

Set No-1

Series Z1XYW/1

Q.P.Code **31/1/1**

Roll No.

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Candidates must write the Q.P. Code on the title page of the answer-book.

- Please check that this question paper contains **17** printed pages.
- Q.P. Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **39** questions.
- **Please write down the Serial Number of the questions in the answer-book before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

SCIENCE
HINTS & SOLUTIONS

Time allowed: 3 hours

Maximum Marks: 80

General Instructions:

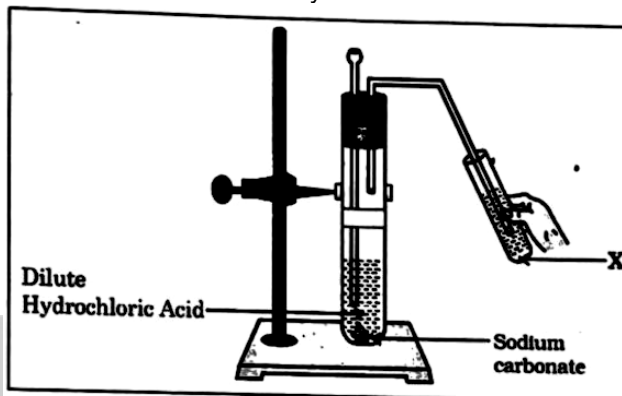
Read the following instructions carefully and strictly follow them :

- (i) The question paper consists of 39 questions. All questions are compulsory.
- (ii) This question paper is divided into FIVE Sections viz. Section A, B, C, D and E
- (iii) In Section A question number 1 to 20 are Multiple Choice Questions (MCQs) carrying 1 mark each.
- (iv) In Section B question number 21 to 26 are Very Short Answer(VSA) type questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
- (v) In Section C question number 27 to 33 are Short Answer(SA) type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words.
- (vi) In Section D question number 34 to 36 are Long Answer(LA) type questions carrying 05 marks each. Answers to these questions should in the range of 80 to 120 words.
- (vii) In Section E question number 37 to 39 are of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.
- (viii) There is no overall choice. However, an internal choice has been provided in some Sections.

SECTION-A

Select and write one most appropriate option out of the four Options given for each of the questions 1 – 20:

1. In the experimental setup given below, it is observed that on passing the gas produced in the reaction in the solution 'X' the solution 'X' first turns milky and then colourless.

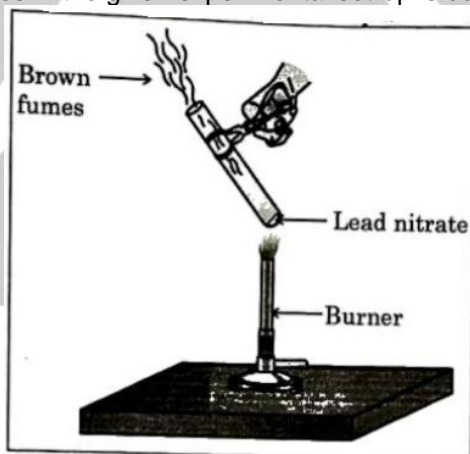


The option that justifies the above stated observation is that 'X' is aqueous calcium hydroxide and (a) it turns milky due to carbon dioxide gas liberated in the reaction and after sometime it becomes colourless due to formation of calcium carbonate. (b) it turns milky due to formation of calcium carbonate and on passing excess of carbon dioxide it becomes colourless due to formation of calcium hydrogen carbonate which is soluble in water. (c) it turns milky due to passing of carbon dioxide through it. It turns colourless as on further passing carbon dioxide, sodium hydrogen carbonate is formed which is soluble in water. (d) the carbon dioxide liberated during the reaction turns lime water milky due to formation of calcium hydrogen carbonate and after some time it turns colourless due to formation of calcium carbonate which is soluble in water.

Ans.

(b)

2. The emission of brown fumes in the given experimental set-up is due to



(a) thermal decomposition of lead nitrate which produces brown fumes of nitrogen dioxide. (b) thermal decomposition of lead nitrate which produces brown fumes of lead oxide. (c) oxidation of lead nitrate forming lead oxide and nitrogen dioxide. (d) oxidation of lead nitrate forming lead oxide and oxygen.

Ans.

(a)

3. $MnO_2 + xHCl \rightarrow MnCl_2 + yH_2O + zCl_2$
In order to balance the above chemical equation, the values of x, y and z respectively are:

(a) 6, 2, 2

(b) 4, 1, 2

(c) 4, 2, 1

(d) 2, 2, 1

Ans.

(c)

4. The table below has information regarding pH and the nature (acidic/basic) of four different solutions.

Option	Solution	Colour of pH paper	Approximate pH value	Nature of solution
(a)	Lemon juice	Orange	3	Basic
(b)	Milk of magnesia	Blue	10	Basic
(c)	Gastric juice	Red	6	Acidic
(d)	Pure water	Yellow	7	Neutral

Which one of the options in the table is correct?

Ans. (b)

5. A metal 'X' is used in thermite process. When X is burnt in air it gives an amphoteric oxide 'Y'. 'X' and 'Y' are respectively:

- (a) Fe and Fe₂O₃ (b) Al and Al₂O₃ (c) Fe and Fe₃O₄ (d) Al and Al₃O₄

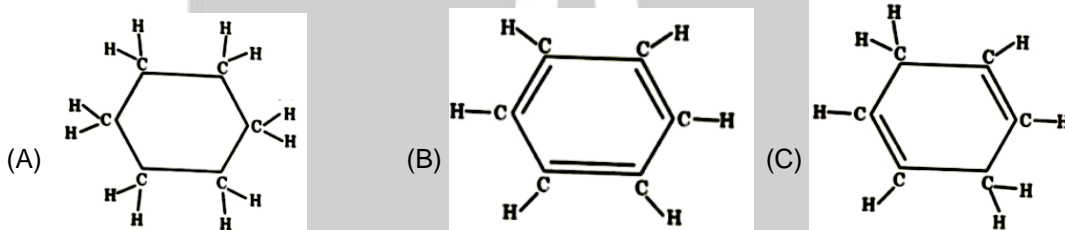
Ans. (b)

