium
 - Sodium hydroxide
 - Ethanol

OR

What are the properties of carbon which lead to huge number of carbon compounds we see around us?

22. Describe how ozone present in the atmosphere is important for sustaining life on earth? [2]
23. Answer the following: [2]
- Name the endocrine gland associated with brain.
 - Which gland secretes digestive enzymes as well as hormones?
 - Name the endocrine gland associated with kidneys.
 - Which endocrine gland is present in males, but not in females?
24. What are decomposers? What will be the consequence of their absence in an ecosystem? [2]
25. Name the reaction which is commonly used in the conversion of vegetable oils to fats. Explain the reaction involved in detail. [2]
26. A concave lens has focal length of 20 cm. At what distance from the lens a 5cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed? [2]

OR

A doctor has prescribed a corrective lens of power + 1.5 D. Find the focal length of lens. Is prescribed lens diverging or converging?

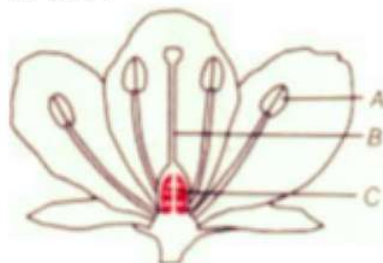
Section C

27. What should be the position of an object with respect to focus of a convex lens of focal length 20cm, so that its real and magnified image is obtained? [3]

28. Identify the type of reaction in the following [3]
- $\text{ZnCO}_3 + 2\text{HCl}(\text{aq}) \longrightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2\text{CO}_3(\text{aq})$
 - $2\text{NaBr}(\text{aq}) + \text{Cl}_2(\text{g}) \longrightarrow 2\text{NaCl}(\text{aq}) + \text{Br}_2(\text{aq})$
 - $2\text{CuO}(\text{s}) \xrightarrow{\text{heat}} 2\text{Cu}(\text{s}) + \text{O}_2(\text{g})$

29. Why do different rays deviate differently in the prism? [3]

30. Name the parts A, B and C shown in the following diagram and state one function of each. [3]



OR

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

31. Give the characteristic tests for the following gases [3]
- CO_2
 - SO_2
 - O_2
 - H_2

32. 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.

33. Study the following cross that shows the self-pollination in F_1 , fill in the blank the genotype and phenotype in the F_1 generation. What type of cross it is? [3]

Parents	RRYY	x	rryy

	Round, yellow		wrinkled, green
F ₁ —	Rr Yy	x	?
	Round, yellow		

OR

A pea plant with purple flowers were crossed with white flowers producing 40 plants with only purple flowers. On selfing, these plants produced 470 plants with purple flowers and 162 with white flowers. What genetic mechanism account for these results.

Section D

34. i. List in tabular form three chemical properties on the basis of which we can differentiate between a metal and a non-metal. [5]
- ii. Give reasons for the following:
- Most metals conduct electricity well.
 - The reaction of iron (III) oxide [Fe₂O₃] with heated aluminum is used to join cracked machine parts.

OR

- Write the electron-dot structures for sodium, oxygen and magnesium.
 - Show the formation of Na₂O and MgO by the transfer of electrons.
 - What are the ions present in these compounds?
35. What precaution should be taken to avoid the overloading of domestic electric circuit ? [5]
36. i. Write the correct sequence of steps followed during journey of oxygen rich blood from lungs to various organs of human body. [5]
- ii. What happens when the system of blood vessels develop a leak?

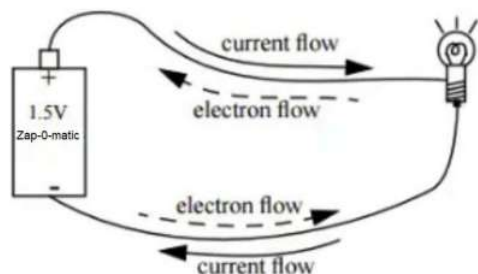
OR

Explain the process of digestion of food in mouth, stomach and small intestine in human body.

Section E

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

The rate of flow of charge is called electric current. The SI unit of electric current is Ampere (A). The direction of flow of current is always opposite to the direction of flow of electrons in the current.



