Ch1 - Chemical Reactions and Equations

1. Which of the following reactions is a displacement reaction?
   (a) $CaO + H_2O \rightarrow Ca(OH)_2$
   (b) $MgCO_3 \rightarrow Mg + CO_2$
   (c) $Mg + CuSO_4 \rightarrow MgSO_4 + Cu$
   (d) $H_2 + Cl_2 \rightarrow 2HCl$
2. When dilute hydrochloric acid is added to granulated zinc placed in a test tube, the observation made is:
   (a) The surface of the metal turns shining
   (b) The reaction mixture turns milky
   (c) Greenish yellow gas is evolved
   (d) Colourless and odourless gas evolves with a pop sound
3. Analyse why oxidising-reducing reactions are the primary chemical mechanism for molecular catabolism in heterotrophs.
4. List four observations that help us to determine whether a chemical reaction has taken place.
5. What is observed when carbon dioxide gas is passed through lime water:
   (i) For a short duration
   (ii) For a long duration
   Also, write the chemical equations for the reactions involved.
6. Write the balanced chemical equation for the following reaction and name the type of reaction:
   Barium chloride + Aluminium sulphate → Barium sulphate + Aluminium chloride
7. Why do we store silver chloride in dark coloured bottles? Explain briefly.
8. Define a combination reaction. Give one example of a combination reaction which is also exothermic.
9. What happens when an iron nail is put inside copper sulphate solution? Write the reaction with observation.
10. Name the raw materials required for the manufacture of washing soda by Solvay process. Describe the chemical reactions involved.
11.
    (i) State the law followed in balancing a chemical equation.
    (ii) Balance the following equation:
    $Fe + H_2O \rightarrow Fe_3O_4 + H_2$
12. A white solid when dropped in water produces a hissing sound.

    i) What may be the solid?
    ii) Give the chemical reaction.
    iii) Name the product formed..
13. When hydrogen gas is passed over heated copper (II) oxide, copper and steam are formed.
14. Write the balanced chemical equation with physical states.
15. Evaluate the chemical necessity of a transportation system in multi-cellular organisms for reacting species.
16. Describe the nature of by-products formed when carbon sources react with oxygen during respiration.
17. Explain the role of bio-catalysts in lowering the activation energy for complex metabolic reactions.

18. How does the chemical conversion of inorganic CO2 into carbohydrates represent a reduction reaction?
19. During a safety demonstration, a teacher performs the dilution of concentrated Sulphuric Acid. (i) Why is the acid added to water and not vice-versa? (ii) Describe the effect of this process on the hydronium ion concentration per unit volume. (iii) What physical change is observed in the temperature of the glass container? (iv) Identify the warning symbol found on the acid bottle.
20. Plaster of Paris is a critical material in orthopaedic medicine. (i) Why must it be stored in moisture-proof containers? (ii) Write the chemical equation for its reaction with water. (iii) Identify the hard solid mass formed. (iv) State the chemical name for the hemihydrate of Calcium Sulphate.
21. Salt crystals often contain fixed amounts of water within their structure. (i) Define "Water of Crystallisation". (ii) How many molecules of water are present in one formula unit of Copper Sulphate? (iii) Describe the visual change when these crystals are heated. (iv) Is the molecule of Washing Soda considered wet?
22. Common salt is the fundamental raw material for the chemical industry. (i) Name the salt deposits found in dried-up ancient seas. (ii) Why are these crystals often brown? (iii) Identify the historical movement in India associated with this salt. (iv) List two chemicals produced using NaCl as a primary reactant.
23. Bleaching Powder is widely used in the textile and sanitation industries. (i) Provide its chemical formula. (ii) How is it used in the paper industry? (iii) State its role in water treatment plants. (iv) Explain its chemical function as an oxidising agent.
24. Sodium Carbonate is a versatile industrial chemical. (i) What is the common name for Na2CO3.10H2O? (ii) Identify its use in the glass industry. (iii) How does it affect the permanent hardness of water? (iv) How is it obtained from Sodium Hydrogencarbonate?

Ch 2 - Acids, Bases and Salts

1. Describe the colour transition of a Curry stain on white linen when it interacts with soap and subsequent rinsing with water.
2. Define olfactory indicators and provide three examples sourced from the text.
3.

   i) Draw a labelled diagram to show the preparation of hydrogen chloride gas in laboratory.

   (ii) Test the gas evolved first with dry and then with wet litmus paper. In which of the two cases does the litmus paper show change in colour?

   (iii) State the reason of exhibiting acidic character by dry HCl gas / HCl solution

4. Why do HCl, HNO_3, etc. show acidic characters in aqueous solution while solutions of compounds like alcohol and glucose do not show acidic character?
5. Specify the exact colour of Litmus solution when the hydronium and hydroxide ion concentrations are balanced.
6. List three botanical sources, other than Litmus, whose petals serve as acid-base indicators.