6. Select washing soda from the following:

- (a) NaHCO₃ (b) Na₂CO₃.5H₂O (c) Na₂CO₃.10H₂O (d) NaOH

Ans. (c)

7. Consider the structure of the three cyclic carbon compounds A, B and C given below and select the correct option from the following:



- (a) A and C are isomers of hexane and B is benzene.
 (b) A is an isomer of hexane, B is benzene and C is an isomer of hexene.
 (c) A is a saturated cyclic hydrocarbon and B and C are unsaturated cyclic hydrocarbons.
 (d) A is cyclohexane and B and C are the isomers of benzene

Ans. (c)

8. An organism which breaks down the food material outside the body and then absorbs it is

- (a) a plant parasite, Cuscuta (b) an animal parasite, Tapeworm
 (c) a bacteria, Rhizobium (d) a fungi, Rhizopus

Ans. (d)

9. Consider the following statements about small intestine and select the 1 one which is NOT correct:

- (a) The length of the small intestine in animals differs as it depends the type of food they eat. on
 (b) The small intestine is the site of complete digestion of food.
 (c) The small intestine receives secretions from liver and pancreas.
 (d) The villi of the small intestine absorb water from the unabsorbed food before it gets removed from the body via the anus.

Ans. (d)

10. The statement that correctly describes the characteristic(s) of a gene is:

- (a) In individuals of a given species, a specific gene is located on a particular chromosome.
 (b) A gene is not the information source for making proteins in the cell.
 (c) Each chromosome has only one gene located all along its length.
 (d) All the inherited traits in human beings are not controlled by genes.

Ans. (a)

11. Select from the following the correct statement about tropic movement in plants:

- (a) It is due to stimulus of touch and temperature.
 (b) It does not depend upon the direction of stimulus received.
 (c) It is observed only in roots and not in stems.
 (d) It is a growth related movement.

Ans. (d)

12. Select the INCORRECT match (between the plant and its vegetative part) from the following:
(a) Bryophyllum, leaf (b) Potato, stem (c) Money-plant, stem (d) Rose, root

Ans. (d)

13. If four identical resistors, of resistance 8 ohm, are first connected in series so as to give an effective resistance R_s , and then connected in parallel so as to give an effective resistance R_p , then the ratio

$$\frac{R_s}{R_p} \text{ is}$$

- (a) 32 (b) 2 (c) 0.5 (d) 16

Ans. (d)

Sol. When the resistors first connected in series then

Equivalent resistance -

$$R_s = R_1 + R_2 + R_3 + R_4$$

$$R_s = 8 + 8 + 8 + 8$$

$$R_s = 32 \Omega$$

When the resistors are connected in parallel

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$$

$$\frac{1}{R_p} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{4}{8} = \frac{1}{2}$$

$$R_p = 2$$

$$\frac{R_s}{R_p} = \frac{32}{2} = 16\Omega$$

14. In domestic electric circuits the wiring with 15 A current rating is for the electric devices which have

- (a) higher power ratings such as geyser.
(b) lower power ratings such as fan.
(c) metallic bodies and low power ratings.
(d) non-metallic bodies and low power ratings.

Ans. (a)

Sol. Higher power rating such as geysers when flow 15 A electric current.

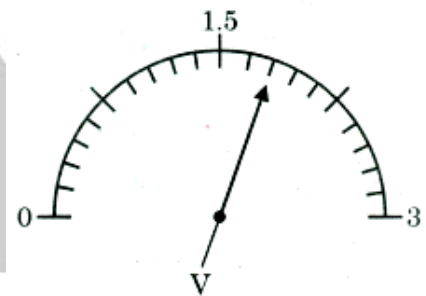
15. In the following diagram, the position of the needle is shown on the scale of a voltmeter. The least count of the voltmeter and the reading shown by it respectively are:

- (a) 0.15 V and 1.6 V (b) 0.05 V and 1.6 V
(c) 0.15 V and 1.8 V (d) 0.05 V and 1.8 V

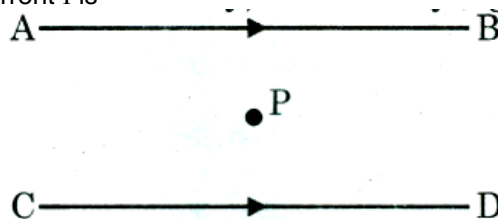
Ans. (c)

Sol. Least count = $\frac{1.5}{10} = 0.15 \text{ V}$

$$\text{Reading} = 1.5 + 2 \times 0.15 = 1.8 \text{ V}$$



16. The resultant magnetic field at point 'P' situated midway between two parallel wires (placed horizontally) each carrying a steady current I is



- (a) in the same direction as the current in the wires.
(b) in the vertically upward direction.
(c) zero
(d) in the vertically downward direction.

Ans. (c)

Q. Nos. 17 to 20 are Assertion- Reason based questions.

These consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true, 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.

17. Assertion (A) : The colour of aqueous solution of copper sulphate turns colourless when a piece of lead is added to it.

Reason (R) : Lead is more reactive than copper, and hence displaces copper from its salt solution.

Ans. (a)

18. Assertion (A): Genes inherited from the parents decide the sex of a child.

Reason (R): X chromosome in a male child is inherited from his father.

Ans. (c)

19. Assertion (A): Blood clotting prevents excessive loss of blood.

Reason (R): Blood clotting is due to blood plasma and white blood cells present in the blood.

Ans. (c)

20. Assertion (A) : The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the number of turns in it.

Reason (R) : The current in each circular turn has the same direction and the magnetic field due to each turn then just adds up.

Ans. (a)

SECTION-B

Q. No. 21 to 26 are very short answer questions.

- 21.** (a) (i) A compound 'X' which is prepared from gypsum has the property of hardening when mixed with proper quantity of water. Identify 'X' and write its chemical formula.
(ii) State the difference in chemical composition between baking soda and baking powder.