The electric potential is defined as the amount of work done in bringing a unit-positive test charge from infinity to a point in the electric field. The amount of work

done in bringing a unit positive test charge from one point to another point in an electric field is defined as potential difference.

$$V_{AB} = V_B - V_A = \frac{W_{BA}}{q}$$

The SI unit of potential and potential difference is volt.

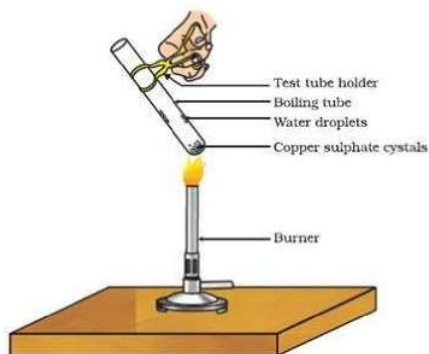
- (i) Write the formula of voltage in terms of work done, current, time and charge.
- (ii) What is the number of electrons flowing per second in a conductor if 1 A current is passing through it?

OR

What would be the potential difference between the two terminals of a battery, if 100 joules of work is required to transfer 20 coulombs of charge from one terminal of the battery to other?

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

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water molecules and became calcium sulphate hemihydrate.



- (i) If the crystal is moistened with water, then which colour of the crystal reappears?
- (ii) What is the commercial name of calcium sulphate hemihydrate?
- (iii) How many water molecules are present in one formula unit of copper sulphate?

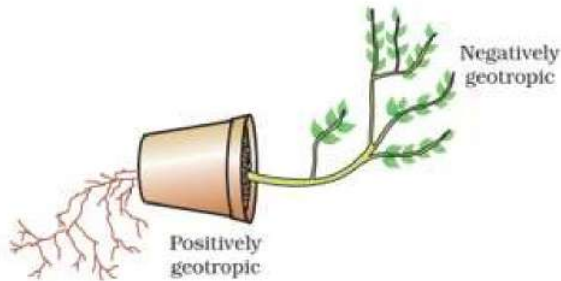
OR

What is obtained when gypsum is heated at 373K?

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

Environmental triggers such as light, or gravity will change the directions that plant parts grow in. These directional, or tropic, movements can be either towards the stimulus or away from it. So, in two different kinds of phototropic movement, shoots respond by bending towards light while roots respond by bending away from it. How does this help the plant? Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity, is, obviously, geotropism. If 'hydro' means water and 'chemo' refers to chemicals, what would

'hydrotropism' and 'chemotropism' mean? Can we think of examples of these kinds of directional growth movements? One example of chemotropism is the growth of pollen tubes towards ovules, about which we will learn more when we examine the reproductive processes of living organisms.



- (i) Where does negative phototropism occur in plants?
- (ii) Phototropism in shoots is attributed due to which plant hormone?
- (iii) Tendrils exhibit/ twining of tendrils show which type of tropic movement?

OR

If the stem grows towards sunlight and the root grows just opposite to it, then what type of movement of the stem is it?

Solution

Section A

1. **(d)** tallness is the dominant trait

Explanation: According to the law of dominance, the character that is expressed in the F₁ generation is called the dominant trait whereas character that is not expressed in F₁ generation is known as recessive trait. Thus, tallness is the dominant trait.

2. **(d)** W₃ or W₄

Explanation: Only the voltmeter is not connected properly as there is a deflection in the ammeter or they may be broken in W₃ or W₄.

3. **(a)** into the page.

Explanation: The direction of force is perpendicular to the direction of the magnetic field and current as given by Fleming's left-hand rule. Recall that the direction of current is taken opposite to the direction of motion of electrons. The force is therefore directed into the page.

4. **(a)** Trypsin digests proteins and lipase emulsified fats

Explanation: Trypsin breaks down proteins into the polypeptides and Lipase digests emulsified fat molecules into fatty acids and glycerol.