7. Describe the visual response of Phenolphthalein in an acidic environment compared to a basic one.
8. State the colour change observed when Methyl Orange is introduced into a solution of Potassium Hydroxide.
9. Predict the olfactory outcome if vanilla essence is added to a solution of Sodium Hydroxide.
10. Devise a protocol to distinguish between Distilled Water, HCl, and NaOH using only Red Litmus paper.
11. Explain why Clove oil loses its characteristic scent in a basic medium but retains it in an acidic one.
12. Contrast the reaction of Turmeric and Methyl Orange when they are both exposed to Vinegar.
13. A compound ‘A’ on heating at 370 K gives ‘B’ used as plaster for supporting fractured bones in the right position. ‘B’ on mixing with water changes to ‘A’. Identify ‘A’ and ‘B’. Write the chemical reaction
14. An unknown gas is evolved during the reaction between a metal carbonate and dilute HCl. (i) Identify the gas evolved. (ii) Describe the chemical test using Lime Water. (iii) What is the visual result if the gas is passed in excess? (iv) Provide the chemical name and solubility of the final product.
15. A white powder 'X' is commonly used in the kitchen to make bread soft and spongy. (i) Identify 'X' and provide its chemical name. (ii) Write the balanced equation for the thermal decomposition of 'X'. (iii) Is the resulting solution of the residue in water acidic or basic? (iv) Name the specific gas responsible for the rising of the bread.
16. Write a balanced chemical equation for the reaction between sodium carbonate and hydrochloric acid indicating the physical states of reactants and products.
17. Name the gas usually liberated when a dilute acid reacts with a metal. What happens when a burning candle is brought near this gas?
18. Name the sodium compound which is used for softening hard water.
19. If someone is suffering from acidity after overeating, which of the following would you suggest as remedy?
    Lemon juice
    Vinegar
    Baking soda solution
    Give reason for your choice
20. Dry pellets of a base ‘X’ when kept in open absorbs moisture and turns sticky. The compound is also formed by chlor-alkali process.
    (i) Write chemical name and formula of X.
    (ii) Describe chlor-alkali process with balanced chemical equation.
    (iii) Name the type of reaction that occurs when X is treated with dilute hydrochloric acid. Write the equation.
    (iv) While diluting an acid, why is it recommended that acid should be added to water and not water to acid?
21. How does the "maintenance of odour" in olfactory indicators provide a chemical signature for acidity?
22. Explain the chemical principle of "nullification" used when treating an acid spill with a base.
23. Describe the tactile and gustatory properties of bases as defined in the "Do You Know?" sections.
24. Why is the "tasting" of laboratory chemicals strictly prohibited for identification purposes?
25. Predict the colour of Petunia petals when placed in a solution of Magnesium Hydroxide.

26. Calculate the relative difference in hydrogen ion concentration between Solution A (pH 6) and Solution B (pH 8).
27. If lemon juice has a pH of 2.2, determine how many times more acidic it is than distilled water (pH 7.0).
28. Calculate the shift in pH when a 1M NaOH solution is diluted by a factor of 100.
29. Compare the electrolytic strength of 1M HCl and 1M Acetic Acid based on their pH values.
30. Rock salt is a geological form of Sodium Chloride. (i) How was rock salt formed? (ii) Why are the crystals often brown? (iii) How is it mined? (iv) Compare its chemical formula with that of common table salt.
31. Plaster of Paris has significant applications in medicine and art. (i) Why do doctors use it for fractures? (ii) Describe the change when it is mixed with water. (iii) Why is it termed a "hemihydrate"? (iv) How many units of Calcium Sulphate share a single water molecule?
32. The pH of a salt depends on the strength of its constituent ions. (i) What is the pH of a salt formed from a strong acid and strong base? (ii) Predict the nature of Sodium Acetate. (iii) Identify the parent acid and base of NaCl. (iv) Is Ammonium Chloride acidic or basic?
33. Bleaching powder is essential for modern sanitation. (i) State its chemical formula. (ii) Why is it used for laundering washed clothes? (iii) How does it sterilise drinking water? (iv) Is it classified as an oxidising or reducing agent?

Ch 3 - Metals and Non-metals

1. Which substance needs to undergo oxidation to produce acetic acid (ethanoic acid)? Write a test to distinguish ethanol and ethanoic acid other than a litmus test.
2. (a) Identify the aldehyde obtained from Ethane. (b) Name the ketone derived from butane.
3. Explain hydrogenation with its industrial application.
4. Which of the following hydrocarbons undergo addition reaction? C2H6, C3H8, C3H6, C2H2, CH4.
5. Name the reaction of ethanoic acid with ethanol in the presence of concentrated H2SO4. Also, mention the products formed in this reaction.
6. l description of the apparatus in Figure 2.1, including the delivery tube and soap solution beaker.Outline the industrial flowchart for synthesising multiple salts starting from sea water.Detail the symbolic importance of Sodium Chloride in the Dandi March and the freedom struggle.
7. Explain why large-scale deposits of salt are mined using mechanical coal-mining techniques.
8. What is saponification? Differentiate between soaps and detergents.
9. Name two carbon compounds with molecular formula C2H6O. Draw their structural formula.
10. Why is ethyne mixed with oxygen for welding instead of using a combination of ethyne and air?
11. Why are compounds such as calcium carbide, carbon monoxide, carbon dioxide, calcium carbonate, etc. classified as inorganic compounds, despite containing carbon atoms in their molecules?
12. Meenakshi heated ethanol with a compound A in the presence of a few drops of concentrated H2SO4 and observed a sweet smelling compound B is formed. When B is treated with sodium hydroxide it gives back ethanol and a compound C. Identify A, B, and C.
13. Brass and copper vessels are common in traditional kitchens. (i) Are these substances pure elements or alloys? (ii) Why do they react with "sour substances"? (iii) Describe the visual

change in the food stored in such vessels. (iv) Discuss the health risks of consuming these reaction products.

