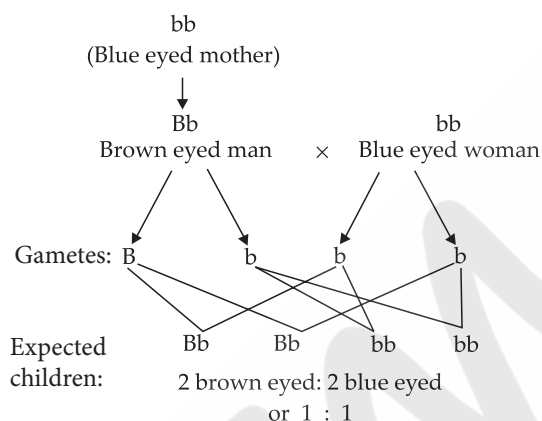


- (b) : Vena cava carries deoxygenated blood from various body parts to right atrium.
- (b) : Glucose (in cytoplasm) $\rightarrow$ Pyruvate (in mitochondria) $\rightarrow$ $\text{CO}_2 + \text{H}_2\text{O} + \text{Energy}$
- (a) : Reflex arcs are more efficient for quick responses because they do not involve thinking.
- (a) : Some plants like the pea plant climb up other plants or fences by means of tendrils. These tendrils are sensitive to touch. When they come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. This causes the tendril to circle around the object and thus cling to it.
- (d) : Recessive character is expressed only in homozygous condition thus blue-eyed woman will have bb genotype, while brown-eyed man may have BB or Bb genotype. But the man had a blue-eyed mother so, he will have Bb genotype. It can be explained as follows:



- (a) : Green plants capture about 1% of the energy of sunlight and convert it into food energy.
- (c) : *Kulhads* are disposable cups made of clay and use of a lot of clay for making millions of *kulhads* daily led to the loss of fertile top soil. So, the practice of using *kulhads* has been discontinued.
- (a) : Mendel used a number of visible contrasting characters of garden peas, produced progeny from them, calculated the percentage of tall or short progeny. He was the first person to make use of his knowledge of science and mathematics and keep a count of individuals exhibiting a particular trait in each generation. This helped him to arrive at the laws of inheritance/heredity.
- (c) : Ozone is present in the stratosphere of the atmosphere. It is formed by photochemical reactions. The UV radiations split some molecular oxygen (O_2) apart into free oxygen atom ($\text{O} + \text{O}$). These atoms then combine with molecular oxygen to form ozone.

10. The urinary bladder is a muscular structure, it is under the control of nervous system. Hence, the urge to urinate can be controlled to some extent.

11. A. Nutrition in both *Amoeba* and *Paramecium* is holozoic. However, *Amoeba* takes in food using temporary finger-like extensions of the cell surface which fuse over the food particle forming a food vacuole. Inside the food vacuole, complex substances are broken down into simpler ones which then diffuse into the cytoplasm. The remaining undigested material is moved to the surface of the cell and thrown out whereas in *Paramecium*, the cell has a definite shape and food is taken in at a specific spot. Food is moved to this spot by the movement of cilia which cover the entire surface of the cell.

OR

- (i) Both arteries and veins carry blood.
- (ii) Both xylem and phloem are conducting tissues in plants.
- (iii) Blood and lymph are fluid connective tissues.

12. Tiger is the top carnivore of a number of food chains. Uncontrolled hunting of tigers will lead to rapid increase in deer population, which in turn may cause ecological imbalance due to rapid consumption of vegetation of that area.

13. Rohan is suffering from diabetes mellitus. It is a metabolic disorder with elevated blood glucose level. Insulin is responsible for maintaining blood sugar level. It is secreted by beta cells of pancreas.

14.

- Parents : Mother Father

BB × bb

↓
Bb
↓

F₁ generation :

F₂ generation :

♀ \ ♂	B	b
B	BB Brown eyed	Bb Brown eyed
b	Bb Brown eyed	bb Blue eyed

Phenotypic ratio : 3 Brown eyed : 1 Blue eyed

Genotypic ratio : 1 BB : 2 Bb : 1 bb

- If mother is heterozygous for brown eye colour (Bb) and father has blue eyes (bb), then genotype of progeny would be :

Parents : Mother × Father
 Bb bb
 Gametes : (B) (b) (b)
 F₁ : Bb bb
 Phenotypic and
 genotypic ratio : 1 : 1

15. A. Rice is rich source of carbohydrate. The carbohydrates in rice are mainly starch. Digestion begins in the mouth where salivary amylase starts breaking down starch into maltose. In the small intestine, pancreatic amylase continues the breakdown into simpler sugars like glucose. These glucose molecules are then absorbed into the blood through the intestinal walls.