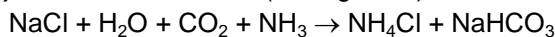
OR

(b) Write balanced chemical equation for the reaction that occurs when:

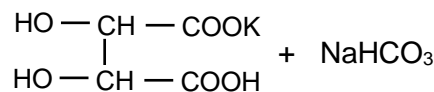
- (i) blue coloured copper sulphate crystals are heated and
- (ii) Sodium hydrogen carbonate is heated during cooking.

Sol. (a) (i) $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$ (Plaster of Paris)

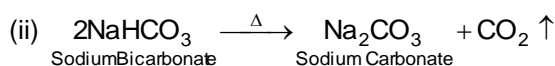
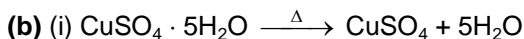
(ii) Sodium bicarbonate (baking soda) is-



and baking powder is Mixture of potassium hydrogen tartarate and sodium bicarbonate-



OR



22. (a) Write the role of insulin in regulating blood sugar levels in human body. Mention the disease caused due to it.

(b) How is the timing and the amount of release of insulin in the blood regulated?

Sol. (a) Insulin helps in regulating blood sugar level by increasing the uptake of glucose.

The disease caused due to this is **diabetes**.

(b) The timing and amount of hormones released are regulated by feedback mechanism.

For example, if the sugar level in blood rise, they are detected by the cells of pancreas which respond by producing more insulin, as the blood sugar level falls, insulin secretion is reduced.

23. (a) Name the type of blood (oxygenated / deoxygenated) transported by each of the following mentioning the path (i.e. from one organ (which place) to another (which place)).

(i) Vena cava

(ii) Pulmonary artery

OR

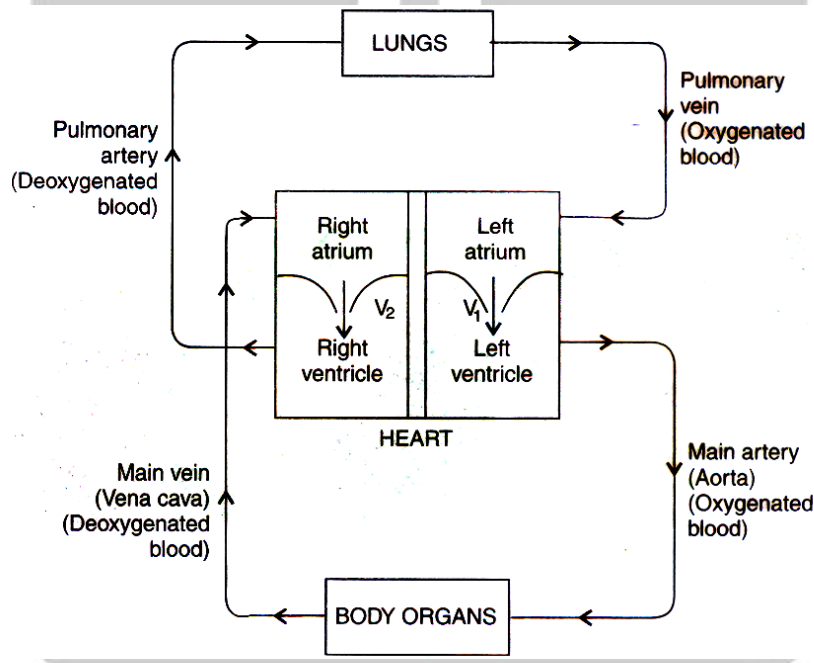
(b) With the help of a schematic flow chart, show the breakdown of glucose in a cell to provide energy-

(i) in the presence of oxygen

(ii) in lack of oxygen

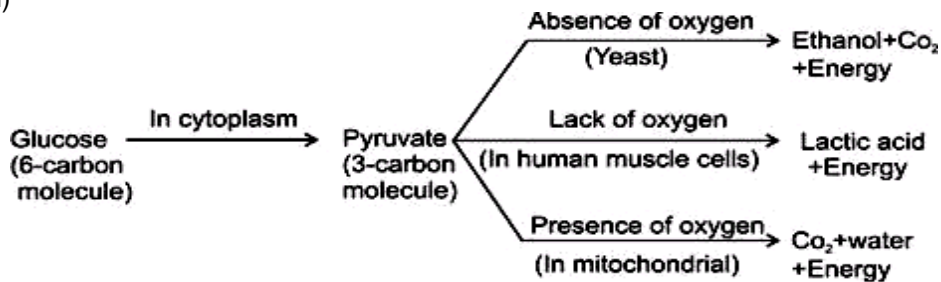
Sol. (a) (i) Vena cava- It carries deoxygenated blood from different body organs to heart.

(ii) Pulmonary artery- It carries deoxygenated blood from heart to lungs.



OR

(b) (i) (ii)

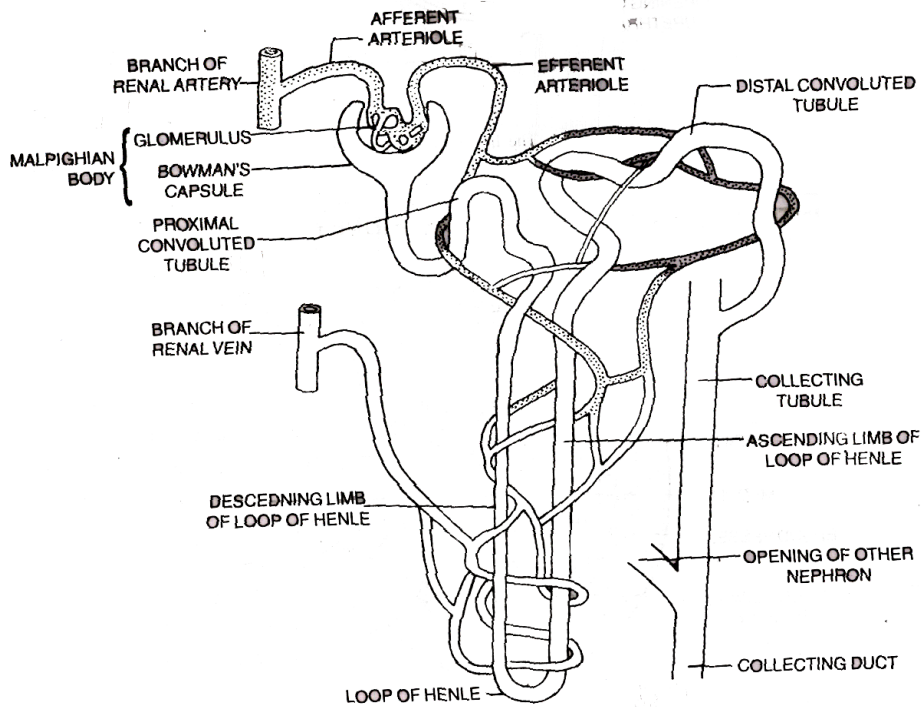


(Break down of glucose by various pathways)