14. A student observes that Zinc reacts with NaOH, but Copper does not. (i) Define the term "displacement" in this context. (ii) Why is Zinc considered more reactive than Copper? (iii) Identify the cation in the reacting acid. (iv) Identify the anion in the product Sodium Zincate.
15. Sodium Chloride is the foundation of the modern chemical industry. (i) Why is it termed a "raw material"? (ii) Name four major industrial chemicals derived from it. (iii) Define "Brine". (iv) Describe the process of extracting salt from sea water.
16. The Lime Water test is a standard procedure for identifying CO2. (i) Why does the solution turn "milky"? (ii) Identify the chemical formula of the precipitate. (iii) Describe the change when excess CO2 is added. (iv) Why does the milkiness eventually disappear?
17. A black powder is stirred into a clear acid, resulting in a blue-green solution. (i) Identify the black powder. (ii) Identify the final salt formed. (iii) What is the chemical nature (acidic/basic) of the black powder? (iv) Provide the balanced equation.
18. Non-metallic oxides are reacted with bases to prove their acidity. (i) Identify the non-metallic oxide used in Activity 2.5. (ii) Which base is it reacted with? (iii) Is the resulting product a salt? (iv) How does this reaction support the "acidic oxide" classification?
19. Tarnished copper vessels are traditionally cleaned with tamarind pulp. (i) What is the chemical nature of the green layer on copper? (ii) Identify the acid in tamarind. (iii) Explain the neutralisation process. (iv) Why does the vessel become shiny again?
20. A piece of marble is dropped into a beaker of dilute HCl. (i) Why does intense effervescence occur? (ii) Identify the gas. (iii) Is this reaction exothermic? (iv) Describe the final state of the marble piece.
21. Sodium Zincate is a complex salt formed in metal-base reactions. (i) Provide its chemical formula. (ii) Identify the metal present in the anion. (iii) Is this salt soluble in water? (iv) Is it classified as an acidic, basic, or neutral salt?
22. An experimental setup for gas evolution is being designed. (i) Why is a delivery tube essential? (ii) Why is the gas passed through soap solution before testing? (iii) What is the function of the candle? (iv) Why are "granules" preferred over a solid "plate" of Zinc?

Ch 4 - Carbon and its Compounds

1. Explain the fundamental role of carbon-based molecules in the "maintenance and repair" of living structures.
2. How does the structural complexity of a carbon source determine the energy required for its catabolism?
3. .Which substance needs to undergo oxidation to produce acetic acid (ethanoic acid)? Write a test to distinguish ethanol and ethanoic acid other than a litmus test.
4. (a) Identify the aldehyde obtained from Ethane.(b) Name the ketone derived from butane.
5. Explain hydrogenation with its industrial application.
6. Which of the following hydrocarbons undergo addition reaction?
   C2H6, C3H8, C3H6, C2H2, CH4. Name the reaction of ethanoic acid with ethanol in presence of concentrated H2SO4. Also mention the products formed in this reaction.
7. Why are a series of chemical reactions necessary to convert heterogeneous carbon
8. i. What are the characteristics of carbon that results in the vast diversity of carbon compounds observed in our surroundings?
   Ii. What is the total number of structural isomers that can be drawn for pentane?

9. Which substance needs to undergo oxidation to produce acetic acid (ethanoic acid)? Write a test to distinguish ethanol and ethanoic acid other than a litmus test.
10. **a.** A salt X is formed, and a gas is evolved when ethanoic acid reacts with sodium hydrogen carbonate. Name the salt X and the gas evolved. Describe an activity and draw the diagram of the apparatus to prove that the evolved gas is the one you have named. Also, write a chemical equation of the reaction involved. **b.** How would you bring about the following conversions? Name the process and write the reaction:

- i. Ethanol to Ethene.
- ii. Propanol to Propanoic acid.

11. What are the characteristics of carbon that results in the vast diversity of carbon compounds observed in our surroundings? Ii. What is the total number of structural isomers that can be drawn for pentane?
12. Why is the "breaking down and building up" of carbon molecules the core mechanism of biological growth?
13. Discuss the specificity of bio-catalysts for different carbon-based functional groups.
14. How does a narrow internal pH range (7.0–7.8) optimise the chemical efficiency of enzymes?
15. Relate the term "growth and development" to the synthesis of carbon-based macromolecules.
16. Why are fungi classified as heterotrophs based on their method of acquiring carbon?
17. Explain the chemical function of enzymes in preventing the "breaking down over time" of living structures.
18. How do bio-catalysts ensure that energy is released in a controlled, uniform manner?
19. Discuss the chemical conversion of food into energy as a regulated bio-catalytic process.

Ch 5: Life Processes

1. Explain why professional biologists consider invisible molecular movement to be an essential criterion for identifying living organisms.
2. Discuss the reasons behind the controversy regarding the classification of viruses as living or non-living entities based on molecular movement.
3. Define the term “Life Processes” and explain their role in the maintenance of the organised and ordered nature of living structures.
4. Why is it necessary for living creatures to keep repairing and maintaining their structures by moving molecules around?
5. Identify the primary source of energy required for maintenance processes and the common name for the process of transferring it into the body.
6. Why is life on Earth fundamentally dependent on carbon-based molecules, and how does the complexity of these molecules affect nutritional processes?
7. Define the process of respiration and explain its significance in the breakdown of food sources for cellular needs.
8. Distinguish between autotrophic and heterotrophic nutrition, providing examples of organisms that utilise inorganic sources like carbon dioxide.
9. Describe the role of bio-catalysts or enzymes in the upkeep and growth of heterotrophic organisms.
10. Outline the three major steps involved in the process of photosynthesis as observed in autotrophic plants.
11. Analyse why simple diffusion is insufficient to meet the oxygen requirements of complex multi-cellular organisms such as humans.