5. **(b)** Hex-1-yne

Explanation: The longest carbon chain contains 6 carbon atoms; hence the first name is "hex". Since a triple bond is present between the carbon atoms, the last name is "yne". The parent hydrocarbon is Hexyne. The triple bond is present between the first and the second carbon atom, hence the name hex-1-yne.

6. **(d)** Bromine

Explanation: Bromine is a fairly abundant element but has a rare property. It is the only nonmetal to exist in liquid form at room temperature, and one of only two elements (the other being mercury) that is liquid at room temperature and pressure.

7. **(d)** formation of daughter cells in Amoeba

Explanation: The sequence illustrates binary fission in Amoeba.

8. **(c)** Universal Indicator

Explanation: Universal Indicator

9. **(c)** (ii) only

Explanation: An electric circuit is a path in which the electrons flow from a voltage or current source. The electric current flows in a closed path. This electrical circuit is a closed-loop network giving a return path for the current. Sodium hydroxide conducts electrons in the form of sodium cations and hydroxyl anions. The ions move towards the two iron nails in the solution acting as the cathode (-) for catching cations and other as the anode (+) for catching anions.

10. **(d)** 1-A, 2-C, 3-B, 4-D

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.
- Variation, in biology, any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences (genotypic variation) or by the effect of environmental factors on the expression of the genetic potentials (phenotypic variation).

- The branch of biological science which deals with heredity and variations is termed as Genetics. The word 'genetics' (a Greek word meaning to generate) was proposed by William Bateson (1902).
- In biology, evolution is the change in the characteristics of a species over several generations and relies on the process of natural selection. The theory of evolution is based on the idea that all species' are related and gradually change over time.

11. (d) Uterus

Explanation: The fertilized embryo gets attached to the uterus and all the developmental process of the embryo takes place in the uterus.

12. (d) Red

Explanation: Violet has the shortest wavelength and red has the longest wavelength.

13. (d) Maximum in case (ii)

Explanation: In this case, two resistors are in series. Hence, their sum will be equal to their arithmetic sum. In the figure, the total resistance will be less than individual resistances because they are connected in parallel. A higher resistance produces more heat.

14. (b) Conc.HCL : Conc. HNO₃

3: 1

Explanation: Aqua regia or nitro-hydrochloric acid is a highly corrosive mixture of acids, a fuming yellow or red solution. The mixture is formed by freshly mixing concentrated hydrochloric acid and nitric acid, optimally in a volume ratio of 3:1. Aqua regia is highly corrosive that it can dissolve metals, such as gold and platinum.

15. (a) Urethra

Explanation: Chlamydia is a common sexually transmitted disease. It is caused by bacteria called Chlamydia trachomatis. It can infect both men and women. In Men, this condition often causes swelling and inflammation of the urethra, accompanied by a penile discharge.

16. (d) Wind velocity

Explanation: Wind velocity doesn't affect the photosynthesis. Unlike light intensity, CO₂ concentration, and temperature which are the major factors influencing the rate of photosynthesis, the wind has no effect on the reactions and the rate of reactions going in the chloroplast of the leaves of the plant.

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

Explanation: When current flows through a solenoid, the currents in the various turns of the solenoid are parallel and in the same direction. Since the current flowing through parallel wires in the same direction lead to force of attraction between them, the turns of the solenoid will also attract each other and as a result the solenoid tends to contract.

18. (a) Both A and R are true and R is the correct explanation of A.

Explanation: The pancreas secretes insulin which helps to regulate blood sugar levels in the body. If the sugar level in the blood rises, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

19. (a) Both A and R are true and R is the correct explanation of A.

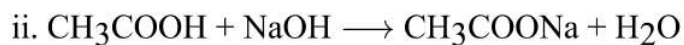
Explanation: Aquatic food chain is the food chain present in water bodies, e.g. phytoplankton → zooplankton → fish → shark

20. (a) Both A and R are true and R is the correct explanation of A.

Explanation: Because H₂SO₄ is a strong acid, it readily forms hydronium ions when dissolved in water which is responsible for its corrosive action.

