

General Instruction:

1. This Question Paper has 5 Sections A-E.
2. **Section A** has 20 MCQs carrying 1 mark each.
3. **Section B** has 5 questions carrying 02 marks each.
4. **Section C** has 6 questions carrying 03 marks each.
5. **Section D** has 4 questions carrying 05 marks each.
6. **Section E** has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

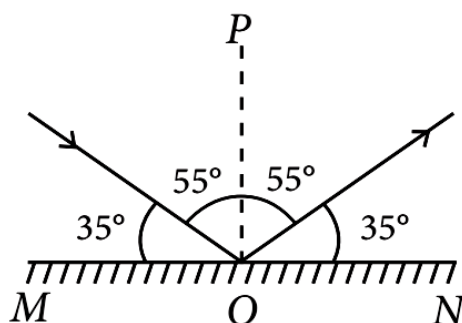
SECTION – A

Questions 1 to 20 carry 1 mark each.

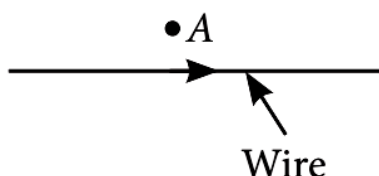
1. Oral contraceptives prevent
(a) fertilisation (b) ovulation (c) entrance of sperms in vagina (d) all of these.
Ans: (b) ovulation
Oral contraceptives also known as oral pills are used to check ovulation. These are mainly hormonal preparations and contain estrogen and progesterone.
2. Complete the given analogy. Non-biodegradable: _____ :: Biodegradable: Livestock wastes
(a) Cotton (b) Grass (c) Glass (d) Orange peel
Ans: (c) Glass
3. The angle between an incident ray and the plane mirror is 35° . The total angle between the incident ray and reflected ray will be
(a) 35° (b) 70° (c) 105° (d) 110°

Ans: (d) : $\angle i = \angle r = 55^\circ$

$$\Rightarrow \angle i + \angle r = 55^\circ + 55^\circ = 110^\circ$$



4. What is the direction of magnetic field at a point A above the wire carrying current I as shown in the adjoining figure?



(a) out of the page (b) into the page (c) up the page (d) down the page

Ans: (a)

5. Which is the correct sequence of air passage during inhalation?

(a) Nostrils → larynx → pharynx → trachea → lungs

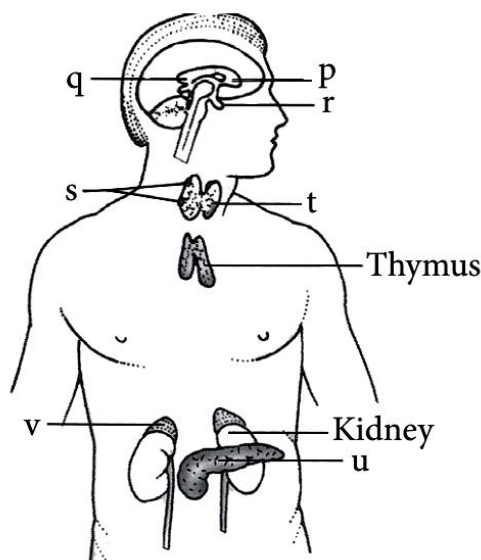
(b) Nasal passage → trachea → pharynx → larynx → alveoli

(c) Larynx → nostrils → pharynx → lungs

(d) Nostrils → pharynx → larynx → trachea → alveoli

Ans: (d) Nostrils → pharynx → larynx → trachea → alveoli

6. Refer to the given figure depicting locations of several endocrine glands in a human and answer the following questions.



Deficiency of hormone of which gland causes:

(i) Dwarfism? (ii) Diabetes mellitus? (iii) Goitre?

(i) (ii) (iii)

(a) p q r

(b) s v r

(c) r u t

(d) q s u

Ans: (c) : Deficiency of growth hormone in childhood leads to dwarfism. Growth hormone is secreted by anterior pituitary(r). Deficiency of insulin, produced by pancreas(u), causes sugar level in the blood to rise causing a disease called diabetes mellitus that has harmful effects on our body. Goitre is caused by deficiency of thyroid(t) hormones in adults.

7. A ray of light falls normally or perpendicularly on the surface of a mirror. Which of the following is not true regarding this?

(a) The angle of incidence for such a ray of light is zero.

(b) The angle of reflection for such a ray of light is zero.

(c) Such ray of light reflects back along the same path.

(d) A ray of light in this case does not follow law of reflection.

Ans: (d) : When a ray of light falls normally or perpendicularly on the surface of a mirror then the angle of incidence (L_i) and angle of reflection (Z_r) are zero. The ray of light reflects back along the same path without any deviation. Therefore, follows the law of reflection.

8. Among Na, Al, Zn and Cu,

(a) Al is more reactive than Na (b) Zn is more reactive than Al

(c) Zn is more reactive than Cu (d) Al is less reactive than Cu.

Ans: (c) Zn is more reactive than Cu

9. A particle contains 26 protons, 30 neutrons and 24 electrons. Which statement is true about this particle?

- (a) It is an atom of a noble gas. (b) It is an atom of a non-metal.
 (c) It is a negative ion. (d) It is a positive ion.

Ans: (d) It is a positive ion.