12. How does an increase in body size and design complexity necessitate the development of specialised tissues for the uptake of food and oxygen?
13. Explain why energy intake is necessary for an organism even when it is in a state of rest or not performing any apparent physical activity.
14. Discuss the necessity of a transportation system in multi-cellular organisms for carrying materials from one part of the body to another.
15. Evaluate the physiological importance of excretion in removing potentially harmful waste by-products generated during energy generation.
16. A unicellular organism and a complex multi-cellular organism are compared regarding waste removal. Explain why the former does not require specialised organs while the latter does.
17. An organism's internal ordered structure is subjected to environmental effects that threaten to break it down. Describe the specific maintenance jobs that must occur to ensure the organism remains alive.
18. Consider the case of an organism needing to synthesise protein for growth. Explain the requirement for outside raw materials and the chemical reactions involved in converting them into useful molecules.
19. Draw a labelled diagram of the cross-section of a leaf, identifying the Waxy Cuticle, Upper Epidermis, Chloroplasts, and Guard Cells
20. Draw a labelled diagram of a stomatal pore, showing both the Open and Closed states with their respective Guard Cells

Ch 6: Control and Coordination

1. Describe the structure of a neuron and trace the path of an electrical impulse from the dendrite to the nerve ending.
2. Define a reflex arc and identify the sequence of components involved in a rapid response to a stimulus.
3. Distinguish between the primary functions of the forebrain and the hindbrain in regulating human activities.
4. Explain the specific roles of the midbrain and the hindbrain in controlling involuntary actions such as salivation and blood pressure.
5. Identify the plant hormone that promotes cell division and mention the areas where it is found in high concentrations.
6. How does abscisic acid differ in function from growth-promoting hormones like gibberellins?
7. Explain the mechanism of action of auxins that results in the bending of a plant shoot towards a light source.
8. Describe how plant hormones facilitate coordination in response to environmental triggers, using the example of a sensitive plant like Mimosa pudica.
9. Predict the physiological changes in a child if the pituitary gland under-secretes growth hormone during the developmental years.
10. A patient exhibits gigantism due to a hormonal abnormality. Identify the gland and the specific hormone responsible for this condition
11. Discuss the role of insulin in regulating blood sugar levels and the consequences of its inadequate secretion by the pancreas.
12. Analyse the importance of iodine in the diet for the synthesis of thyroxine and the clinical symptoms of goitre.

13. Describe the “fight or flight” response triggered by adrenaline and how it prepares the human body to handle emergency situations.
14. How does the over-secretion of thyroxine affect an individual’s metabolic rate and general physical health?
15. Evaluate the impact of low levels of testosterone and oestrogen on the development of secondary sexual characteristics in males and females respectively.
16. Explain the feedback mechanism that regulates the timing and amount of hormone release, using the regulation of blood sugar as an example.
17. Compare the speed, reach, and duration of communication via electrical impulses versus chemical signalling in animals.
18. Discuss the limitations of the nervous system that make the endocrine system a necessary addition for coordination in complex organisms.
19. Draw a labelled diagram of a Nerve Cell (Neuron), identifying the Dendrite, Cell Body, Axon, and Nerve Ending
20. Draw a labelled diagram of the Human Brain, specifically identifying the Cerebrum, Cerebellum, Medulla, and Midbrain

Ch 7: How do Organisms Reproduce?

1. Differentiate between binary fission as seen in Amoeba and multiple fission as seen in Plasmodium.
2. Explain the process of budding in Hydra and how it differs from the process of fragmentation in Spirogyra.
3. Why is regeneration not considered a complete method of reproduction in complex multi-cellular organisms?
4. Identify the advantages of vegetative propagation for farmers growing plants like bananas or jasmine that have lost the capacity to produce seeds.
5. Describe the structure of a pollen grain and its role in the process of pollination in flowering plants.
6. Explain the significance of the placenta in providing nutrition and removing waste for a developing human embryo.
7. Identify the functions of the secretion from the prostate gland and seminal vesicles in the human male reproductive system.
8. Describe the changes that occur in the human female reproductive system if the egg is not fertilised.
9. List and explain the mechanism of three different categories of contraceptive methods used for reproductive health.
10. Discuss the dual role of mechanical barriers like condoms in population control and the prevention of sexually transmitted diseases.
11. Why is the process of DNA copying essential for the production of two similar cells during cell division?
12. Analyse the importance of the subtle variations produced during DNA copying for the long-term survival of a species.
13. How does the consistency of DNA copying during reproduction maintain the stability of a population’s body design?
14. Explain why sexual reproduction is likely to produce more significant variations in a population compared to asexual reproduction.

15. Evaluate the relationship between the accuracy of DNA copying and the ability of a species to occupy a specific niche.
16. In a community with limited healthcare, maternal mortality is high. Discuss how lack of access to reproductive health education contributes to this scenario.
17. A couple chooses to undergo a surgical procedure for permanent contraception. Contrast the procedures of vasectomy and tubectomy in terms of the reproductive organs involved.
18. Draw a labelled diagram of the Longitudinal Section of a flower, identifying the Stigma, Style, Ovary, Anther, and Filament
19. Draw a labelled diagram of the Human Male Reproductive System, identifying the Testis, Vas Deferens, Prostate Gland, and Urethra
20. Draw a labelled diagram of the Human Female Reproductive System, identifying the Ovaries, Fallopian Tube, Uterus, and Cervix

Ch 13: Our Environment

1. Distinguish between natural and artificial ecosystems, providing one example of each.
2. Define the role of decomposers and explain why their absence would lead to the accumulation of garbage in an ecosystem.
3. Describe the flow of energy through trophic levels and explain why it is always unidirectional.
4. State the 10% law and calculate the amount of energy available to the tertiary consumer if the producer has 10,000 Joules of energy.
5. Explain the formation of the ozone layer in the atmosphere and the role of UV radiation in this process.
6. Identify the primary pollutants responsible for ozone depletion and the international agreement made to limit their production.
7. Differentiate between biodegradable and non-biodegradable substances, citing their relative impacts on the environment.
8. Define a food web and explain how it provides greater stability to an ecosystem than a simple food chain.
9. Why are there usually no more than three or four steps in a food chain regarding energy availability?
10. Identify the various biotic and abiotic components that interact to form a functional ecosystem.
11. Analyse the phenomenon of biological magnification and explain why human beings often have the highest concentration of toxins in their bodies.
12. How does the use of non-biodegradable pesticides in agriculture lead to their entry into the human food chain?
13. Explain the relationship between the increase in the number of individuals at lower trophic levels and the energy available at those levels.
14. Discuss why the concentration of harmful chemicals increases significantly as we move from producers to top carnivores.
15. Evaluate the environmental impact of modern packaging materials that are non-biodegradable.
16. A farmer uses persistent pesticides to protect crops from insects. Predict the long-term consequences for a population of eagles living near the farm that prey on small animals from the fields.

