BRAIN INTERNATIONAL SCHOOL
SESSION 2025-26

PRACTICE PAPER 1
CLASS X
SUBJECT- SCIENCE (086)

Time: 3 Hours **Max. Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in some-questions. A student is expected to attempt only one of these questions.

SECTION-A

1. Which of the following represents the correct sequence of events in the nutrition of Amoeba?
(a) Digestion → Ingestion → Absorption → Assimilation → Egestion
(b) Ingestion → Digestion → Absorption → Assimilation → Egestion
(c) Egestion → Ingestion → Digestion → Absorption → Assimilation
(d) Ingestion → Assimilation → Digestion → Absorption → Egestion

2. The nerve impulse is the signal transmitted along a nerve fibre. What is the correct pathway for the flow of this impulse within a single neuron?
(a) Axon terminal → Cell body → Dendrite
(b) Cell body → Axon → Dendrite
(c) Dendrite → Cell body → Axon terminal
(d) Axon terminal → Dendrite → Cell body

3. There are various methods to prevent pregnancy. Which of the following contraceptive methods also provides protection from acquiring sexually transmitted diseases (STDs)?
(a) Copper-T (b) Oral Pills
(c) Condom (d) Tubectomy

4. In a classic Mendelian monohybrid cross, when a heterozygous tall pea plant (Tt) from the F1 generation is self-pollinated, what is the resulting phenotypic ratio of tall to dwarf plants in the F2 generation?
(a) 1:1 (b) 1:2
(c) 3:1 (d) 2:1

5. In any ecosystem, certain organisms are responsible for breaking down complex organic substances from dead plants and animals into simpler inorganic substances. What are these essential organisms called?
(a) Producers (b) Primary Consumers
(c) Carnivores (d) Decomposers

6. Consider the following statements about the human heart:
(i) The human heart is a four-chambered organ.
(ii) The right ventricle pumps oxygenated blood to the lungs.
(iii) The wall of the left ventricle is thicker than the wall of the right ventricle.
(iv) Valves ensure that blood flows in only one direction through the heart.

Which of the above statements are correct?

(a) (i), (iii), and (iv)
(b) (i) and (ii) only
(c) (ii) and (iv) only
(d) All are correct.

7. Fertilization in flowering plants is the fusion of male and female gametes. Where does this process typically take place?
   (a) On the surface of the stigma.
   (b) Inside the growing pollen tube.
   (c) Within the anther of the stamen.
   (d) Inside the ovule, which is located within the ovary.

8. **Assertion (A) :** Abscisic acid is referred to as a "stress hormone" in plants.
   Reason (R) : The production of abscisic acid in plants stimulates the closure of stomata, which helps to reduce water loss during dry conditions.
   (a) Both A and R are true, and R is the correct explanation of A.
   (b) Both A and R are true, and R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) A is false but R is true.

9. **Assertion(A) :** All variations that arise in a species have an equal chance of survival.
   Reason (R) : Natural selection favors variations that provide a survival advantage in a particular environment.
   (a) Both A and R are true, and R is the correct explanation of A.
   (b) Both A and R are true, and R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) A is false but R is true.

10. While plants generate oxygen during the day, they produce carbon dioxide at night. Justify this statement.

11. Student to attempt either option A or B.
   A. How is the process of breathing different in aquatic organisms compared to terrestrial organisms? Explain why the rate of breathing in aquatic organisms is much faster.

   OR

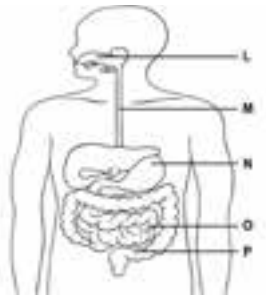
   B. What is translocation in plants? Name the tissue responsible for it and the form in which the food is transported.

12. In a grassland ecosystem, the following organisms are present:
   Grass, Grasshopper, Hawk, Lizard, and Snake. Construct two distinct food chains from this ecosystem, each starting with the producer.

13. Draw a neat diagram of a reflex arc showing the pathway of a reflex action when a person accidentally touches a hot object. Label the key components involved.

14. In pea plants, a pure tall plant (TT) is crossed with a pure short plant (tt).
   (i) What is the phenotype and genotype of the F1 generation?
   (ii) If the F1 plants are self-pollinated, what will be the ratio of pure tall, hybrid tall, and dwarf plants obtained in the F2 generation? Show the cross.

15. A student had a meal containing rice and lentils (dal). Refer to the figure of the human alimentary canal to the following questions.



Human Alimentary canal

Attempt either subpart A or B.