It is a positive ion because the number of electrons is less than the number of protons. In fact, the particle carries a charge of +2. The atomic number (or number of protons) represents that the particle is Fe²⁺. No noble gas has an atomic number of 26. It is not an atom of a non-metal. In a negative ion, the number of electrons is greater than the number of protons.

- 10.** Two wires of same metal have the same length but their cross-sectional area in the ratio 3: 1. They are joined in series. The resistance of the thicker wire is 10 W. The total resistance of the combination will be
 (a) 40Ω (b) 40/3 Ω (c) 5/2 Ω (d) 100 Ω

Ans: (a) 40Ω

Same metal means same specific resistance.

- 11.** Which of the following molecules has all its atoms joined together by double covalent bonds?
 (a) Methane (b) Water (c) Carbon dioxide (d) Nitrogen trichloride

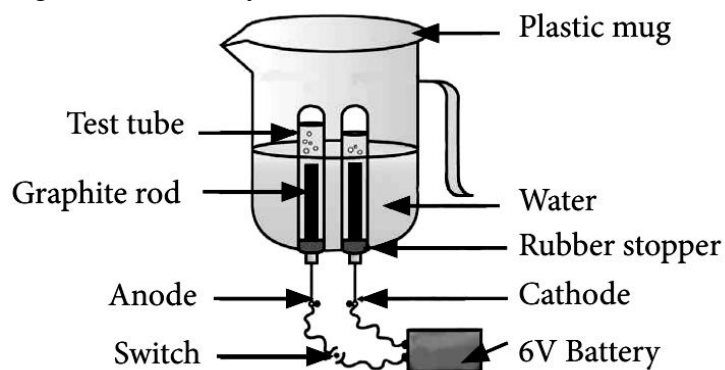
Ans: (c) Carbon dioxide

- 12.** Quick lime combines vigorously with water to form (A) which reacts slowly with the carbon dioxide in air to form (B). What are (A) and (B)?

- | | |
|-------------------------|---------------------|
| (A) | (B) |
| (a) Calcium carbonate | Calcium hydroxide |
| (b) Calcium hydroxide | Calcium carbonate |
| (c) Calcium nitrate | Calcium bicarbonate |
| (d) Calcium bicarbonate | Calcium nitrate |

Ans: (b)

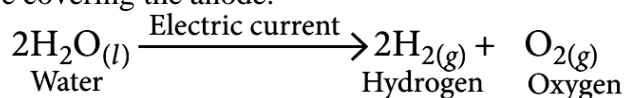
- 13.** Observe the given diagram and identify the correct statements.



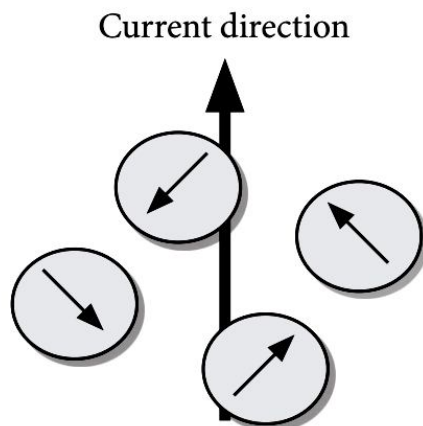
- (i) At anode, oxygen gas is evolved.
 (ii) In the test tube covering the anode, the amount of gas collected is double than that of the gas collected in the test tube covering the cathode.
 (iii) At cathode, hydrogen gas is evolved.
 (iv) It is a decomposition reaction.
 (a) (i), (ii) and (iii) (b) (i), (iii) and (iv) (c) (iii) and (iv) (d) All the statements are correct.

Ans: (b) (i), (iii) and (iv)

In the test tube covering the cathode, the amount of gas collected is double than that of the gas collected in the test tube covering the anode.



- 14.** What can be deduced from the following diagram showing a current flowing in a straight wire surrounded by four compasses?



- (a) The magnetic field caused by the four compasses put close together will always cause the compass needles to point in a circle.
 (b) Compass needles are affected by the material of the wire.
 (c) Compass needles are affected by the circular electric field in the wire.
 (d) Compass needles are affected by the circular magnetic field produced by the current in the wire.
 Ans: (d) : A current in a wire will always produce a circular magnetic field around the wire.

15. Select the correct representation of the safest method to detect hydrogen gas produced in a reaction.

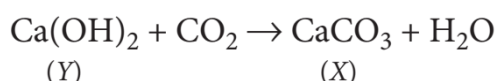
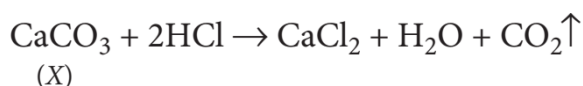


Ans: (d)

16. A metal carbonate X on treatment with a mineral acid liberates a gas which when passed through aqueous solution of a substance Y gives back X. The substance Y on reaction with the gas obtained at anode during electrolysis of brine gives a compound Z, which can decolourise coloured fabrics. The compounds X, Y and Z respectively are

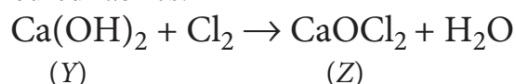
- (a) CaCO_3 , Ca(OH)_2 , CaOCl_2
 (b) Ca(OH)_2 , CaO , CaOCl_2
 (c) CaCO_3 , CaOCl_2 , Ca(OH)_2
 (d) Ca(OH)_2 , CaCO_3 , CaOCl_2

Ans: (a)



Cl_2 gas is released at anode on electrolysis of brine solution.