Section B

21. i. $2\text{CH}_3\text{COOH} + 2\text{Na} \rightarrow 2\text{CH}_3\text{COONa} + \text{H}_2$

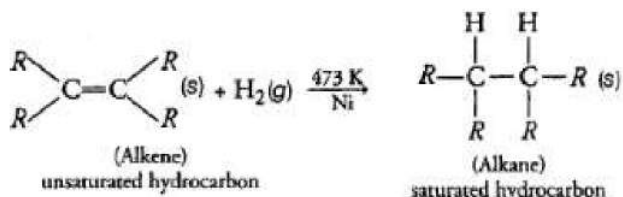


OR

The properties of carbon which lead to a huge number of carbon compounds are as follows:-

- (i) Self linking property of carbon called catenation. Carbon can combine with other carbon atoms and form long chains. The long chain forms the backbone to which other atoms can attach in a number of ways.
- (ii) Carbon has an atomic number of 6. It is tetravalent. It can neither gain 4 electrons nor lose 4 electrons to achieve noble gas configuration. It therefore readily unites with atoms like hydrogen, oxygen etc by sharing of electrons.
22. The layer of atmosphere in which most of the atmosphere's ozone is concentrated is called ozone layer which lies in stratosphere. It shields the surface of the earth from harmful ultraviolet (UV) radiations of the sun which are highly damaging to organisms. They can cause skin cancer in human beings, damage eyes (cause a disease called cataract), decrease crop yield, disturb global rainfall, etc. Thus, ozone layer act as a blanket by sheilding the earth surface and organisms from these harmful UV rays.
23. a. **Pituitary gland:** Hypothalamus present in brain releases hormones that regulate the secretion of pituitary glands. The pituitary gland is a part of **endocrine system which is also known as Master gland** it produces many hormones that travel throughout the body, directing certain processes or stimulating other **glands** to produce other hormones. Its main function is to secrete **hormones** into our bloodstream. These **hormones** can affect other organs and glands, especially **thyroid**. It also stimulates the adrenal **glands** to **secrete** steroid hormones, principally cortisol. growth hormone, which regulates growth, metabolism and body composition.
- b. **Pancreas:** It is part of the digestive system and produces insulin and other important enzymes and hormones that help break down foods. The pancreas has an **endocrine** function because it releases juices directly into the bloodstream, and it has an exocrine function because it releases juices into ducts.
- c. **Adrenal gland:** -The **adrenal glands** (also known as **suprarenal glands**) are endocrine **glands** that produce a variety of hormones They are found above the kidneys. Each **gland** has an outer cortex which produces steroid hormones and an inner medulla. Located at the top of each **kidney**, the adrenal glands produce **hormones** that help the **body** control blood sugar, burn protein and **fat**, react to stressors like a major illness or injury, and regulate blood pressure. Two of the most important adrenal **hormones** are cortisol and aldosterone.
- d. **Testis** The testis are housed in the **scrotum** just behind the penis. The testis is the male gonads — the primary male reproductive organs. They have two, very important functions that are very important to the male reproductive system, they produce gametes, or sperm, and they secrete **hormones**, primarily testosterone.
24. Decomposers break down the complex organic substances of garbage, dead animals and plants into simpler inorganic substances that enter into the soil and are used up again by the plants. In the absence of decomposers, recycling of material in the biosphere will not take place which will ultimately lead to end of all life forms.
25. The conversion of vegetable oils to fats is known as hydrogenation reaction. When vegetable oils are treated with hydrogen and passed over finely divided nickel at 473K, the hydrogen molecules are added to the unsaturated carbon-carbon bonds. hence, saturated vegetable fats are obtained.

Reaction:



26. Let Focal length, $f = 20\text{cm}$

Object height, $h = 5\text{cm}$

image distance, $v = -15\text{cm}$

image height, $h' = ?$

object distance, $u = ?$

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

$$\frac{1}{-20} = \frac{1}{-15} - \frac{1}{u}$$

$$\frac{1}{u} = \frac{-1}{15} + \frac{1}{20}$$

$$\frac{1}{u} = \frac{-4+3}{60} = \frac{-1}{60}$$

$$u = -60\text{cm}$$

$$\frac{h'}{h} = \frac{v}{u}$$

$$\frac{h'}{5} = \frac{-15}{-60}$$

$$h' = \frac{15 \times 5}{60}$$

$$h' = \frac{5}{4} = +1.25\text{cm}$$

OR

$$f = \frac{1}{P} = \frac{1}{1.5} = 0.67 \text{ m}$$

$$f = 0.67 \text{ m}$$

Lens is converging.