17. A city faces a crisis with overflowing landfills. Propose a waste management strategy that distinguishes between materials that can be broken down by biological processes and those that cannot.
18. An industrial area releases chemicals into a nearby river system. Analyse how this might affect the health of the local population through the process of bio-accumulation.
19. A school initiates an environmental conservation programme to replace plastic bottles with glass or metal ones. Discuss the benefit of this individual choice in reducing the burden on waste disposal systems.
20. Draw a pyramid of energy showing different trophic levels, identifying the Producers, Primary Consumers, Secondary Consumers, and Tertiary Consumers

Ch9 - Light – Reflection and Refraction

1. Where is the image formed when an object is at large distance from a concave mirror ?

2. Magnification of a plane mirror is m=+1.What does m=1 and positive sign signify?

3. Define power of a lens.

4. State the two laws of reflection of light.

5. Give the answers of the following questions (short answer type)

6. (i) -Find the absolute refractive index of a medium in which light travels with a speed of 1.4x108 m/s

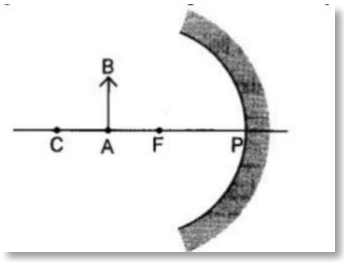
7. How do we distinguish a medium to be a rarer or denser ? Give two reasons.

8. Draw a ray diagram to show the formation of image of an object placed between the pole and Principal focus of a concave mirror. How will the nature and size of the image formed change ,if the mirror is replaced by converging lens of same focal length.

9. An object 4.0cm in size, is placed 25.0cm in front of a concave mirror of focal length 15.0cm.

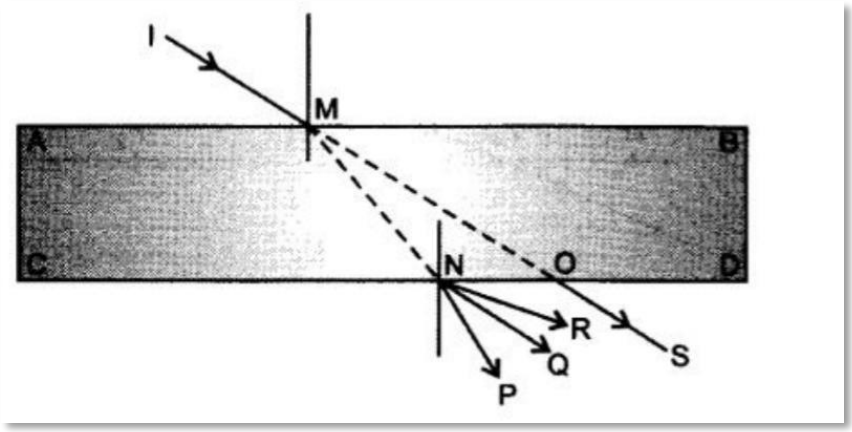
    (a) At what distance from the mirror should a screen be placed in order to obtain a screen in order to obtain a sharp image? (b) Find the size of the image (c) Draw a ray diagram to show the formation of image in this case.How can an observer perceive motion in an organism that respires without visible chest wall movement?

10. Draw the following diagram in your answer book and show the formation of image of the object AB with the help of suitable rays.



11. Which kind of mirrors are used in the headlights of a motor-car and why?
12. Explain with the help of a diagram, why a pencil partly immersed in water appears to be bent at the water surface.
13. Name the type of mirror used in the following situations: (i) Headlights of a car (ii) Rear-view mirror of vehicles (iii) Solar furnace. Support your answer with reason.
14. A concave lens has focal length of 20 cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed.
15. An object 50 cm tall is placed on the principal axis of a convex lens. Its 20 cm tall image is formed on the screen placed at a distance of 10 cm from the lens. Calculate the focal length of the lens.
16. Draw the ray diagram in each case to show the position and nature of the image formed when the object is placed:

    - (i) at the centre of curvature of a concave mirror
    - (ii) between the pole P and focus F of a concave mirror
    - (iii) in front of a convex mirror
    - (iv) at 2F of a convex lens
    - (v) in front of a concave lens



17. If a light ray IM is incident on the surface AB as shown, identify the correct emergent ray.

18. Draw ray diagrams to represent the nature, position and relative size of the image formed by a convex lens for the object placed:

    a. (a) at

    b. (b) between and the optical centre O of lens.

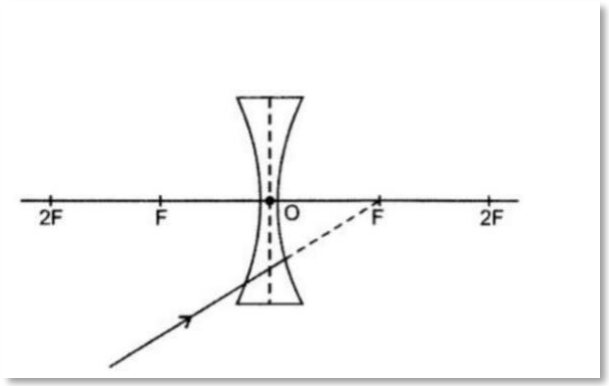
19. A ray of light, incident obliquely on a face of a rectangular glass slab placed in air, emerges from the opposite face parallel to the incident ray. State two factors on which the lateral displacement of the emergent ray depends.