Cl_2 gas also decolourises coloured fabrics.



DIRECTION: In the question number 17 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**.

Choose the correct option

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

17. Assertion (A): AlCl_3 is a basic salt.

Reason (R): AlCl_3 is a salt of strong acid and a weak base.

Ans: (d) Assertion (A) is false but reason (R) is true.

AlCl_3 is an acidic salt as it is a salt of strong acid (HCl) and a weak base $[\text{Al}(\text{OH})_3]$.

18. Assertion (A): The connecting wires are made of copper.

Reason (R): The electrical conductivity of copper is high.

Ans: (a) : Due to high electrical conductivity of copper, it conducts the current without offering much resistance.

19. Assertion (A): The plants store some of the waste products in their body parts.

Reason (R): Plants can get rid off excess water by transpiration.

Ans: (b) :The plants store some of the waste products in their body parts. For example, some of the waste products are collected in the leaves, bark and fruits of the plants. In plants also, certain metabolic waste products are formed which have to be expelled out. Photosynthetic and respiratory wastes like O_2 and CO_2 are expelled out through stomata. Excess of water is eliminated by transpiration.

20. Assertion (A): Rate of breathing is slower in aquatic organisms than terrestrial organisms.

Reason (R): Amount of dissolved oxygen is low as compared to amount of atmospheric air.

Ans: (d) Assertion (A) is false but reason (R) is true.

The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms since the amount of dissolved oxygen is fairly low compared to the amount of oxygen in the air.

SECTION – B

Questions 21 to 26 carry 2 marks each.

21. (a) What is a gene?

(b) What is heredity?

Ans: (a) A gene is a unit of DNA on a chromosome which governs the synthesis of particular protein that controls specific characteristics (or traits) of an organism.

(b) The inheritance of characters (or traits) from the parents to their offsprings is called heredity.

OR

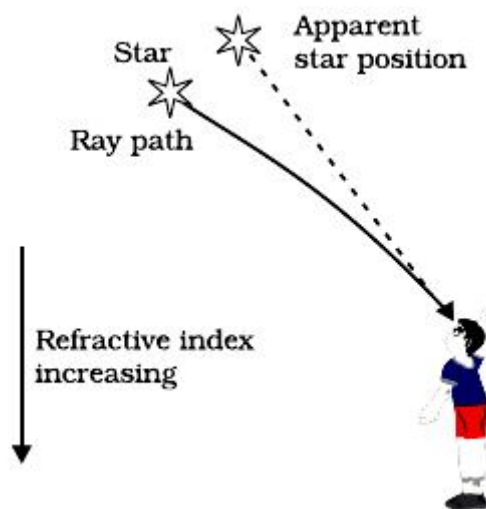
List the seven pairs of contrasting characters of experimental plant studied by Mendel.

Ans: Mendel studied garden pea (*Pisum sativum*) for his experimental studies. He chose following seven pairs of contrasting characters :

- (i) Seed shape - Round, wrinkled;
- (ii) Seed colour - Yellow and green ;
- (iii) Flower colour -Violet and white ;
- (iv) Pod shape - Inflated and constricted;
- (v) Pod colour - Green and yellow ;
- (vi) Flower position -axial and terminal ;
- (vii) Stem height - Tall and dwarf.

22. Why do stars appear to twinkle ? Explain.

Ans: Due to atmospheric refraction, position of star visible from sun is slightly different from its actual position. This apparent position of the star is not stationary, but keeps on changing with change in physical condition on earth's atmosphere. Since the stars are very distant, they are approximately point-sized sources of light. As the path of rays of light coming from the star goes on varying slightly, the apparent position of the star fluctuates and the amount of starlight entering the eye flickers the star sometimes appears brighter, and at some other time, fainter, which is the twinkling effect.



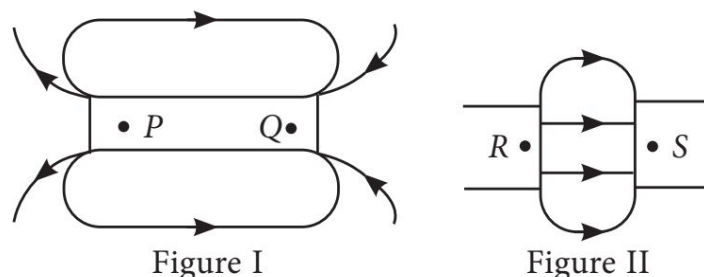
23. Predict (a) the functional group and (b) the number of carbon atoms in a molecule of butene.

Ans: (a) Since its name ends in '-ene', it belongs to the homologous series of alkenes. Thus, its functional group is the carbon-carbon double bond.

(b) Since its name starts with 'but-', it has four carbon atoms.

24. (a) Name the poles P, Q, R and S of the magnets in the following figures I and II.

(b) State the inference drawn about the direction of the magnetic field lines on the basis of these diagrams.



Ans: (a) In figure I, poles P and Q of the magnet represents north pole and south pole respectively. In figure II, poles R and S of the magnet also represents north pole and south pole respectively.