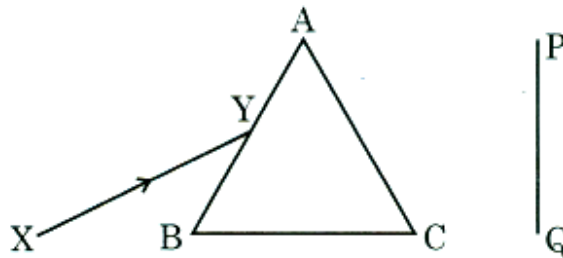
24. Name the part of the human excretory system where nephrons are found. Write the structure and function of nephrons.

Sol. The part in which nephrons are found is **Kidney**

Structure of nephron



25. (a) A narrow beam XY of white light is passing through a glass prism ABC as shown in the diagram:

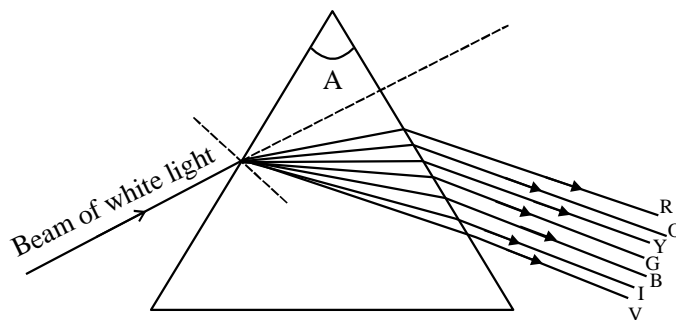


Trace it on your answer sheet and show the path of the emergent beam as observed on the screen PQ. Name the phenomenon observed and state its cause.

OR

- (b) It is observed that the power of an eye to see nearby objects as well as far off objects diminishes with age.
- Give reason for the above statement.
 - Name the defect that is likely to arise in the eyes in such a condition.
 - Draw a labelled ray diagram to show the type of corrective lens used for restoring the vision of such an eye.

Sol. (a)



Phenomenon → Dispersion of light

Cause of Dispersion: Dispersion takes place because light of different colours have different speed in a medium. Therefore the refractive index of glass is different for different colours of light. When white light is incident on the first surface of a prism and enters it, light of different colours is refracted or deviated through different angles. Thus the dispersion or splitting of white light into its constituent colours takes place.

(b) (i) As the person ages. The ciliary muscles get weaken to change the focal length of lens accordingly.

(ii) The person is suffering from **PRESBYOPIA**

Presbyopia : This defect arises with aging. A person suffering from this defect can see neither nearby objects nor distant objects clearly/distinctly. This is because the power of accommodation of the eye decreases due to the gradual weakening of the ciliary muscles and diminishing flexibility of the eye lens.

This defect can be corrected by using bi-focal lenses. Its lower part consists of a convex lens and is used for reading purposes whereas the upper part consists of a concave lens and is used for seeing distant objects.

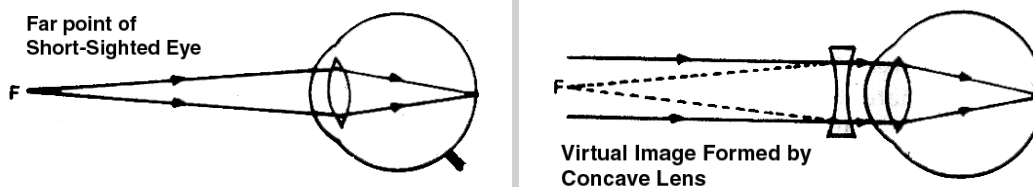
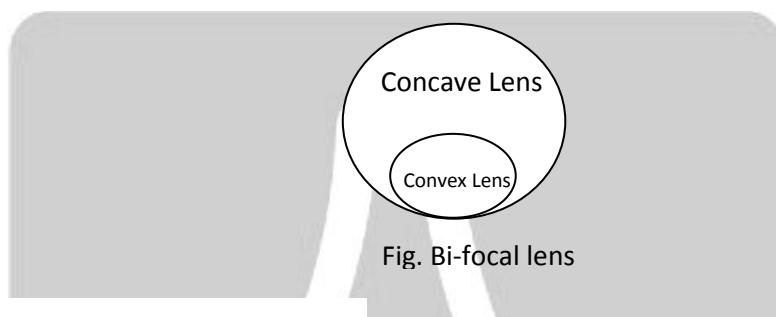


Fig. Correction of short sightedness by concave lens (Myopia)

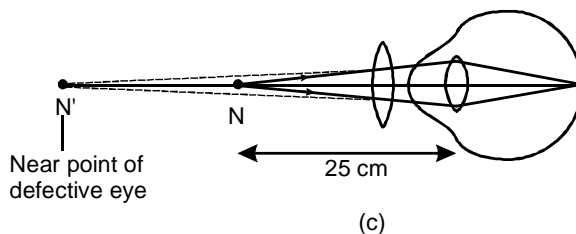
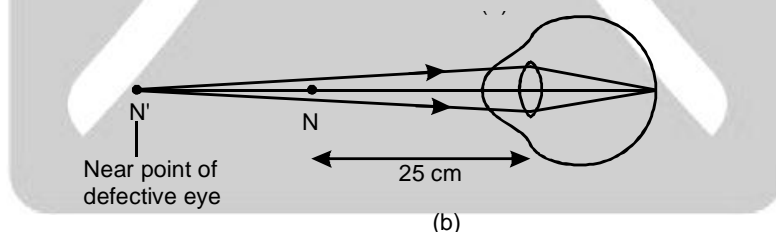


Fig : Correction of far sightedness by convex lens (Hypermetropia)

26. **Sol.** How do harmful chemicals get accumulated progressively at each trophic level in a food chain?
Pesticides are harmful chemicals which are used to protect our crops from diseases. These chemicals are either washed down into the soil or water bodies which are further absorbed by plants. When herbivores feed on plants, these chemicals enter into their bodies through food chain. Since these chemicals are not degradable they get accumulated into tissues and their concentration increases which is passed on from one trophic level to next.
Hence, maximum concentration is accumulated at the top carnivore level.