20. An object 2 cm in size is placed 30 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror should a screen be placed in order to obtain a sharp image? What will be the nature and the size of the image formed? Draw a ray diagram to show the formation of the image in this case.

21. An object 2 cm high is placed at a distance of 64 cm from a white screen. On placing a convex lens at a distance of 32 cm from the object it is found that a distinct image of the object is formed on the screen. What is the focal length of the convex lens and size of the image formed on the screen? Draw a ray diagram to show the formation of the image in this position of the object with respect to the lens.

22. Why does a ray of light bend when it travels from one medium into another?

23. Redraw the diagram given below in your answer book and show the direction of the light ray after refraction from the lens.



24. A convex lens has a focal length of 10 cm. At what distance from the lens should the object be placed so that it forms a real and inverted image 20 cm away from the lens? What would be the size of the image formed if the object is 2 cm high? With the help of a ray diagram show the formation of the image by the lens in this case.

25. The refractive index of water is 1.33 and the speed of light in air is . Calculate the speed of light in water.

26. The refractive index of glass is 1.50 and the speed of light in air is . Calculate the speed of light in glass.

27. For which position of the object does a convex lens form a virtual and erect image? Explain with the help of a ray diagram.

28. In an experiment with a rectangular glass slab, a student observed that a ray of light incident at an angle of with the normal on one face of the slab, after refraction strikes the opposite face of the slab before emerging out into air making an angle of with the normal. Draw a labelled diagram to show the path of this ray. What value would you assign to the angle of refraction and angle of emergence?

29. At what distance should an object be placed from a convex lens of focal length 18 cm to obtain an image at 24 cm from it on the other side. What will be the magnification produced in this case?

30. What is the nature of the image formed by a concave mirror if the magnification produced by the mirror is +3?

31. Between which two points of a concave mirror should an object be placed to obtain a magnification of -3?

32. Define and show on a diagram, the following terms relating to a concave mirror: (i) Aperture (ii) Radius of curvature.

33. How far should an object be placed from a convex lens of focal length 20 cm to obtain its image at a distance of 30 cm from the lens? What will be the height of the image if the object is 6 cm tall?

34. The image of an object placed at 60 cm in front of a lens is obtained on a screen at a distance of 120 cm from it. Find the focal length of the lens. What would be the height of the image if the object is 5 cm high?

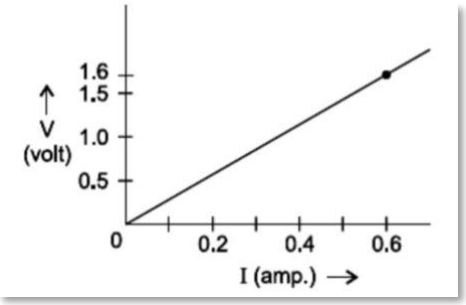
Chapter 10 - The Human Eye and the Colourful World

1. Varun instead of copying from the black board used to copy regularly from the notebook of his friend, Sudhir with whom he sat on the same desk.
   (a) What in your view, is wrong with Varun's eyes and how can it be corrected?
   (b) If the doctor prescribes Varun to use lenses of power – 0.5 D, what is the type of the lenses?
2. Why is Tyndall effect shown by colloidal particles? State four instances of observing the Tyndall effect.
3. State the phenomena observed in the given diagram (referring to a prism splitting light). Explain which of the two lights (yellow or blue) will have the higher wavelength?
4. A student traces the path of a ray of light through a glass prism as shown in the diagram, but leaves it incomplete and unlabelled. Redraw and complete the diagram. Also label on it ∠i, ∠e, ∠r and ∠D.
5. (a) What is visible spectrum?
   (b) Why is red used as the stopping light at traffic signals?
   (c) Two triangular glass prisms are kept together connected through their rectangular side. Will there be any dispersion? Justify your answer.
6. Name the defect that arises due to gradual weakening of ciliary muscles and diminishing flexibility of the eye lens. Name the type of lens required and explain its structure and function.
7. (i) A person is suffering from both myopia and hypermetropia. What kind of lenses can correct this and how are they prepared?
   (ii) A person needs a lens of power +3D for near vision and –3D for distant vision. Calculate the focal lengths of the lenses.
8. What is scattering of light? Why is the colour of the clear sky blue? Explain.
9. What is the spectrum known as that is formed by tiny droplets of water after a rain shower? Draw a labelled diagram to show its formation
10. What is atmospheric refraction? Use this phenomenon to explain (a) Twinkling of stars and (b) Advanced sunrise and delayed sunset. Draw diagrams to illustrate.
11. (i) Write the functions of the Cornea, Iris, Crystalline lens, Ciliary muscles, and Retina.
    (ii) Study the provided eye diagram: Name the defect represented and show how it is corrected with a diagram.

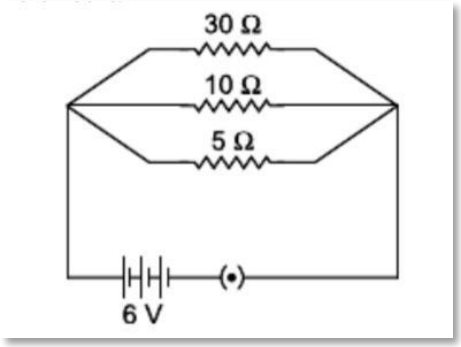
12. **Case Study (Aditya):** A back bencher has frequent headaches and cannot read the blackboard.
    (a) What type of defect is Aditya suffering from? What are the causes?
    (b) Where is the image formed? What lens is required? Draw the defected eye and its correction.
    (c) The far point of a myopic person is 50 cm. What will be the nature and power of the corrective lens?
13. **Case Study (Aarush):** Observing rainbow patterns in prisms vs. glass slabs.
    (a) Name the phenomenon explaining rainbow formation.
    (b) What is the band of colours known as? Explain the cause of its formation.
    (c) Why don't we observe similar band of colours when light passes through a glass slab?