(b) Magnetic field lines are closed continuous curves directed from north pole to south pole outside the magnet but from south pole to north pole inside the magnet.

OR

What is Maxwell's cork-screw rule? For what purpose is it used?

Ans: The direction of lines of forces of the magnetic field produced by a current carrying straight conductor is find from the maxwell's corkscrew rule. According to this rule, if the corkscrew moves in the direction of the current, then the hand turns in the direction of the magnetic lines of force.

25. Write the main functions of the following:

(a) Sensory neuron (b) Cranium

Ans: (a) Sensory neuron: These often occur in sense organs and receive stimuli through their dendrites. The sensory neurons transmit impulses towards the central nervous system (brain and spinal cord) with the help of their axons.

(b) Cranium: The bones of cranium or brain box protect the brain from mechanical injury.

26. List two preparations shown every month by the uterus in anticipation of pregnancy in humans.
 Ans: The two preparations shown every month by the uterus in anticipation of pregnancy in humans are: (i) The wall of uterus becomes thick to receive the fertilised egg. (ii) The uterine wall is richly supplied with blood to nourish the growing embryo.

SECTION – C

Questions 27 to 33 carry 3 marks each.

27. Differentiate between self-pollination and cross-pollination.

Ans: Differences between self pollination and cross pollination are as follows:

	Character	Self pollination	Cross pollination
(i)	Occurrence	Occurs within a flower or between two flowers of the same plant.	Occurs between two flowers of two different plants of the same species.
(ii)	Agent of pollination	No external agent of pollination required (usually)	External agents such as wind, water, insects and birds are required
(iii)	Production of pollen grains	Produced in small numbers, thus no wastage of pollen grains occurs.	Produced in large numbers(usually) thus wastage of pollen grains occurs
(iv)	Appearance of flowers	Flowers are not attractive (usually)	Flowers are attractive with colour petals in case of insect pollination
(v)	Fragrance and nectar	Flowers not (usually) produce scent or nectar.	Flowers generally produce scent and nectar
(vi)	Nature of offspring produced	Offsprings produced have genetic make up identical to the parent plant, purity of race maintained, no variation occurs	Offspring produce may differ in genetic make-up, and variations occur.

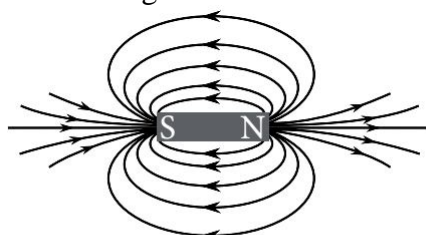
28. How do proteins control the expression of characters? Explain it by taking an example of tallness in plants as a characteristic.

Ans: Plants have hormones that can trigger growth. Plant height can depend on the amount of a particular plant hormone. The amount of the plant hormone produced will depend on the efficiency of the process for making it. An enzyme (chemically protein molecules) that is important for this process, if works efficiently, a lot of hormone will be produced, and the plant will be tall. If the gene for that enzyme has an alteration that makes the enzyme less efficient, the amount of hormone will be less and the plant will be short. Thus, enzymes which are proteinaceous in nature control the expression of characters.

29. What are magnetic field lines? Justify the following statements:

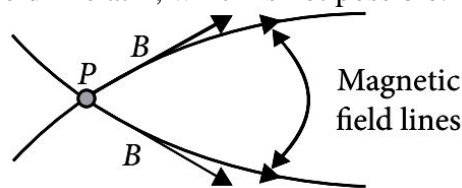
- (i) Two magnetic field lines never intersect each other.
 (ii) Magnetic field are closed curves.

Ans: Imaginary continuous closed curves used to represent the magnetic field in a region is known as magnetic field lines. It is directed from north pole to south pole outside the magnet and south pole to north pole inside the magnet.



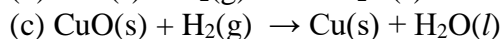
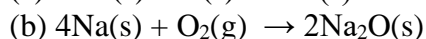
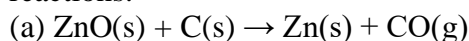
Magnetic field lines around
a bar magnet

(i) The direction of magnetic field (B) at any point is obtained by drawing a tangent to the magnetic field line at that point. In case, two magnetic field lines intersect each other at the point P as shown in figure, magnetic field at P will have two directions, shown by two arrows, one drawn to each magnetic field line at P, which is not possible.



(ii) It is taken by convention that the field lines emerge from north pole and merge at the south pole. Inside the magnet, the direction of field lines is from its south pole to its north pole. Thus, the magnetic field lines are closed curves.