Section C

27. Given focal length f of lens 20 cm

To obtain real and magnified image, the object should be placed between F_1 and $2F_1$, So the range will be from 20 cm to 40 cm of convex lens.

28. a. Double decomposition reaction [An exchange of ions took place]

b. Displacement reaction [A more reactive non-metal displaces a less reactive non-metal from its salt solution.]

c. Decomposition reaction/Reduction reaction [A compound decomposes to form two or more products./CuO is reduced to Cu.]

29. Different wavelengths deviate differently in the prism because the angle of refraction for different colours having different wavelengths is different while passing through the glass prism (medium). A light ray is refracted when it passes from one medium to another at an angle and its speed changes. At the interface, it is bent in one direction if the material it enters is denser (when light slows down) and in the other direction if the material is less dense (when light speeds up). Because different wavelengths (colours) of light travel through a medium at different speeds, the amount of bending is different for different wavelengths. Violet is bent the most and red the least because violet light has a shorter wavelength, and short wavelengths travel more slowly through a medium than longer ones do.

30.

Part	Function

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.

OR

Sexually transmitted disease caused due to

1. Bacterial infection is gonorrhoea, and
 2. 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.
31. The characteristic test for
- i. Carbon dioxide (CO₂): This gas turns lime water milky when passed through it due to the formation of insoluble calcium carbonate.

$$\underset{\text{Limewater}}{\text{Ca(OH)}_2} + \underset{\text{Carbon dioxide}}{\text{CO}_2} \longrightarrow \underset{\text{Calcium}}{\text{CaCO}_3} + \text{H}_2\text{O}$$
 - ii. Sulphur dioxide (SO₂): This gas when passed through acidic potassium permanganate solution (purple in colour) turns it colourless because SO₂ is a strong reducing agent

$$2\text{KMnO}_4 + 2\text{H}_2\text{O} + 5\text{SO}_2 \longrightarrow \text{K}_2\text{SO}_4 + \underset{\text{Manganese sulphate}}{2\text{MnSO}_4} + 2\text{H}_2\text{SO}_4$$
 - iii. Oxygen: The evolution of oxygen (O₂) gas during a reaction can be confirmed by bringing a burning candle near the mouth of the test tube containing the reaction mixture. The intensity of the flame increases because oxygen supports burning.
 - iv. Hydrogen (H₂): This gas burns with a squeaky pop sound when a burning candle is brought near the mouth of the test tube. Hydrogen gas is highly flammaed.
32. 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.
 2. 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.

33.

Parents	RRYY	x	rryy
---------	------	---	------

	Round, yellow		wrinkled, green
F ₁ —	Rr Yy	x	Rr Yy
	Round, yellow		Round, yellow

The given cross is a dihybrid cross that shows the inheritance of two different traits simultaneously. In the given question, when pure breeding dominant parent plant (RRYY) crossed with pure breeding recessive parent plant (rryy), it gives heterozygous dominant progeny in the F₁ generation. All progeny in this cross will have genotype RrYy and exhibit round yellow. Self-cross of F₁ progeny will give F₂ generation.

OR

The ratio of purple flowers to white flowers in F₂ generation was approximately 3 : 1. This ratio is termed Mendelian ratio or Monohybrid ratio. It explains:

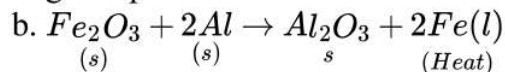
- 1) F₁ hybrids always exhibited only one of the parental form of a trait and showed dominance / recessive mechanism.
- 2) Both parental forms of trait segregate and were expressed in F₂ (second filial) generation.
- 3) The form of trait that appeared in F₁ offspring i.e. the dominant form was present in the F₂ generation about three times as frequently as its alternate form (470 : 162). It is approximately 3 : 1. It is due to mechanism of segregation at the time of gamete formation.