A. Name the component in rice that is the primary source of energy. Where does its digestion begin and which enzyme is responsible?

OR

B. Lentils are a rich source of protein. Describe the process of protein digestion that occurs in the stomach (Part N) and the small intestine (Part O).

C. How is the small intestine (Part O) designed to maximize the absorption of digested food?

16. Attempt either option A or B

A. (i) A student observed a slice of bread with a cottony growth after leaving it in a moist, dark place. Identify the organism and its mode of reproduction.
(ii) Explain how this mode of reproduction helps the organism to survive unfavourable conditions.
(iii) State one key advantage of sexual reproduction over this method.

OR

B. (i) Draw a labelled diagram of the longitudinal section of a flower.
(ii) List any three changes that take place in a flower after fertilization which lead to the formation of fruit and seed.
(iii) What is the function of the sepals and petals in a flower?

SECTION-B

17. Which of the following equations represent redox reactions and what are the values for 'p' and 'q' in these equations?

Equation 1 : $pAgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g)$

Equation 2 : $Zn(s) + qHCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

(a) Only equation 1 is a redox reaction, p = 1 and q = 2
(b) Only equation 2 is a redox reaction, p = 2 and q = 1
(c) Both equations 1 and 2 are redox reactions, p = 2 and q = 2
(d) Neither equation is a redox reaction, p = 1 and q = 1

18. Four statements about the reactions of oxides are listed.

I. Lead(II) oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide.
II. Magnesium oxide reacts with dilute hydrochloric acid but does not react with aqueous sodium hydroxide.
III. Copper(II) oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide.
IV. Sodium oxide reacts with aqueous sodium hydroxide but not with dilute hydrochloric acid.

Which statements are correct?

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

19. A strip of zinc is added to a test tube containing aqueous ferrous sulphate, and a copper wire is added to another test tube containing aqueous zinc sulphate. Which of the following observations is correct?

(a) The green solution in the first test tube turns colourless, and the second test tube remains colourless with no change.
(b) There is no reaction in the first test tube, but the blue solution in the second test tube turns colourless.
(c) A brown coating is observed on the zinc strip, and a grey coating is observed on the copper wire.
(d) The solution in both test tubes turns black, and a gas is evolved.

20. What change would you observe if you put blue litmus paper and red litmus paper into a sample of soap solution?

	Colour change on Blue Litmus	**Colour change on Red Litmus**
a	No change	Turns blue
b	Turns red	No change
c	Turns red	Turns blue
d	No change	No change

21. Which of the following substances, when mixed with water, will result in a solution with the lowest pH value?

(a) Milk of Magnesia
(b) Human Blood
(c) Gastric juice from the stomach
(d) Pure Water

22. When dilute hydrochloric acid is added to solid sodium carbonate placed in a test tube, the observation is:

(a) A reddish-brown gas is evolved.
(b) The solution turns milky, and the test tube becomes hot.
(c) Brisk effervescence is seen due to the evolution of a colourless, odourless gas.
(d) A yellow precipitate is formed.

23. In the reaction of an aqueous solution of lead(II) nitrate with an aqueous solution of potassium iodide, the insoluble substance formed is:

(a) KNO_3
(b) $Pb(NO_3)_2$
(c) KI
(d) PbI_2

24. **Assertion (A) :** Soaps are not effective cleansing agents in hard water.
Reason (R) : Soaps form insoluble precipitates (scum) on reaction with calcium and magnesium ions present in hard water.

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

25. Answer the following:

(a) School bells are designed to be sonorous. Why are they made of metals like brass or bronze and not wood?
(b) Aluminium metal is highly malleable. How is this property utilized in the food industry?

26. Attempt either option A or B.

(A) An element 'Y' is the most abundant metal in the earth's crust. It is extracted by the electrolytic reduction of its molten oxide. This metal readily forms a thin, tough, and non-porous oxide layer on its surface upon exposure to air.

(i) Identify the element 'Y'.

(ii) Explain why electrolytic reduction is necessary for its extraction.

(iii) Write the chemical equation for the reaction that takes place at the cathode during its electrolysis.

OR

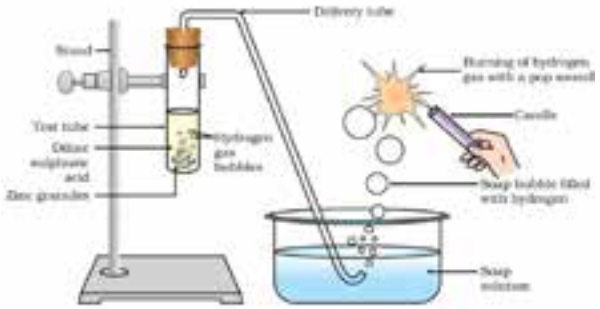
(B) Galvanisation is a common method used to protect iron articles from rusting.