SECTION-C

Q. No. 27 to 33 are short answer questions.

27. (a) Identify the reducing agent in the following reaction:
 (i) $4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}$
 (ii) $\text{H}_2\text{O} + \text{F}_2 \rightarrow \text{HF} + \text{HOF}$
 (iii) $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
 (iv) $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 (b) Define a redox reaction in terms of gain or loss of oxygen.

- Sol.** (a) (i) Reducing Agent $\rightarrow \text{NH}_3$
 (ii) Reducing Agent $\rightarrow \text{H}_2\text{O}$
 (iii) Reducing Agent $\rightarrow \text{CO}$
 (iv) Reducing Agent $\rightarrow \text{H}_2$
 (b) (i) Reduction \rightarrow Gain of Electron
 (ii) Oxidation \rightarrow Loss of Electron

28. (a) Suggest one remedial measure each to counteract the change in pH in human beings in following cases:
 (i) Production of too much acid in stomach during indigestion
 (ii) Stung by a honey bee / nettle leaves

- (b) Fresh milk has a pH of 6. When it changes into curd will its pH increase or decrease ? Why?
Sol. (a) (i) We can use antacid $[\text{Mg}(\text{OH})_2]$ or aluminum hydroxide $[\text{Al}(\text{OH})_3]$ gel or baking powder.
 (ii) Sting of honey bee contains formic acid (HCOOH) can be neutralized by washing with soap solution on biting site or rubbing active metal on the biting site.
 (b) Milk contains lactic acid and the bacteria present in milk changes lactose sugar into lactic acid. So pH will decrease.

29. (a) (i) State the role of ATP in cellular respiration. (ii) What ensures sufficient exchange of gases in plants?
 (iii) State the conditions on which the direction of diffusion of gases in plant depend upon.

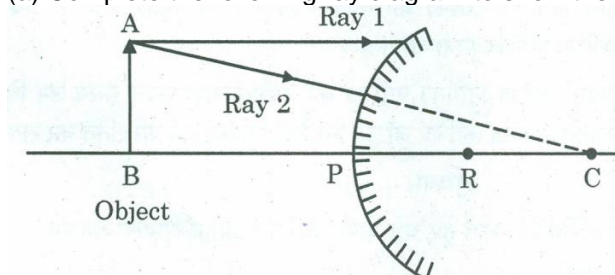
OR

- (b) (i) What is the internal energy reserve in plants and animals?
 (ii) How desert plants perform photosynthesis if their stomata remain closed during the day?
Sol. (a)
 (i) Role of ATP : ATP is used for formation of Pyruvic Acid from the breakdown of glucose in the process of glycolysis.
 (ii) Stomata ensure sufficient exchanges of gases in plants.
 (iii) The direction of diffusion of gases in plants depends upon environmental condition like time of the day and requirement of the plants.

OR

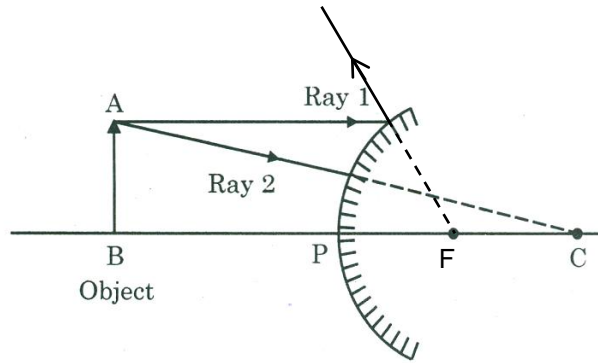
- (b) (i) Carbohydrates are internal energy reserve in plants and animals.
 In plants it is reserved as starch and in animal it is reserved as glycogen.
 (ii) Desert plants open their stomata during night and take in CO_2 and store it as an intermediate substance that will be used during the day for photosynthesis because they close their stomata during day time to prevent the loss of water (transpiration).

30. (a) Complete the following ray diagram to show the formation of image :



- (b) Mention the nature, position and size of the image formed in this case.
 (c) State the sign of the image distance in this case using the Cartesian sign convention.

Sol.



Nature → Virtual & erect
Size → Smaller than the object
Position → between P & F.
Sign of V → Positive

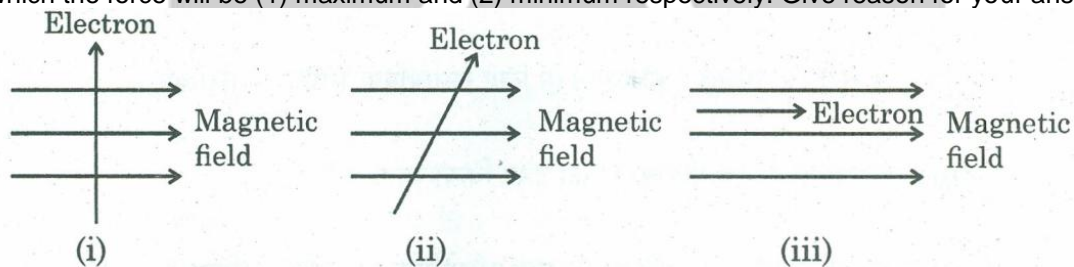
31. Give reasons for the following :

- (a) Danger signals installed at airports and at the top of tall buildings are of red colour.
- (b) The sky appears dark to the passengers flying at very high altitudes.
- (c) The path of a beam of light passing through a colloidal solution is visible.