Ch11 - Electricity

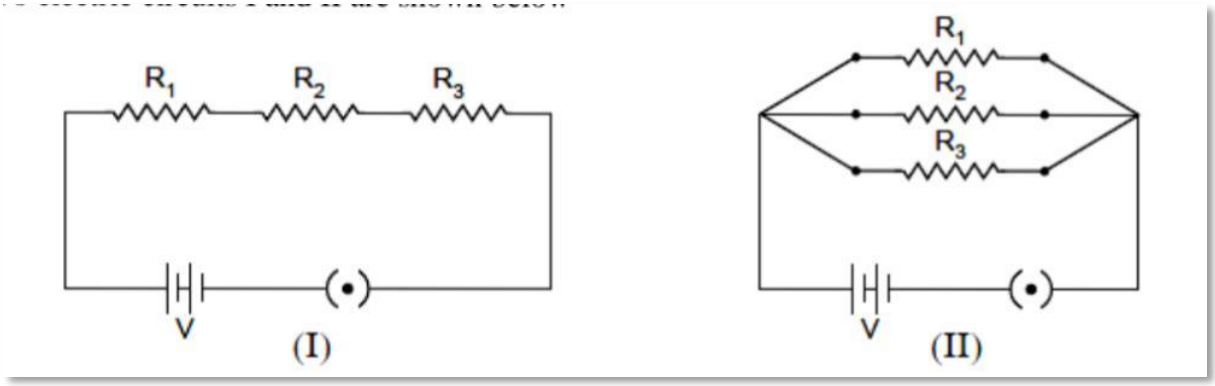
Following graph was plotted between V and I values:
What would be the values of V/I ratios when the potential difference is 0.8V ,1.2V and 1.6V respectively? What conclusion do you draw from these values?



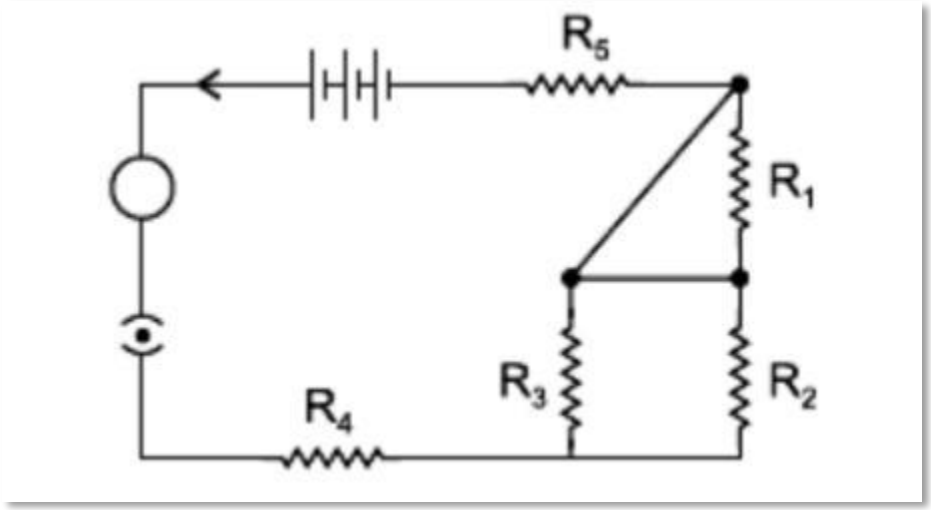
14. For the electric circuit given below calculate:
    (i) Current in each resistor, (ii) Total current drawn from the battery, and (iii) Equivalent resistance of the circuit.



15. Two electric circuits I and II are shown below:
    (i) Which of the two circuits has more resistance?
    (ii) Through which circuit more current passes?
    (iii) In which circuit, the potential difference across each resistor is equal?

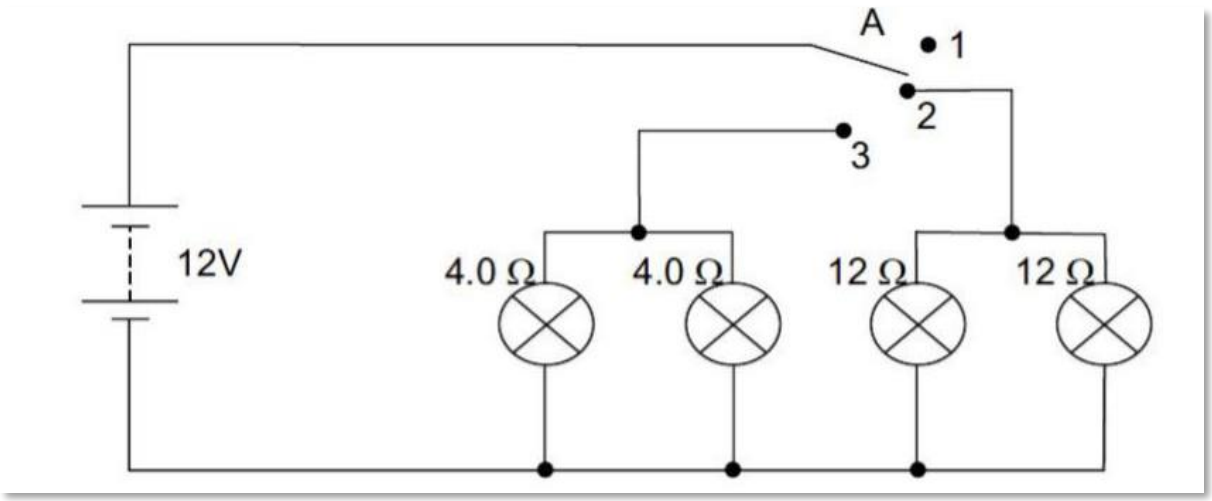


16. Consider the following electric circuit:



(a) Which two resistors are connected in series?
(b) Which two resistors are connected in parallel?
(c) If every resistor of the circuit is of 2Ω, what current will flow in the circuit?