(i) Name the metal used to provide the coating on iron during galvanisation.

(ii) Explain how this coating prevents rusting, even when the coating is scratched and the iron is exposed.

(iii) Suggest one other method apart from galvanisation and painting that can be used to prevent the rusting of iron.

27. A student sets up an apparatus for the reaction of zinc granules with dilute sulphuric acid as depicted.



(a) What would the student observe happening near the surface of the zinc granules?

(b) Name the gas evolved in this process. How can its presence be tested in the laboratory?

(c) If the student touches the bottom of the flask after the reaction starts, what change in temperature would be felt? Justify your answer.

28. A farmer found that the soil in his fields was very acidic with a pH of around 4.5, resulting in poor crop growth. An agricultural expert advised him to add either quick lime (calcium oxide), slaked lime (calcium hydroxide), or chalk (calcium carbonate) to the soil.

(a) Why is highly acidic soil detrimental to crop growth?

(b) Explain why the addition of any of the three suggested substances can improve the soil quality.

(c) Write a balanced chemical equation showing the neutralisation of soil acid (assume sulphuric acid, H_2SO_4) with slaked lime.

OR

A baker prepared a cake batter and added baking soda. However, he forgot to add another key dry ingredient, causing the final cake to have a bitter, soapy taste.

(a) What crucial ingredient, usually found mixed with baking soda in 'baking powder', did he likely forget? Why is this ingredient necessary?

(b) What is the chemical name and formula of baking soda?

(c) Explain the role of baking soda in making the cake soft and spongy, and write the chemical equation for the reaction that occurs when it is heated.

29. Attempt either option A or B.

(A) An organic compound 'A' has the molecular formula C_2H_6O and is a common solvent and the active ingredient in alcoholic beverages. When 'A' is warmed with alkaline potassium permanganate solution, it gets converted to an organic acid 'B'. When 'A' and 'B' are heated together in the presence of a few drops of concentrated sulphuric acid, a new compound 'C' with a fruity smell is formed.

(a) Identify the compounds 'A', 'B', and 'C'.
(b) Write the balanced chemical equation for the conversion of 'A' to 'B'.
(c) What is the general name for the process of formation of 'C'?
(d) Draw the electron dot structure for compound 'A'.
(e) What is the role of concentrated sulphuric acid in the formation of 'C'?

OR

(B) Carbon is an element that forms the basis for all life. It belongs to Group 14 of the periodic table and exhibits unique properties.

(a) What is the valency of Carbon? Name the property of carbon which allows it to form long chains with itself.
(b) Carbon exists in various forms with different physical properties but identical chemical properties. What are these different forms called? Name one hard and one soft crystalline form.
(c) Draw the structure of the hard crystalline form you named in part (b).
(d) What type of bonds are present in compounds of carbon? Give a reason why these compounds are generally poor conductors of electricity.
(e) Write the name and draw the electron dot structure of the simplest compound formed between carbon and hydrogen.

SECTION-C

30. A student observed the reflection of light from different types of spherical mirrors and made the following statements:

I. A concave mirror can form a magnified and real image of an object.
II. A convex mirror can only form a virtual image of an object.
III. The magnification produced by a concave mirror can be negative.

Choose from the following the correct option that lists the correct statements.

(a) I and II
(b) I and III
(c) I, II and III
(d) II and III

31. Choose the correct option from the below which explains the reason for us to perceive the day sky as blue.

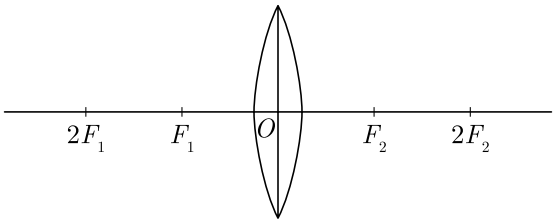
(a) As sunlight passes through the atmosphere, shorter wavelengths, such as blue are scattered more than other colors.
(b) The sky appears blue because all colors are scattered equally, but blue light is stronger and more visible to the human eye.
(c) The blue color of the sky is due to longer wavelengths like red and orange scattering more than shorter wavelengths, making blue stand out.
(d) The atmosphere contains blue-colored particles that give the sky its blue appearance.

32. **Assertion (A) :** A point object is placed at a distance of 26 cm from a convex mirror of focal length 26 cm. The image will not form at infinity.

Reason (R) : For above given system the equation $1/f = 1/v + 1/u$ gives v = ∞.