Sol.

- (a) Because, the scattering of red colour is minimum . So it can travel large distance.
- (b) At, high altitude, there is not atmosphere present. So scattering of light does not happened and sky appears dark.
- (c) The size of colloidal solution is enough to scatter the beam of light when light passes through it.

32. (a) (i) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field.
(ii) Given below are three diagrams showing entry of an electron in a magnetic field. Identify the case in which the force will be (1) maximum and (2) minimum respectively. Give reason for your answer.

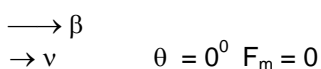
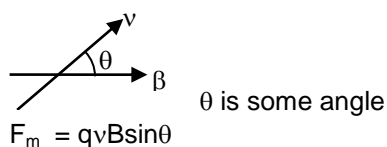
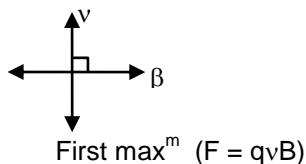


OR

(b) (i) Draw the pattern of magnetic field lines of (1) a current carrying solenoid (2) a bar magnet
(ii) List two distinguishing features between the two fields.

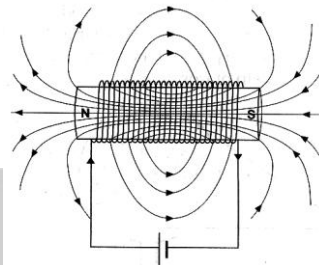
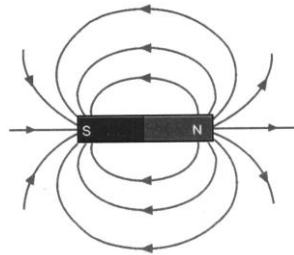
Sol.

- (a) (i) Fleming left hand rule
- (ii) $f_m = qvB\sin\theta$
 $\theta = 90^\circ$



OR

(i)



(ii) In solenoid field strength can be changed but in bar magnet it is not possible

(iii) In solenoid we can change pole but in bar magnet it is fixed

33.

(a)

(i) Why does a kitchen garden called an artificial ecosystem while a forest is considered to be a natural ecosystem?

(ii) While designing an artificial ecosystem at home, write any two things to be kept in mind to convert it into a self-sustaining system. Give reason to justify your answer.

OR

(b) (i) Construct a food chain of four trophic levels comprising the following:
Hawk, snake, plants, rat.

(ii) 20,000 J of energy was transferred by the producers to the organism of second trophic level. Calculate the amount of energy that will be transferred by organisms of the third trophic level to the organisms of the fourth trophic level.

Sol.

(a) (i) Kitchen garden comes under man made ecosystem where biotic and abiotic components are manipulated by human.

- In forest ecosystem, different species of plants and animals grow without any human interference.

(ii) Two things to keep in mind to convert artificial ecosystem into a self-sustaining system by:-

- Light- Plants should grow in an area where they receive proper amount of sunlight as it is the ultimate source of energy.
- Depending on the soil quality of growing area, if nutrient deficient we can add nutrients to it and plant should be able to sustain climatic condition.

OR

(b) (i) A food chain of four trophic level are as follow.

Plant → Rat → Snake → Hawk

(ii) The energy will be calculated by the **10% law of energy** transfer.

T_1	→	T_2	→	T_3	→	T_4
(Producer)		(Primary consumer)		(Secondary consumer)		(Top consumer)
(200000 J)	→	(20000 J)	→	(2000 J)	→	(200 J)

SECTION-D

Q. No. 34 to 36 are long answer questions.

34. (a) A saturated organic compound 'A' belongs to the homologous series of alcohols, On heating 'A' with concentrated sulphuric acid at 443 K, it forms an unsaturated compound 'B' with molecular mass 28 u. The compound 'B' on addition of one mole of hydrogen in the presence of Nickel, changes to a saturated hydrocarbon 'C'.
- Identify A, B and C.
 - Write the chemical equations showing the conversion of A into B.
 - What happens when compound C undergoes combustion?
 - State one industrial application of hydrogenation reaction.
 - Name the products formed when compound A reacts with sodium.

OR

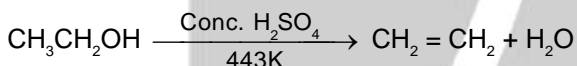
- With the help of diagram, show the formation of micelles, when soap is applied on oily dirt.
- Take two test tubes X and Y with 10 mL of hard water in each. In test tube 'X', add few drops of soap solution and in test tube Y add a few drops of detergent solution. Shake both the test tubes for the same period.

- In which test tube the formation of foam will be more? Why?
- In which test tube is a curdy solid formed? Why?

Sol.

- Compound A ethanol (C₂H₅OH)
Compound B Ethene (C₂H₄)
Compound C Ethane (C₂H₆)

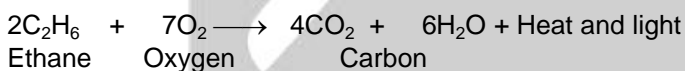
(ii) Action with concentrated sulphuric acid : Ethanol reacts with concentrated sulphuric acid at 443 K to produce ethylene. This reaction is known as acidic dehydration of ethanol because in this reaction, water molecule is removed from ethanol.



Ethanol Ethene

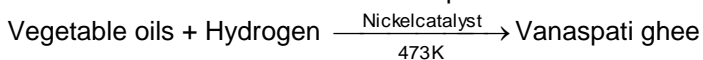
The concentrated sulphuric acid may be regarded as a dehydrating agent because it removes water from ethanol.

(iii) Compound C ethane is a saturated hydrocarbons. Saturated hydrocarbons burn with blue non-sooty flame. This is because the percentage of carbon in these compounds is low which gets oxidised completely by the oxygen present in the air.