20. In a domestic circuit, five LED bulbs are arranged as shown. The source voltage is 220V and the power rating of each bulb is marked in the circuit diagram.



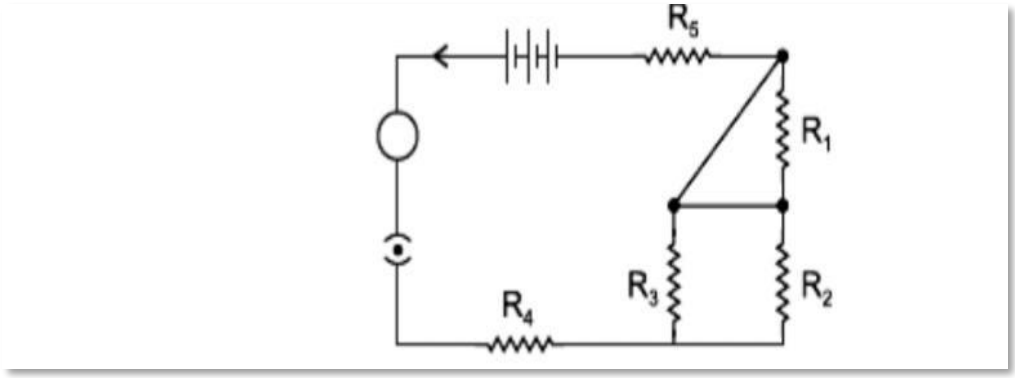
Answer the following:

(a) State what happens when (i) key K1 is closed, (ii) key K2 is closed.

(b) Find the current drawn by bulb B when it glows.

(c) Calculate (i) the resistance of bulb B, and (ii) total resistance of the combination of bulbs B, C, D and E.

21. Vinita and Ahmed demonstrated a circuit that operates the two headlights and the two sidelights of a car.



(a) State what happens when switch A is connected to (i) Position 2 (ii) Position 3.

(b) Find the potential difference across each lamp when lit.

(c) Calculate the current in each 12 Ω, lamp and each 4 Ω, lamp when lit.

Ch12 - Magnetic Effects of Electric Current

1.When is the force experienced by a current-carrying conductor in a uniform magnetic field (i) Maximum and (ii) Minimum?

2. **(a)** Name the poles P, Q, R, and S of the magnets shown in the figures.
(b) What inference is drawn about the direction of field lines based on these diagrams?
3. What is the function of an earth wire and why is it necessary for metallic appliances?

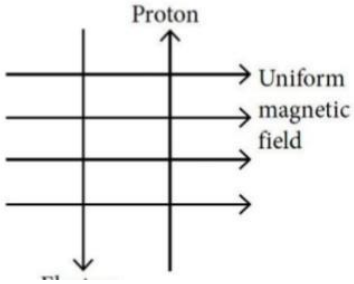
4. Two magnets X and Y are kept near each other. If X is moved towards Y, will they attract or repel? Justify using the field lines.

5. State two factors on which the magnetic field of a straight conductor depends and name the rule to find its direction.
6. State observations and reasons for a compass needle when:
(a) Current in the wire is increased.
(b) The needle is moved away from the wire

7. **(a)** How should an electric heater, bulb, and fan be connected to the mains? Give three reasons.
(b) What is an electric fuse and how is it connected?
8. Prove that "Magnetic field is a physical quantity that has both direction and magnitude" using a bar magnet's field lines.
9.**(a)** Why do iron filings arrange themselves in a particular pattern around a bar magnet?
(b) Which physical quantity is indicated by this pattern?
(c) State any two properties of magnetic field lines.
10. List four properties of magnetic lines of force.
11. **(i)** Why is A.C. advantageous over D.C. for long-distance transmission?
(ii) How does household current differ from battery current?
(iii) How does a fuse prevent damage from short circuits or overloading?
12. Draw magnetic field lines for a solenoid and explain at which point (A, B, or C) the field strength is maximum and minimum.

13.

. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in the figure.



14.

(a) Name the poles P, Q, R and S of the magnets in the following figures 'a' and 'b':

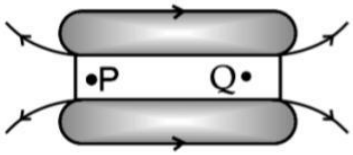


Figure 'a'

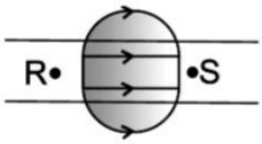
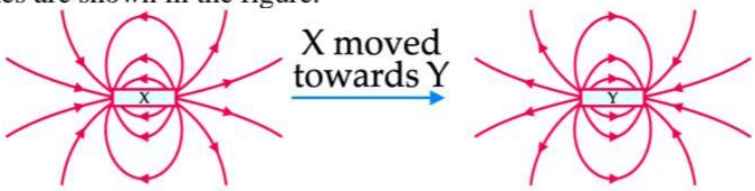


Figure 'b'

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

15.

. The figure shows two magnets X and Y kept near each other. Their poles are not marked, but the magnetic field lines are shown in the figure.



If magnet X is moved towards magnet Y as indicated by the arrow, will the two magnets attract or repel each other? Justify your answer by describing how you interpret the field lines.