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

33.



The above image shows the lens is placed on the axis

A. Which type of the lens is used in the above diagram ?

B. Complete the diagram in your answer book

C. Write the nature of the image formed.

34. Attempt either option A or B.

A. Two identical resistors of 24 Ω each are connected to a battery of 6 V. Calculate the ratio of the power consumed by the resulting combinations with

(a) Minimum resistance and

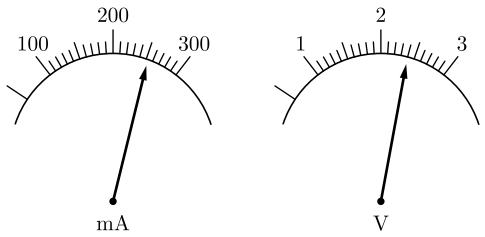
(b) Maximum resistance.

OR

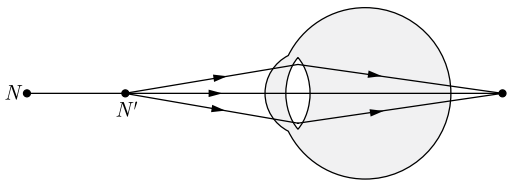
B. The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively :

(a) What are the least counts of these meters?

(b) What is the resistance of the resistor?



35. Study the diagram given below and answer the questions that follow :



(i) Name the defect of vision represented in the diagram. Give reason for your answer.

(ii) List two causes of this defect.

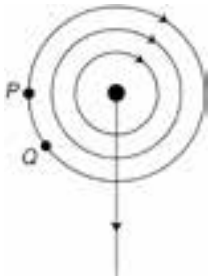
(iii) With the help of a diagram show how this defect of vision is corrected.

36. A wire is cut into three equal parts and then connected in parallel. How will its :

(a) Resistance

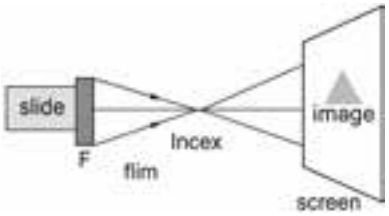
(b) Resistivity get effected ?

37. The magnetic field lines are shown around a current-carrying straight conductor. A student claims that the magnetic field strength at point P is stronger than at point Q.



(i) Is the student's claim correct? Give reason.
(ii) Redraw the diagram and mark the direction of magnetic field lines using right-hand thumb rule.

38. A multimedia projector is often used in classrooms and seminar halls to project enlarged images of slides or digital content onto a distant screen. The arrangement generally consists of a powerful light source and a convex lens, which is adjusted to obtain a sharp image on the screen. The clarity of the image depends on the lens–screen distance, as well as the focal length of the convex lens used in the projector. The figure below illustrates how the slide is kept between the focus and the lens to form a magnified real image on the screen.



A. Which type of lens is used in the projector?
B. What type of image is formed on the screen?
Attempt either subpart C or D.
C. The projector lens has focal length $f = 10\text{cm}$. The sharp image is obtained on a screen 200cm behind the lens. Find the object (slide) distance u from the lens.

OR

D. If the slide height is 2.0cm and the image distance is 200cm (with the same lens as above), calculate the image height.

39. Attempt either option A or B.
A. A household uses the following electric appliances :
(i) refrigerator of rating 400 W for 10 hours each day.
(ii) two electric fans of rating 80 W each for 6 hours daily.
(iii) six electric tubes of rating 18 W each for 6 hours daily.
Calculate the electricity bill for the household for month of June, if cost of electrical energy is ₹ 3.00 per unit.

OR

B. The values of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are given below:

I (ampere)	0.5	1.0	2.0	3.0	4.0
V (volt)	1.6	3.4	6.7	10.2	13.2

Plot a graph between V and I and calculate the resistance of the resistor.

BRAIN INTERNATIONAL SCHOOL
SESSION 25-26

PRACTICE PAPER 2
CLASS X
SUBJECT- SCIENCE (086)

Time: 3 Hours **Max. Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in somequestions. A student is expected to attempt only one of these questions.