(iv) Hydrogenation of oils :

Certain vegetable oils such as groundnut oil, cotton seed oil and mustard oil, contain double bonds (C = C) and are liquids at room temperature. Because of the presence of double bonds, the vegetable oils undergo hydrogenation, like alkenes, to form saturated products called vanaspati ghee, which is a solid or a semi-solid at the room temperature.

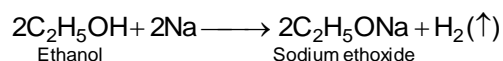


(Unsaturated and
in liquid state)

(Saturated and
in solid state)

You must have seen advertisements stating that some of the vegetable oils are 'healthy'. But it is worth mentioning that animal fats, such as 'Ghee' and butter contain saturated fatty acids which are not considered good for health and even doctors discourage their use. On the other hand, oils containing unsaturated fatty acids are generally used for cooking purposes.

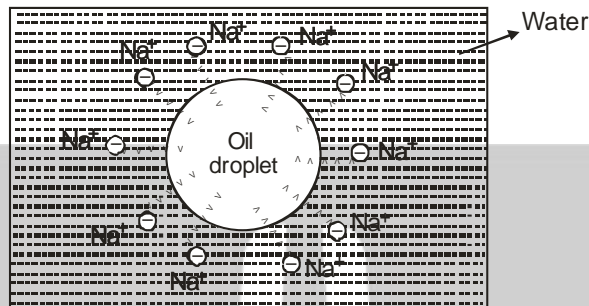
(v) Reaction with sodium : Ethanol reacts with sodium to produce hydrogen gas and sodium ethoxide.



OR

(b) (i) **Cleansing action of soap** : Mostly the dirt is held to any surface such as cloth by the oil or grease which is present there. Now since the oil and grease are not soluble in water, the dirt particles cannot be removed by simply washing the cloth with water. However, when soap is applied, the non-polar hydrocarbon part of the soap molecules dissolves in oil droplets while the polar – COO⁻ Na⁺ groups remain attached to water molecules. In this way, each oil droplet gets surrounded by negative charge.

These negatively charged oil droplets cannot coalesce and continue breaking into small droplets. These oil droplets (containing dirt particles) can be washed away with water along with dirt particles. So, the action of soap or detergents is to emulsify oil or grease, this loosens the solid particles of dirt and they are removed.



(ii)
1) In Test tube Y, the formation of foam will be more because detergent reduces the hardness of water hence form more foam.

2) In test tube 'X' a curdy solid formed. As soap react with Ca⁺² and Mg⁺² ion of hard water to form an insoluble solid.

35. (a) Name the parts of a bisexual flower that are not directly involved in reproduction.
(b) Differentiate between self pollination and cross pollination. List any two significance of pollination.
(c) What is the fate of ovules and ovary after fertilization in a flower?

Sol. (a) Calyx (Sepals) and Corolla (Petals)
(b)

DIFFERENCES BETWEEN SELF POLLINATION & CROSS POLLINATION		
S.NO.	Self - pollination	Cross-pollination
1.	Pollen grains are transferred from the anther to the stigma of the same flower (autogamy) or another flower borne on the same plant (geitonogamy).	Pollen grains are transferred from the anther of one flower to the stigma of another flower borne on a different plant of the same species (allogamy).

(c) After fertilization ovule(s) converts into seed(s) & the ovary converts into fruit.

36. (a) An electric iron consumes energy at a rate of 880 W when heating is at the maximum rate and 330 W when the heating is at the minimum. If the source voltage is 220 V, calculate the current and resistance in each case.

(b) What is heating effect of electric current?

(c) Find an expression for the amount of heat produced when a current passes through a resistor for some time.

Sol. (a) $P = 880 \text{ w}$ P_{\min}
 $V = 220$
 $P = VI$ $P = IV$
 $I = \frac{P}{V}$ $I = \frac{P}{V}$
 $= \frac{880}{220}$ $= \frac{330}{220}$

$$I = 4 \text{ A} \qquad I = \frac{3}{2} \text{ A}$$

$$V = IR$$

$$R = \frac{V}{I}$$

$$= \frac{220}{4}$$

$$= R = 55 \Omega$$

$$R = 146.67 \Omega$$

$$v = IR$$

$$R = \frac{v}{I} = \frac{220}{3/2}$$

$$= \frac{220 \times 2}{3} = \frac{440}{3}$$

(b) When the conductor offers resistance to the flow of current the work done by electric current in overcoming this resistance is converted into heat.

(c) $H = I^2 R t$ = Heat
 H = Heat produced
 I = current
 R = Resistance
 t = time

SECTION-E

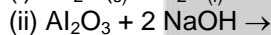
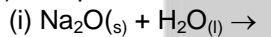
Q. No. 37 to 39 are case based/data based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

37. Almost all metals combine with oxygen to form metal oxides. Metal oxides are generally basic in nature. But some metal oxides show both basic as well as acidic behavior. Different metals show different reactivities towards Oxygen. Some react while some do not react at all.

(a) What happens when copper is heated in air? (Give the equation of the reaction involved).

(b) Why are metal oxides categorized as amphoteric? Give one example.

(c) Complete the following equations:



OR

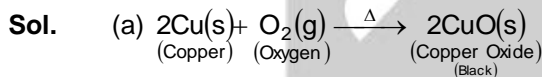
(c) On burning Sulphur in oxygen a colourless gas is produced.

(i) Write chemical equation for the reaction.

(ii) Name the gas formed.

(iii) State the nature of the gas.

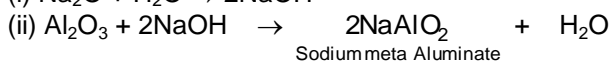
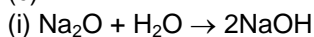
(iv) What will be the action of this on a dry litmus paper?



When copper is heated in air, black copper oxide is formed.

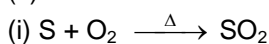
(b) Amphoteric molecules, which can either donate or accept the proton (H^+), are one sort of amphoteric species. So, Amphoteric oxides are classified as metal oxides as they react with both acids as well as bases to create salts and water. Eg. lead oxide and zinc oxide.