30. Identify the substance that is oxidized and the substance that is reduced in the following reactions:



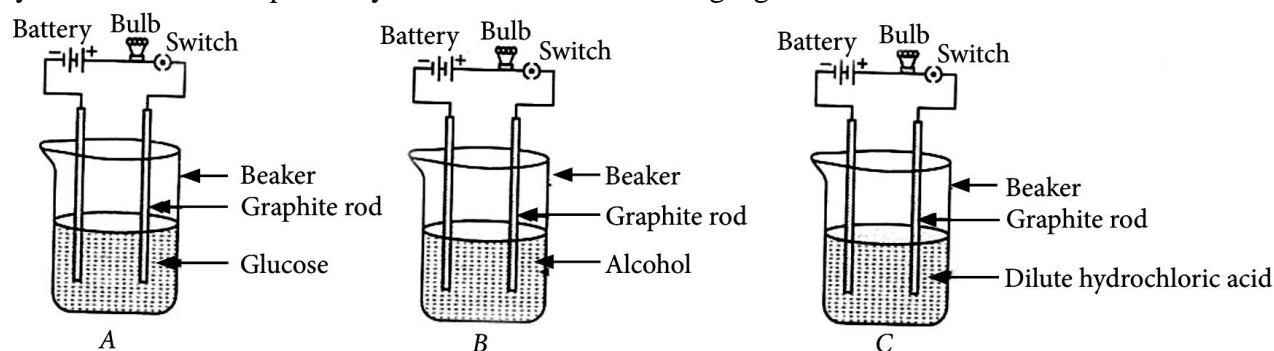
Ans:

	Reaction	Substance	
		Oxidized	Reduced
(a)	$\text{ZnO}(s) + \text{C}(s) \rightarrow \text{Zn}(s) + \text{CO}(g)$ <p style="text-align: center;"> Oxidised ↓ ↓ ↑ Reduced </p>	C	ZnO
(b)	$4\text{Na}(s) + \text{O}_2(g) \rightarrow 2\text{Na}_2\text{O}(s)$ <p style="text-align: center;"> Oxidised ↓ ↓ ↑ Reduced </p>	Na	O ₂
(c)	$\text{CuO}(s) + \text{H}_2(g) \rightarrow \text{Cu}(s) + \text{H}_2\text{O}(l)$ <p style="text-align: center;"> Reduced ↓ ↓ ↑ Oxidised </p>	H ₂	CuO

31. Trace the sequence of events which occur when a bright light is focused on your eyes.

Ans: When a bright light enters the eye then most of the refraction for the light rays entering the eye occurs at the outer surface of the cornea. Then, the crystalline lens merely provides the finer adjustment of focal length required to focus object at different distances on the retina. The pupil regulates and controls the amount of light entering the eye. At retina, the light-sensitive cells get activated upon illumination and generate electric signals. These signals are sent to the brain via the optic nerves. The brain interprets these signals and finally, processes the information so that we perceive objects as they are.

32. A student takes three beakers A, B and C filled with aqueous solutions of glucose, alcohol and hydrochloric acid respectively as shown in the following figures :



- (a) State your observation in terms of glowing of bulb when the switch is 'ON'.
 (b) Justify your observations by giving reason in each case.
 (c) Mention the change noticed with appropriate reason if the content of beaker B is replaced by sodium hydroxide solution.

Ans: (a) Bulbs in beakers A and B do not glow, while the bulb glows in beaker C.

(b) Glucose and alcohol solutions do not conduct electricity as they do not give ions. Dilute hydrochloric acid gives ions, so the flow of ions is responsible for the flow of current, and hence the bulb glows in beaker C.

(c) After replacement, bulb glows in beaker B as sodium hydroxide solution gives ions (Na⁺ and OH⁻).

33. (a) "Veins are thin walled and have valves". Justify the statement.

(b) In birds and mammals the left and right side of the heart are separated. Give reason.

Ans: (a) Veins have thin, less elastic and muscular walls because the blood flowing through them is no longer under pressure instead, they have valves to ensure that the blood flows in one direction only.

(b) The separation of left and right sides of heart in birds and mammals prevent mixing of oxygenated and deoxygenated blood and allow a highly efficient supply of oxygen to the body. This is useful in animals that have high energy needs (birds and mammals) which constantly use energy to maintain their body temperature.

OR

What are the necessary conditions for photosynthesis? How is it significant to mankind?

Ans: The necessary conditions for photosynthesis are the presence of sunlight, chlorophyll, carbon dioxide and water. It is significant to human beings in the following ways :

(i) It helps in maintaining the equilibrium of oxygen in atmosphere.

(ii) It provides us food, directly or indirectly.

(iii) It provides a huge source of energy in the form of coal, wood, petroleum, etc.

SECTION – D

Questions 34 to 36 carry 5 marks each.

34. Equal lengths of magnesium ribbons are taken in two test tubes (A) and (B). H₂SO₄ is added to test tube (A) and H₂CO₃ in test tube (B) in equal amounts.

(a) Identify the test tube which will show vigorous reaction.

(b) Give reason to support your answer.

(c) Name the gas liberated in both the test tubes. How will you prove its liberation?

(d) Write chemical equations for both the reactions.

(e) Out of the two acids taken above, which one will have lower pH value and lower H⁺ ion concentration respectively?

Ans: (a) Vigorous reaction will be seen in test tube (A).

(b) This is because H₂SO₄ is a stronger acid than H₂CO₃.

(c) Hydrogen gas is liberated in both the test tubes. When we bring a burning candle near the evolving gas, it burns with a pop sound. This proves that the produced gas is hydrogen gas.

(d) $\text{Mg(s)} + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{MgSO}_4(\text{aq}) + \text{H}_2(\text{g})$

$\text{Mg(s)} + \text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{MgCO}_3(\text{aq}) + \text{H}_2(\text{g})$

(e) H₂SO₄ has lower pH value and H₂CO₃ has lower H⁺ ion concentration.