Section D

34. i. Difference between Metals and Non-metals:

Metals	Non-metals
They react with oxygen to form basic oxide. $2Mg + O_2 \rightarrow 2MgO$ <i>Magnesium</i> <i>Magnesium oxide</i>	They react with oxygen to neutral or basic oxide. $4C(s) + O_2(g) \rightarrow CO_2(s)$ <i>Carbon</i> <i>Carbondioxide</i>
They react with water to produce metal hydroxide and hydrogen gas. $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$	They do not react with water,
Generally, they do not combine with hydrogen except sodium, potassium, and calcium which form ionic hydrides.	They react with hydrogen to form covalent hydrides.

ii. a. Metals for example Na have an electronic configuration of 2, 8, 1 i.e. It has one free electron. This electron moves through the metal and conducts an electric current due to the presence of a free electron. So, metals conduct electricity because they readily give up their valence electron.



It is a thermite reaction.

This reaction is an exothermic reaction the reaction produces a large amount of heat due to which iron metal is produced in molten form and use to join the tracks.

OR

i.

Metal	Symbol	Atomic number	Electronic configuration K, L, M, N	No. of outermost electrons	Electron dot structures

Metal	Symbol	Atomic number	Electronic configuration K, L, M, N	No. of outermost electrons	Electron dot structures
Sodium	Na	11	2,8, 1	1	Na.
Oxygen	O	8	2,6	6	:O::
Magnesium	Mg	12	2,8, 2	2	Mg:

ii. Formation of Na_2O :

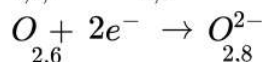
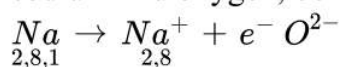
The atomic number of sodium is 11 and it has only one valence electron.

Hence, electronic configuration of ${}_{11}Na$ is 2, 8, 1.

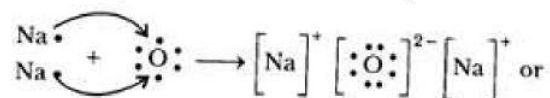
The atomic number of oxygen is 8 and it has 6 electrons in its valence shell.

Hence, electronic configuration of ${}_8O$ is 2, 6.

Sodium has a tendency to lose the valence electron and oxygen has a tendency to gain the electron lost by sodium. Since, sodium can lose only one electron of the valence shell, and oxygen atom needs two electrons to complete its octet in the valence electron, two atoms of sodium combine with one atom of oxygen. By losing valence electron, sodium is changed into Na^+ and by gaining two electrons lost by two sodium atoms, oxygen atom is changed into an oxide anion, O^{2-} . In this process, both the atoms, sodium and oxygen, obtain the stable electronic configuration of the noble gas neon.



The oppositely charged sodium ion, Na^+ and oxide ion, O^{2-} are now held together by electrostatic force of attraction or by ionic or electrovalent bond. Na_2O is, therefore, an ionic or electrovalent compound.

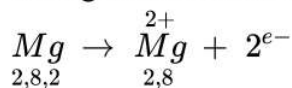


Formation of MgO :

The atomic number of magnesium = 12

Its electronic configuration is K, L, M
 $2, 8, 2$

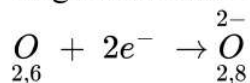
It has two electronic in its outermost shell. So, the magnesium atom donates its 2 valence electrons and forms a stable magnesium ion, Mg^{2+} to attain the electronic arrangement of neon atom.



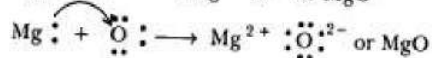
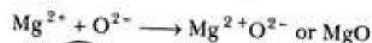
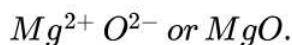
The atomic number of oxygen = 8

Electronic configuration = K, L
 $2, 6$

It has 6 electrons in its valence shell. Therefore, it requires 2 more electrons to attain the stable electronic arrangement of neon gas. Thus, oxygen accepts 2 electrons donated by magnesium atom and forms a stable oxide ion, O^{2-}



The oppositely charged magnesium ions, Mg^{2+} , and oxide ions, are held together by a strong force of electrostatic attraction to form magnesium oxide compound.