(c)



OR

(c)



(ii) Sulphur-di-oxide

(iii) Acidic in nature

(iv) No change

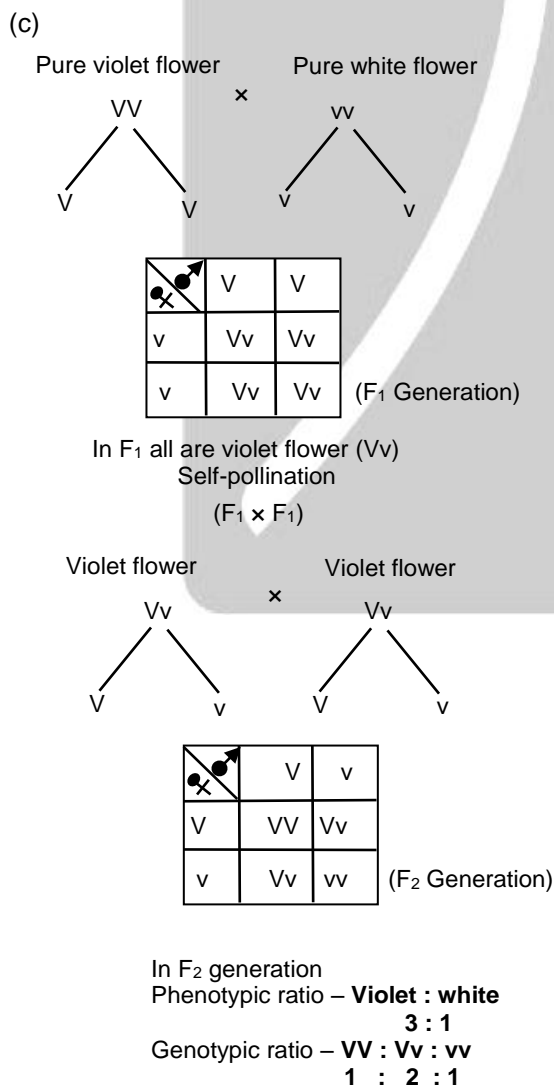
38. In order to trace the inheritance of traits Mendel crossed pea plants having one contrasting character or a pair of contrasting characters. When he crossed pea plants having round and yellow seeds with pea plants having wrinkled and green seeds, he observed that no plants with wrinkled and green seeds were obtained in the F₁ generation. When the F₁ generation pea plants were cross-bred by self-pollination, the F₂ generation had seeds with different combinations of shape and colour also.
- (a) Write any two pairs of contrasting characteristics of pea plant used by Mendel other than those mentioned above. (b) Differentiate between dominant and recessive traits. (c) State the ratio of the combinations observed in the seeds of F₂ generation (in the above case). What do you interpret from this result?

OR

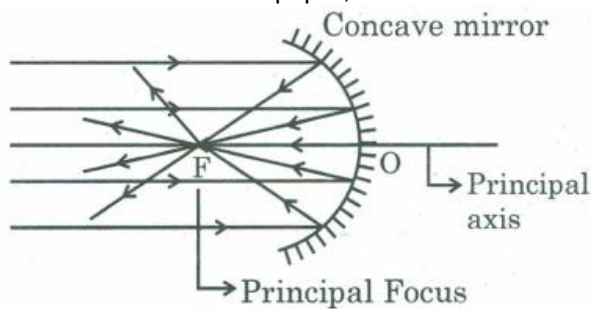
(c) Given below is a cross between a pure violet flowered pea plant (V) and a pure white flowered pea plant (v). Diagrammatically explain what type of progeny is obtained in F₁ generation and F₂ generation:
Pure violet flowered plant x Pure white flowered plant.

- Sol. (a) (i) Flower position-Axial/Terminal
(ii) Height of stem - Tall/Dwarf
- (b) Dominant trait : The trait which appears in F₁ generation is called as dominant trait. It is denoted by capital letter. e.g. TT (tall).
Recessive trait : The traits which does not appear in F₁ generation is called as recessive trait. It is denoted by small letter. e.g. tt (dwarf)
- (c) Phenotypic ratio is 9 : 3 : 3 : 1
If the inheritance of more than one pair of characters is studied simultaneously, the factors or genes for each pair of characters assort out independently.

OR



39. Hold a concave mirror in your hand and direct its reflecting surface towards the sun. Direct the light reflected by the mirror on to a white card-board held close to the mirror. Move the card-board back and forth gradually until you find a bright, sharp spot of light on the board. This spot of light is the image of the sun on the sheet of paper; which is also termed as "Principal Focus" of the concave mirror.



- (a) List two applications of concave mirror.
 (b) If the distance between the mirror and the principal focus is 15 cm, find the radius of curvature of the mirror.
 (c) Draw a ray diagram to show the type of image formed when an object is placed between pole and focus of a concave mirror.

OR

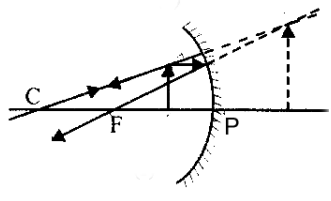
- (c) An object 10 cm in size is placed at 100 cm in front of a concave mirror. If its image is formed at the same point where the object is located, find:
 (i) focal length of the mirror, and
 (ii) magnification of the image formed with sign as per Cartesian sign convention.

Sol.

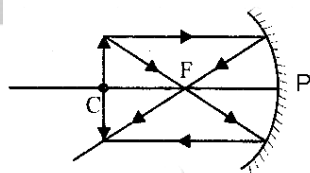
- (a)
 (i) It is use as Shaving mirror.
 (ii) It is use as solar cooker.

(b) $f = 15 \text{ cm}$
 $R = 2f$
 $= 2 \times 15$
 $= 30 \text{ cm}$

(c)



OR



(i) $l_0 = 10 \text{ cm}$
 $u = -100 \text{ cm}$
 $v = -100 \text{ cm}$
 $R = 100 \text{ cm}$

$f = 50 \text{ cm}$ $f = \frac{R}{2}$

(ii) $m = \frac{-v}{\mu} = -1$

$m = -1$ Real & inverted

RESONites ने फिर लहराया सफलता का परचम

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