SECTION-A

1. Plants need to get rid of waste products just like animals. Through which of the following structures do plants excrete gaseous waste products like oxygen?
(a) Stomata and Lenticels
(b) Xylem and Phloem
(c) Roots and Bark
(d) Flowers and Fruits

2. The rapid folding of the leaves of a 'touch-me-not' plant (Mimosa pudica) upon being touched is an example of which type of plant movement?
(a) Phototropism
(b) Geotropism
(c) Nastic movement
(d) Chemotropism

3. In the human female reproductive system, the process of fertilization, where the sperm fuses with the ovum, typically takes place in which specific location?
(a) Uterus
(b) Vagina
(c) Ovary
(d) Oviduct (Fallopian tube)

4. In the study of genetics, the term used to describe the observable physical traits of an organism, such as its height, eye colour, or hair texture, is its:
(a) Genotype
(b) Phenotype
(c) Allele
(d) Chromosome

5. An ecosystem is composed of both living and non-living components. Which of the following lists contains only the abiotic components of an ecosystem?
(a) Sunlight, Soil, Bacteria, Water
(b) Temperature, Fungi, Air, Soil
(c) Water, Air, Sunlight, Temperature
(d) Plants, Air, Water, Animals

6. Consider the following statements regarding the process of human digestion:
   (i) The digestion of starch begins in the mouth by the action of salivary amylase.
   (ii) Pepsin is the primary enzyme in the stomach that digests proteins in an acidic medium.
   (iii) Bile juice, produced by the liver, contains powerful enzymes for digesting fats.
   (iv) Trypsin, found in the small intestine, acts on proteins and breaks them down.
   Which of the above statements are correct?
   (a) (i) and (iii) only
   (b) (i), (ii), and (iv)
   (c) (ii) and (iv) only
   (d) All are correct.

7. The regulation of blood sugar levels is a classic example of a hormonal feedback mechanism. Which hormones are responsible for lowering and raising blood sugar levels, respectively?
   (a) Glucagon and Insulin
   (b) Insulin and Glucagon
   (c) Adrenaline and Thyroxine
   (d) Thyroxine and Adrenaline

8. **Assertion(A) :** Decomposers play a critical role in every ecosystem.
   Reason (R) : They are responsible for breaking down dead organic matter and returning essential nutrients to the soil, which are then used by producers.
   (a) Both A and R are true, and R is the correct explanation of A.
   (b) Both A and R are true, and R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) A is false but R is true.

9. **Assertion (A) :** A plant grown from a cutting will be genetically identical to the parent plant.
   Reason (R) : This method of reproduction, known as vegetative propagation, involves the fusion of gametes from two different parents.
   (a) Both A and R are true, and R is the correct explanation of A.
   (b) Both A and R are true, and R is not the correct explanation of A.
   (c) A is true but R is false.
   (d) A is false but R is true.

10. "The release of energy in aerobic respiration is much larger than in anaerobic respiration." Provide two reasons to justify this statement.

11. Student to attempt either option A or B.
   A. Differentiate between arteries and veins based on the thickness of their walls and the type of blood they generally carry.

   OR

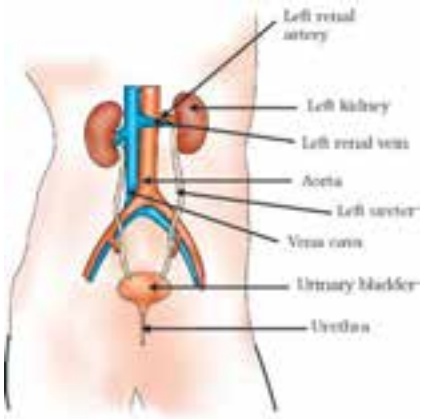
   B. Explain the role of kidneys in osmoregulation in the human body.

12. The overuse of fertilizers in agricultural fields often leads to the enrichment of nearby water bodies with chemicals, a process called eutrophication. How does this process affect the aquatic life in the water body?

13. Draw a neat diagram of the human brain and label the following parts:
(i) Cerebrum
(ii) Cerebellum
(iii) Medulla

14. A man with blood group A marries a woman with blood group B, and they have a child with blood group O.
(i) What are the genotypes of the parents?
(ii) Show the possible genotypes and phenotypes of the offspring with a cross.
(iii) What is the probability of them having a child with blood group AB?

15. Observe the given diagram showing a part of the human excretory system. the questions that follow.



A. Identify the structural and functional unit of the part labelled 'Kidney'. Draw its neat labelled diagram.

OR

B. Describe the process of urine formation in a human kidney, focusing on ultrafiltration and selective reabsorption.
C. What happens to the glucose that enters the nephron along with the filtrate? What does the presence of glucose in urine indicate?

16. Attempt either option A or B.
A. (i) Name the type of fission carried out by Leishmania. How is it different from the fission in Amoeba?
(ii) What is regeneration? Give an example of an organism that shows this ability. Can regeneration be considered a mode of reproduction? Why?

OR

B. (i) Identify the male and female reproductive parts of a flower. State the function of each.
(ii) What is pollination? Differentiate between self-pollination and cross-pollination.
(iii) Mention one agent of cross-pollination.