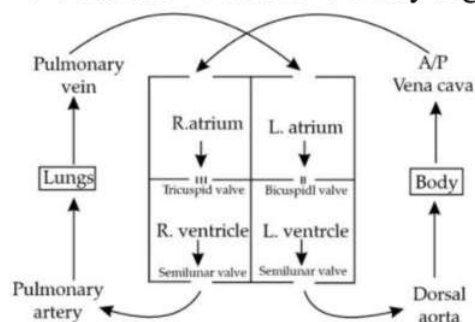
MgO is ionic compound.

iii. The ions present in Na_2O are sodium ions ($2Na^+$) and oxide ion O^{2-} .

The ions present in MgO are magnesium ion (Mg^{2+}) and oxide ion O^{2-} .

35. (1) Wires used for carrying current should be of proper current rating.
 (2) Wire should be replaced by new wires of proper rating after every 3-4 years.
 (3) Separate circuit should be there for heating appliance.
 (4) Each circuit should has a fuse of proper rating.
 (5) PVC of good quality should be used.
 (6) Whereas wire of low current rating may be used for lighting electric bulbs, tubes, T.V. etc. wires of higher current rating should be used for A.C., heating appliances etc.
 (7) Avoid using too many appliances in a single line, i.e. from a single output.
 (8) Fuse or MCB of proper rating should be used.

36. i. The correct sequence is blood flow from the Lungs $\xrightarrow[\text{vein}]{\text{Pulmonary}}$ Left sides of the heart
 \rightarrow Ventricle \rightarrow Aorta \rightarrow Body organs



- ii. The leaked blood flows into surrounding tissues leading to accumulation of blood. This condition is known as hematoma.

OR

Digestion of food occurs in the following steps:

- i. **Mouth** (Buccal cavity): The mouth contains teeth, which crush the food into small particles. Salivary glands present in the mouth secrete saliva, which moistens the food. It also contains enzyme salivary amylase which gets mix with food and form bolus. From here, food travels to the esophagus or swallowing tube. The esophagus is a muscular tube extending from the pharynx to the stomach.
- ii. **Stomach**- The stomach is a sac-like organ with strong muscular walls which acts like mixer and grinder. Gastric glands are present in the wall of the stomach which release following secretions:
- Hydrochloric acid** To make the medium acidic for the action of enzyme pepsin.
 - Mucus** To protect the inner lining of the stomach from the action of an acid.
 - Pepsin** A protein-digesting enzyme.
- iii. **Small intestine** is made up of three segments, the duodenum, jejunum, and ileum. The small intestine is a long tube loosely coiled in the abdomen It is the site of complete digestion of carbohydrates, proteins, and fats. It receives secretions from liver and pancreas.
- Bile juice** It is secreted by the liver and performs the following functions:
It makes the medium alkaline for the pancreatic enzymes to act. It also breaks down large fat globules into smaller globules.

b. **Pancreatic juice** It is secreted by the pancreas. It contains enzymes like amylase for digesting starch, trypsin for digesting proteins and lipase for breaking down emulsified fats.

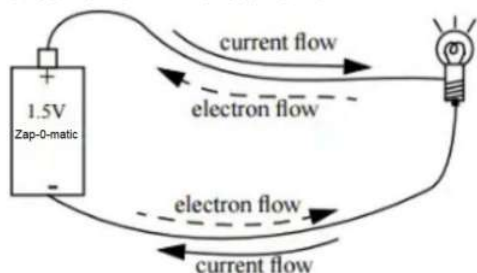
c. **Intestinal juice** It is secreted by the walls of the small intestine. It contains a number of enzymes such as maltase, lipase etc., for complete digestion

Colon - The final stage of the digestive system is the colon (large intestine) which absorbs water and salts before the remains are passed out of the rectum as faeces. The colon can also help to absorb remaining carbohydrate and some fats.