OR

(a) What will you observe when

(i) Methyl orange is added to dilute hydrochloric acid

(ii) A drop of phenolphthalein is added to the solution of lime water?

(b) What is an acid-base indicator? Give two examples of synthetic acid-base indicators.

(c) What are olfactory indicators? Name two substances which can be used as olfactory indicators?

(d) Solutions X, Y and Z have pH values 8, 10 and 12 respectively. Arrange them in increasing order of basic strength.

Ans: (a) (i) In acidic solution, the colour of methyl orange will change to red.

(ii) Lime water contains calcium hydroxide, $\text{Ca}(\text{OH})_2$. It is therefore, basic in nature. The colour of phenolphthalein will become pink.

(b) An acid-base indicator is a substance which has one colour in the acidic medium and a different colour in the basic medium. Two examples of synthetic indicators are phenolphthalein and methyl orange.

(c) Olfactory indicators are those substances which have one odour in acidic medium and a different odour in basic medium. For example, onions, vanilla essence and clove oil can act as olfactory indicators.

(d) $[\text{H}^+]$ of solution X = 10^{-8}

$[\text{H}^+]$ of solution Y = 10^{-10}

$[\text{H}^+]$ of solution Z = 10^{-12}

$\therefore [\text{OH}^-]$ of solution X = 10^{-6}

$[\text{OH}^-]$ of solution Y = 10^{-4}

$[\text{OH}^-]$ of solution Z = 10^{-2}

\therefore Increasing order of their basic strength is $X < Y < Z$.

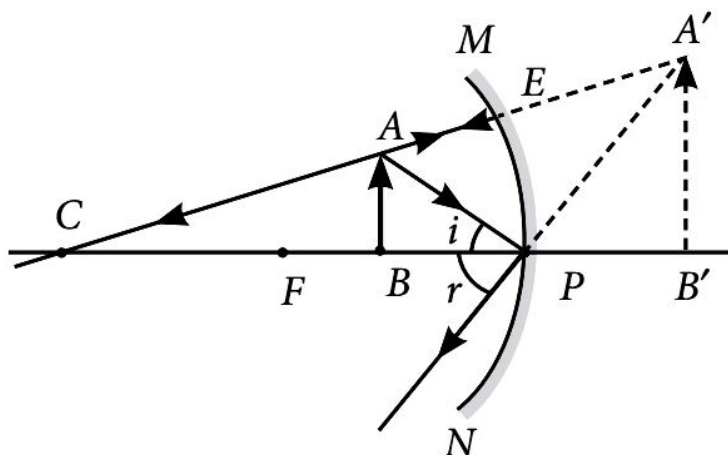
35. (a) To construct a ray diagram we use two rays which are so chosen that it is easy to know their directions after reflection from the mirror. Use these two rays and draw ray diagram to locate the image of an object placed between pole and focus of a concave mirror.

(b) A concave mirror produces four times magnified image on a screen. If the objects placed 30 cm in front of the mirror, how far is the screen from the object?

Ans: (a) Two lights rays whose path of reflection are priorly known are :

(i) When the incident ray passes through the centre of curvature of a concave mirror, it gets reflected in the same path.

(ii) When the ray is incident obliquely to the principal axis, towards the pole of mirror, it gets reflected back by making equal angles with the principal axis (laws of reflections).



Suppose an object is placed between focus and pole of the concave mirror. Then by using the above two rays, the image of the object can be located as Image formed is virtual, erect, magnified and it is formed behind the mirror.

(b) Given, magnification, $m = -4$,

Object distance, $u = -30$ cm

Magnification, $m = -v/u$ or $-4 = -v/-30$ or $v = -120$ cm

The screen is placed in front of the mirror at a distance of 120 cm from the pole. Thus, the screen is placed 90 cm ($= 120$ cm - 30 cm) away from the object.

OR

A student focussed the image of a candle flame on a white screen using a convex lens. He noted down the position of the candle screen and the lens as under

Position of candle = 12.0 cm, Position of convex lens = 50.0 cm, Position of the screen = 88.0 cm

(i) What is the focal length of the convex lens?

(ii) Where will the image be formed if he shifts the candle towards the lens at a position of 31.0 cm?

- (iii) What will be the nature of the image formed if he further shifts the candle towards the lens?
 (iv) Draw a ray diagram to show the formation of the image in case (iii) as said above.

Ans: Distance of object (candle) from lens, $u = 12 \text{ cm} - 50 \text{ cm} = -38 \text{ cm}$

Distance of image from lens, $v = 88 \text{ cm} - 50 \text{ cm} = 38 \text{ cm}$

(i) Using lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u} = \frac{1}{38} - \frac{1}{-38} = \frac{1}{38} + \frac{1}{38} = \frac{2}{38} \Rightarrow f = \frac{38}{2} = 19 \text{ cm}$

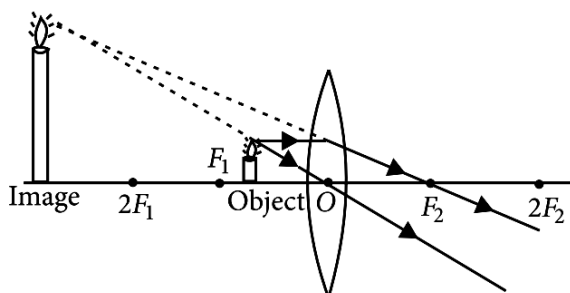
(ii) New position of object, $u = 31 \text{ cm} - 50 \text{ cm} = -19 \text{ cm}$

From lens formula, $\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{19} - \frac{1}{19} = 0 \Rightarrow v = \infty$

The image forms at infinity.