SECTION-B

17. Analyze the following chemical equations and identify the correct values for 'p' and 'q'.
Equation 1 : $pMg(s) + O_2(g) \rightarrow 2MgO(s)$

Equation 2 : $2Pb(NO_3)_2(s) \xrightarrow{\text{Heat}} qPbO(s) + 4NO_2(g) + O_2(g)$
(a) p = 1, q = 1
(b) p = 2, q = 4
(c) p = 1, q = 2
(d) p = 2, q = 2

18. When dissolved in water, which of the following oxides is most likely to form a solution with a pH value greater than 7?
(a) SO_2 (Sulphur dioxide)
(b) CO_2 (Carbon dioxide)
(c) K_2O (Potassium oxide)
(d) N_2O_5 (Dinitrogen pentoxide)

19. A student places a clean strip of magnesium metal into a test tube containing a blue solution of copper(II) sulphate. What is the expected observation after some time?
(a) The solution remains blue, and a greyish layer deposits on the strip.
(b) A colourless, odourless gas is evolved, and the strip dissolves completely.
(c) The blue colour of the solution fades, and a reddish-brown solid is deposited on the strip.
(d) No reaction occurs, and the appearance of the solution and the strip remains unchanged.

20. A few drops of phenolphthalein indicator are added separately to a solution of vinegar and a solution of washing soda. What are the observed colours?

	Colour in Vinegar	**Colour in Washing Soda Solution**
A	Pink	Colourless
B	Colourless	Pink
C	Orange	Yellow
D	Colourless	Colourless

21. Arrange the following common substances in the increasing order of their pH values: Lemon Juice, Toothpaste, Sodium Hydroxide Solution, Distilled Water.
(a) Lemon Juice < Toothpaste < Distilled Water < Sodium Hydroxide Solution
(b) Distilled Water < Lemon Juice < Toothpaste < Sodium Hydroxide Solution
(c) Lemon Juice < Distilled Water < Toothpaste < Sodium Hydroxide Solution
(d) Sodium Hydroxide Solution < Toothpaste < Distilled Water < Lemon Juice

22. Dilute sulphuric acid is added to sodium hydrogen carbonate. The gas evolved is then passed through freshly prepared lime water. What is the final observation?
(a) A reddish-brown gas is seen, which turns lime water orange.
(b) No gas is evolved.
(c) Brisk effervescence occurs, and the gas turns lime water milky.
(d) The solution becomes hot, and the lime water remains clear.

23. Consider the reaction : $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq) + \text{Heat}$ This reaction can be classified as:

(i) Combination reaction

(ii) Exothermic reaction

(iii) Decomposition reaction

(iv) Endothermic reaction

(a) (iii) and (iv)

(b) (i) and (ii)

(c) (i) and (iv)

(d) (ii) and (iii)

24. **Assertion (A) :** Synthetic detergents can be used for washing clothes even in hard water.
Reason (R) : The charged ends of detergent molecules form soluble salts with the calcium and magnesium ions present in hard water.

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

(b) Both A and R are true, and R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

25. Answer the following based on the properties of metals:

(a) The electrical wiring in homes is typically made of copper or aluminium. Which property of these metals makes them suitable for this purpose?

(b) Gold can be drawn into extremely thin wires, some just a few micrometers thick. Name the property responsible for this characteristic.

26. Attempt either option A or B.

(A) The chief ore of a metal 'M' is Cinnabar (HgS). This metal is placed low in the reactivity series.

(i) Identify the metal 'M'.

(ii) Name the process used to convert the sulphide ore into its oxide and write the balanced chemical equation for the reaction.

(iii) How is metal 'M' subsequently extracted from its oxide? Write the equation.

OR

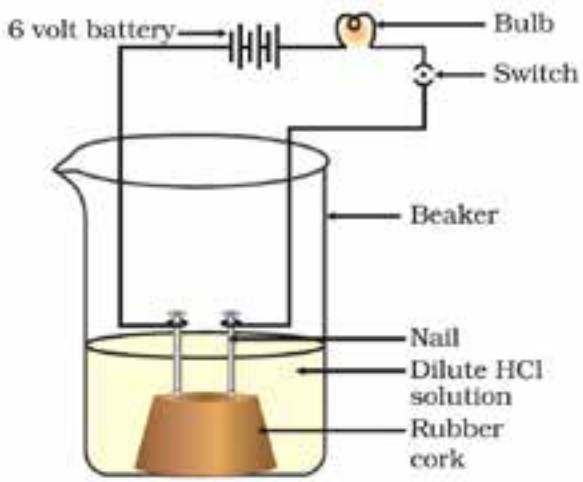
(B) Alloys are prepared to enhance the properties of metals.