Section E

37. Read the text carefully and answer the questions:

The rate of flow of charge is called electric current. The SI unit of electric current is Ampere (A). The direction of flow of current is always opposite to the direction of flow of electrons in the current.



The electric potential is defined as the amount of work done in bringing a unit-positive test charge from infinity to a point in the electric field. The amount of work done in bringing a unit positive test charge from one point to another point in an electric field is defined as potential difference.

$$V_{AB} = V_B - V_A = \frac{W_{BA}}{q}$$

The SI unit of potential and potential difference is volt.

(i) $V = \frac{W}{q} = \frac{W}{It}$

(ii) $I = 1 \text{ A}, t = 1 \text{ s}$

$$q = It = 1 \times 1 = 1 \text{ C}$$

$$n = \frac{q}{e} = \frac{1}{1.6 \times 10^{-19}} = 6.25 \times 10^{18}$$

OR

The potential difference is the work done in moving a unit of positive electric charge from one point to another.

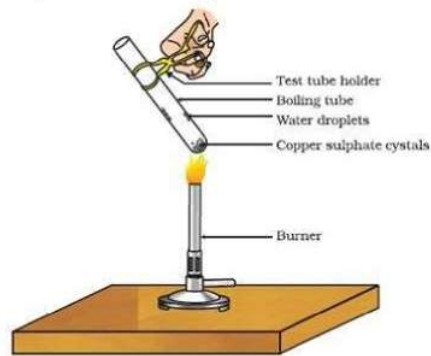
$$W = 100 \text{ J}, q = 20 \text{ C}$$

$$V = \frac{W}{q} = \frac{100}{20} = 5 \text{ V}$$

38. Read the text carefully and answer the questions:

Copper sulphate crystal contains water of crystallisation when the crystal is heated the water is removed and salt turns white. The crystal can be moistened again with water. The water of crystallisation is the fixed number of water molecules present in 1 formula unit of copper sulphate. On heating gypsum at 373K, it loses water molecules and became calcium

sulphate hemihydrate.



- (i) If the crystal is moistened with water, then the blue colour of the crystal reappears.
- (ii) The commercial name of calcium sulphate hemihydrate is Plaster of Paris.
- (iii) Five water molecules are present in one formula unit of copper sulphate.

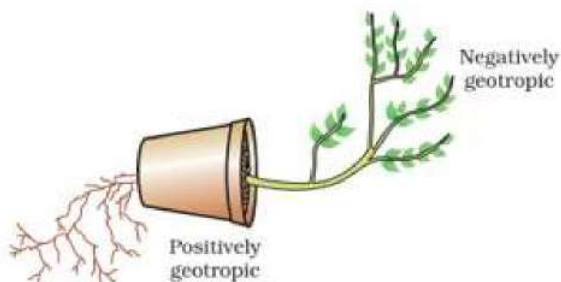
OR

$\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ is obtained when gypsum is heated at 373K.

Heating gypsum at 373K results in loss of water of crystallization, forming plaster of Paris as the product.

39. Read the text carefully and answer the questions:

Environmental triggers such as light, or gravity will change the directions that plant parts grow in. These directional, or tropic, movements can be either towards the stimulus or away from it. So, in two different kinds of phototropic movement, shoots respond by bending towards light while roots respond by bending away from it. How does this help the plant? Plants show tropism in response to other stimuli as well. The roots of a plant always grow downwards while the shoots usually grow upwards and away from the earth. This upward and downward growth of shoots and roots, respectively, in response to the pull of earth or gravity, is, obviously, geotropism. If 'hydro' means water and 'chemo' refers to chemicals, what would 'hydrotropism' and 'chemotropism' mean? Can we think of examples of these kinds of directional growth movements? One example of chemotropism is the growth of pollen tubes towards ovules, about which we will learn more when we examine the reproductive processes of living organisms.



- (i) In plants, negative phototropism occurs in roots.
- (ii) Phototropism in shoots is attributed due to auxin in plants.
- (iii) Tendrils exhibit/ twining of tendrils show thigmotropism movement.

OR

Positive phototropic movement.