(iii) If the student further shifts the candle towards the lens, the candle will lie between focus and optical centre of the convex lens. Therefore, the image will be enlarged, virtual and erect and on the same side of the lens as the object.

(iv)



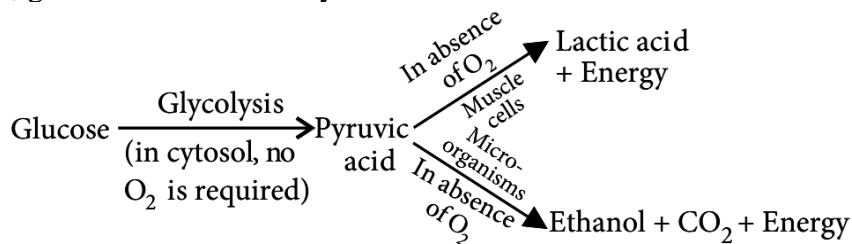
36. (a) What are two different ways in which glucose is oxidised to provide energy in various organisms?

(b) Write any two differences between the two ways of oxidation of glucose in organisms.

Ans: (a) Oxidation of food (glucose) within cell may be of two types depending upon the availability of atmospheric oxygen: aerobic respiration and anaerobic respiration.

(i) **Aerobic respiration:** The oxidative breakdown of respiratory substrates with the help of atmospheric O_2 is known as aerobic respiration. During this process, the respiratory substrate (glucose) is completely broken down into carbon dioxide and water by the process of oxidation and large amount of energy (38 ATP) is produced. Aerobic respiration includes glycolysis which is common to both aerobic and anaerobic respiration. The pyruvic acid (pyruvate) molecules formed during glycolysis are carried to the mitochondria where they completely break down into CO_2 and H_2O with the evolution of a large amount of energy.

(ii) **Anaerobic respiration:** Oxidation of respiratory substrates in absence of oxygen is termed as anaerobic respiration. It involves incomplete breakdown of respiratory substrates in which the end products, such as ethanol or lactic acid are formed and small amount of energy is released. It involves glycolysis, during which glucose is degraded into pyruvate. Further breakdown of pyruvic acid in absence of oxygen result in the production of ethanol or lactic acid. Anaerobic oxidation of glucose in microorganisms forms ethanol and CO_2 and in muscle cells of humans, glucose is anaerobically metabolised into lactic acid.



(b) Differences between aerobic and anaerobic respiration are as follows:

S.No.	Aerobic respiration	Anaerobic respiration
(i)	Aerobic respiration occurs in presence of oxygen.	Anaerobic respiration occurs in absence of oxygen.
(ii)	Glucose is completely broken down to release the end products in the form of carbon dioxide and water.	Glucose is incompletely oxidised to release the end products in the form of ethanol or lactic acid.

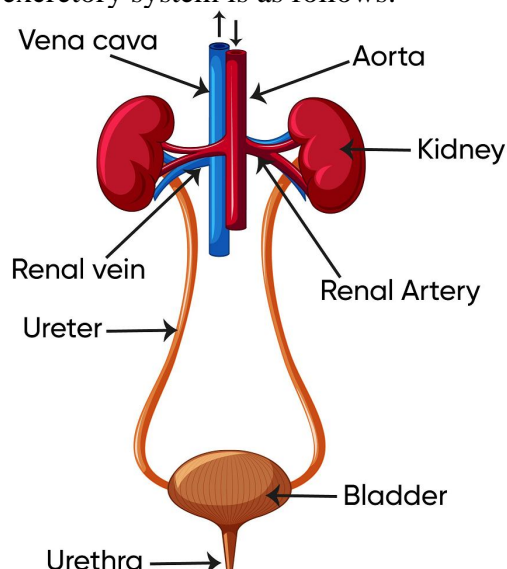
(iii)	Energy is released in larger amount.	Energy is released in lesser amount.
(iv)	It takes place in cytoplasm and mitochondria.	It takes place only in cytoplasm. The mitochondria is not involved.

OR

(a) Draw a diagram of excretory system in human beings and label on it : aorta, vena cava, urinary bladder and urethra.

(b) Write in brief the function of following : (i) Ureter (ii) Urethra (iii) Urinary bladder (iv) Kidney

Ans: (a) Diagram of human excretory system is as follows:



(b) (i) Ureter : Each ureter is a tube that carries urine from kidneys to urinary bladder by peristalsis.

(ii) Urethra : It is the structure through which urine is passed out from the body.

(iii) Urinary bladder : It is a pear-shaped muscular reservoir that stores urine before it is discharged.

(iv) Kidney : It regulates the pH of blood, maintains constant concentration of blood plasma, homeostasis and helps conversion of inactive form of vitamin D to the active form.

SECTION – E(Case Study Based Questions)

Questions 37 to 39 carry 4 marks each.