(i) Name the constituent elements of the alloy Brass.

(ii) State two reasons why stainless steel, an alloy of iron, is preferred over pure iron for making cooking utensils.

(iii) What is an alloy containing mercury as one of its constituents called? Give an example.

27. A student performs an experiment to test the electrical conductivity of a dilute acid solution using a beaker, two graphite rods, a battery, and a bulb.



(a) When a dilute solution of hydrochloric acid (HCl) is taken in the beaker and the switch is turned on, what will the student observe? Give a reason for this observation.

(b) If the HCl solution is replaced with an aqueous solution of glucose ($C_6H_{12}O_6$), will the observation change? Explain why.

(c) Name a common base which, if used instead of HCl, would produce a similar observation as seen in part (A).

28. While playing in a garden, Anjali was stung by a honeybee, which caused her immense pain and a burning sensation. Her friend immediately advised her to rub the affected area with some toothpaste. Later that evening, after having a spicy meal, her father complained of acidity. Anjali suggested he take a solution of baking soda.

(a) Bee stings are acidic in nature. How does rubbing toothpaste on the sting provide relief?

(b) Why did Anjali suggest baking soda for her father's acidity?

(c) Name the acid injected by the bee sting.

OR

A laboratory has three unlabelled beakers containing different liquids : (A) Rainwater with a pH of 5.2, (B) Tap water with a pH of 7.1, and (C) Drain cleaner with a pH of 13.5.

(a) Classify each liquid as a weak acid, a weak base, or a strong base.

(b) What is acid rain? Explain why liquid (A) is an example of acid rain.

(c) Which of the three liquids will have the highest concentration of hydrogen (H^+) ions?

29. Attempt either option A or B.

(A) The molecular formula of a saturated hydrocarbon is C_4H_{10}.

(a) Draw the structural formula of its straight-chain isomer and provide its IUPAC name.

(b) Draw the structural formula of its branched-chain isomer and provide its IUPAC name.

(c) What is the relationship between these two compounds called? Define this phenomenon.

(d) Explain why the boiling point of the straight-chain isomer is higher than that of the branched-chain isomer.

(e) Write the balanced chemical equation for the complete combustion of this hydrocarbon.

OR

(B) Four organic compounds are given below:

(i) $CH_3–CH_2–CHO$

(ii) $CH_3–CO–CH_3$

(iii) $CH_3–COOH$

(iv) $CH_3–CH_2–OH$

(a) Identify and name the functional group present in compounds (iii) and (iv).

(b) Give the IUPAC names for compounds (i) and (ii).

(c) Which two compounds from the list are isomers of each other? Justify your answer.

(d) Which compound is commonly used as a solvent in nail polish removers?

(e) Write the balanced chemical equation for the reaction that occurs when compound (iv) reacts with compound (iii) in the presence of an acid catalyst.

SECTION-C

30. A student is analyzing the behavior of light rays and makes the following observations:

I. A ray of light passing through the center of curvature of a concave mirror retraces its path.

II. A ray of light parallel to the principal axis of a convex mirror, after reflection appears to diverge from the principal focus.

III. A ray of light incident obliquely at the pole of a concave mirror is reflected obliquely, making an equal angle with the principal axis.

Choose from the following the correct option that lists the correct statements.

(a) I and II

(b) I and III

(c) I, II and III

(d) II and III

31. When a beam of white light passes through a glass prism, the light separates into its constituent colors. Choose the correct option that explains this phenomenon.

(a) The different colors of light travel at the same speed inside the prism.

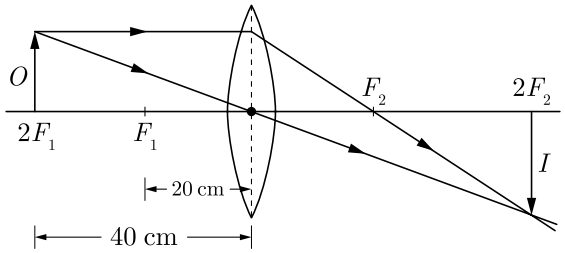
(b) The different colors of light are refracted at different angles due to their different speeds inside the prism.

(c) The prism itself produces the colors and this effect is due to the scattering of light by the prism material.

(d) The angle of incidence is different for each color of light, leading to the separation of colors.

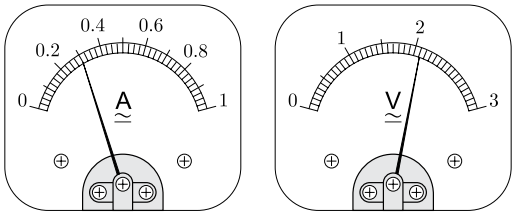
32. **Assertion (A) :** A convex lens of focal length 20 cm is placed in front of an object at 10 cm. The image formed will be virtual and erect.
Reason (R) : For a convex lens, when the object is placed between the optical center and the principal focus, it forms a virtual and erect image.
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

33.



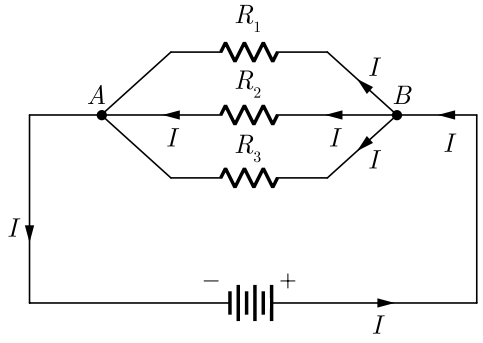
The above image shows the formation of an image with an optical instruments.
A. Which type of the lens is used in the above diagram ?
B. What type image is formed in the above case?
C. What is the focal length of the lens

34. Attempt either option A or B.
A. The current flowing through a resistor connected in an electrical circuit and the potential difference developed across its ends are shown in the given ammeter and voltmeter. Find the least count of the voltmeter and ammeter. What is the voltage and the current across the given resistor?



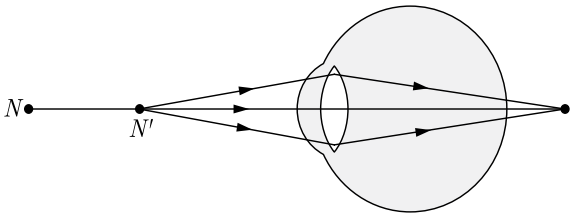
OR

B. In the given circuit diagram suppose the resistors R_1, R_2 and R_3 have the values $5\,\Omega$, $10\,\Omega$, $30\,\Omega$ respectively, which have been connected to a battery of 12 volt. Calculate



(a) The current through each resistor,
(b) The total current in the circuit and

35.



Study the diagram below and answer the following questions :
(i) Name the defect of vision depicted in the diagram.
(ii) List two causes of the above defect.
(iii) Draw a ray diagram for the correction of the above defect using an appropriate lens.

36. (a) What is the total resistance of n resistors each of resistance R connected in :
(i) Series,
(ii) Parallel.
(b) Calculate the resultant resistance of 3 resistors $3\,\Omega$, $4\,\Omega$ and $12\,\Omega$ connected in parallel.

37. What is a compass needle ? What happens when a compass needle is placed
(a) in a region having no magnetic field,
(b) near a bar magnet ?

38. Every car today is fitted with rear-view mirrors for safety purposes. The outside rear-view mirror is specially designed to give a wider field of view so that the driver can see vehicles coming from behind. These mirrors are made slightly curved outward and provide an image that looks smaller than the actual object, but helps cover a larger portion of the road. That is why the message "Objects in the mirror are closer than they appear" is written on such mirrors. This practical application is based on the principle of image formation by spherical mirrors.

convex mirror

A. Which type of spherical mirror is used here—concave or convex?
B. State two characteristics of the image formed in such a mirror for distant objects.
Attempt either subpart C or D.

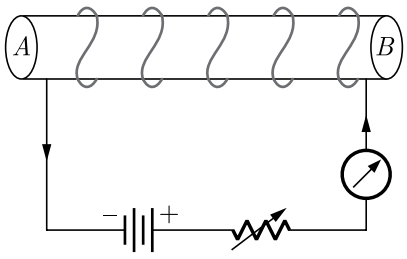
C. For a convex mirror of focal length $f = -30\text{cm}$, a vehicle is $u = -500\text{cm}$ from the mirror. Find the image distance v.

OR

D. For the situation in (C), find the magnification m and comment on the image size.

39. Attempt either option A or B.

A. A student named Riya is conducting an experiment using a coil wound around a long, hollow cardboard tube connected to a battery to demonstrate the concept of electromagnetism. Copy the diagram



(i) Show the polarity acquired by each face of the solenoid.

(ii) Draw the magnetic field lines of force inside the coil and also show their direction.

(iii) Mention two methods to increase the strength of the magnetic field inside the coil.

OR

B. State the factors on which the resistance of a cylindrical conductor depends. How will resistance of a conductor change if it is stretched so that its length is doubled ?