37. Case Study – 1

The introduction of disposable plastic cups was hailed as a step forward for reasons of hygiene. These cups made up of clay are the most commonly found solid wastes and cause environmental pollution.



Kulhad tea cups, deeply rooted in Indian tradition, are charming, eco-friendly vessels that enhance the tea-drinking experience. Crafted from natural .



- (a) Kulhads are not recommended over plastic paper disposable cups. Why?
 (b) What would be the advantages of disposable paper cups over disposable plastic cups?

OR

The committee members of Aryan's society placed two bins-green coloured and blue coloured in their premises for garbage collection. Given is the list of few solid wastes generated in his society. Segregate the wastes in their respective bins.

Paper cup, credit card, fruit and vegetables peels, cardboard, metal rod, aluminium foil, plastic key chain, pencil, glass sheet

Ans: (a) Sometime back, kulhads were suggested as an alternative of disposable plastic cups for use in trains. However, little thought discouraged this suggestion as making these kulhads on a large scale would have resulted in the loss of the fertile top soil.

(b) Disposable paper cups are easily disposable and degradable so these are better than non-degradable plastic cups.

OR

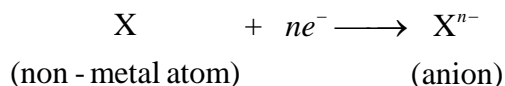
Green bin is used for disposing biodegradable wastes while blue bin is used for disposing non-biodegradable wastes.

Green Bin: Paper cup, fruits and vegetable peels, cardboard, pencil.

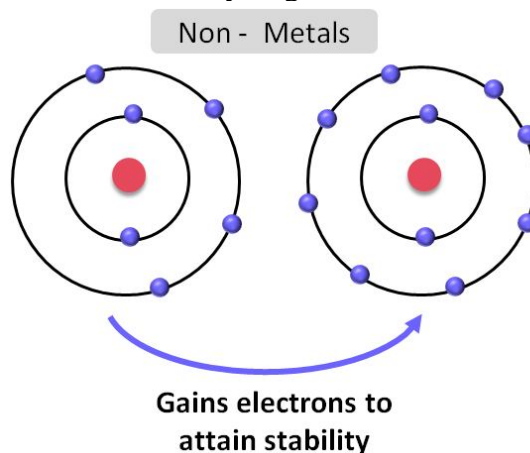
Blue bin: Credit card, metal rod, aluminium foil, plastic key chain, glass sheet

38. Case Study – 2

Non-metals are highly electronegative in nature. They have a tendency to gain electrons in their valence shell to achieve nearest noble gas configuration. Thus, they form anions and act as good oxidizing agents.



They react with air or oxygen on heating to form oxides which react with water to form acids. Thus, nonmetal oxides are acidic in nature. Non-metals do not react with dilute acids at all. This is because they are electronegative and therefore, cannot displace hydrogen from acids but they form covalent hydrides when heated with hydrogen.

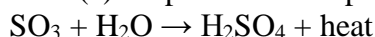


- (a) Name the acid formed when Sulphur trioxide reacts with water.
 (b) An element 'X' forms an oxide XO_2 , which is a very useful gas for the process of photosynthesis. Name the element 'X'.
 (c) Name any two non-metals which form covalent hydrides.

OR

An element Y gains two electrons. What will it form, cation or anion? Write its formula.

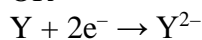
Ans: (a) Sulphuric acid is produced on reaction of sulphur trioxide with water. The reaction is



(b) Carbon forms CO_2 on reaction with oxygen. During photosynthesis, plants take in CO_2 . Hence, element 'X' is C.

(c) Carbon and sulphur are non-metals that form covalent hydrides.

OR



It will form an anion.

39. Case Study - 3

The electrical energy consumed by an electrical appliance is given by the product of its power rating and the time for which it is used. The SI unit of electrical energy is Joule. Actually, Joule represents a very small quantity of energy and therefore it is inconvenient to use where a large quantity of energy is involved. So, for commercial purposes we use a bigger unit of electrical energy which is called kilowatt hour. 1 kilowatt-hour is equal to 3.6×10^6 joules of electrical energy.

(a) The electrical refrigerator rated 400 W operates 8 hours a day. The cost of electrical energy is Rs. 5 per kWh. Find the cost of running the refrigerator for one day?

(b) Calculate the energy transformed by a 5 A current flowing through a resistor of 2Ω for 30 minutes?

(c) State the difference between kilowatt and kilowatt hour.

OR

Converts the 250 kWh into energy?

Ans: (a) Given: $P = 400 \text{ W}$, $t = 8 \text{ hour}$

$$E = 400 \times 8 = 3200 \text{ Wh} = 3.2 \text{ kWh}$$

$$\therefore \text{Cost} = 3.2 \times 5 = \text{Rs. } 16$$

(b) Given: $I = 5 \text{ A}$, $R = 2 \Omega$, $t = 30 \text{ min}$

$$E = I^2 R t = 5 \times 5 \times 2 \times 30 \times 60$$

$$\therefore E = 90000 \text{ J} = 90 \text{ kJ}$$

(c) Kilowatt is unit of power and kilowatt hour is unit of energy.

OR

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

$$\text{So, } 250 \text{ kWh} = 250 \times 10^3 \times 3600 \Rightarrow 9 \times 10^8 \text{ J}$$