OR

B. *Dal* is rich in protein. Enzymes pepsin and trypsin help in the digestion of protein. When process of digestion is completed, proteins are converted into amino acids.

C. The small intestine has finger-like projections called villi, which increase the surface area for absorption and hence increase the capacity of absorption by wall of intestine.

D. The digestive juices X, Y and Z are saliva, gastric juice and intestinal juice respectively. Gastric juice contains dilute HCl, mucus, rennin and pepsin. Pepsin gets activated in an acidic medium and acts upon the proteins to convert them into peptones.

16. A. (i) The device used by Priya could be any Intrauterine Device (IUD), commonly made of copper or plastic. It is inserted into the uterus by a medical professional. The copper IUD releases copper ions, which are toxic to sperm, reducing their mobility and viability. It also creates an inflammatory environment in the uterus that prevents implantation of a fertilised egg, thus preventing pregnancy.

(ii) Possible reasons for IUD failure include:

- Improper insertion or displacement of the device.
- The IUD might have been expelled unknowingly.
- Rarely, sperm might still fertilise the egg despite the IUD.
- The woman's body might have reacted in a way that reduced the effectiveness of the device.

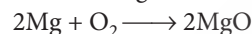
Regular check-ups ensure that the IUD is correctly positioned in the uterus. They help detect any displacement, infection, or complications early. This minimises failure chances and health risks, ensuring effective contraception and timely medical intervention if pregnancy occurs.

OR

B. (i) AIDS is a sexually transmitted disease which is caused by Human Immunodeficiency Virus (HIV). Awareness campaigns educate people about modes of HIV transmission (like unprotected sex, sharing needles) and preventive measures (using condoms, safe blood transfusion). This knowledge encourages safer behaviours, early testing, and treatment, which help in controlling the spread of AIDS and protecting public health.

(ii) Early detection allows timely treatment, reducing the severity of symptoms and preventing complications. It also stops infected individuals from unknowingly spreading STDs to others. Early treatment can suppress HIV in AIDS patients, improving their life expectancy and quality of life. Testing campaigns and counseling encourage people to get diagnosed early, which is vital for controlling epidemics.

17. (b) : Magnesium metal, Mg (X) burns in oxygen with a dazzling white flame forming a white ash, MgO (Y).



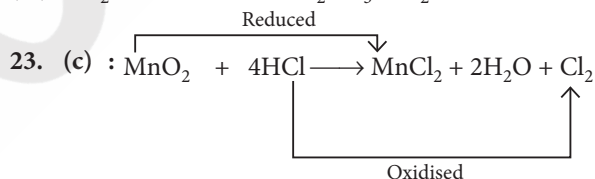
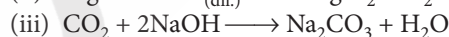
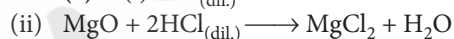
18. (b) : As copper metal is less reactive than sodium, no displacement reaction will occur between NaCl solution and copper metal. Similarly, zinc is more reactive than iron and hence cannot be displaced by iron. Copper can displace silver and magnesium can displace aluminium.

19. (d) : The gas evolved is hydrogen that burns with a popping sound.



20. (a) : Colour of red litmus remains red in neutral solutions, become dark red in acidic and blue in presence of basic solutions. So, there will be no change in colour of red litmus in distilled water (test tube A). In test tube B, it becomes dark red and in test tube C, red litmus turns blue.

21. (d) : Bases are substances which have bitter taste, soapy touch and turn red litmus solution to blue. Bases have pH more than 7. Bases give pink colour when phenolphthalein is added to them.



As hydrogen is removed from HCl to give Cl₂, HCl is being oxidised whereas oxygen is removed from MnO₂ to give MnCl₂, hence MnO₂ is reduced.

24. (b) : When an ester reacts with the base, saponification reaction occurs.

25. We know that a more reactive metal can displace a less reactive metal from its solution or oxide. On this basis, we can say

(i) metal B displaces metal A from its oxide A₂O₃, therefore, B is more reactive than A.

(ii) metal B displaces metal C from its salt CSO₄, therefore, B is more reactive than C.

(iii) metal A displaces metal C from its oxide, therefore, A is more reactive than C.

Thus, it may be concluded.

(a) B is most reactive metal that

(b) Order of increasing reactivity is C < A < B.

26. A. Based on the reactivity series, the relative position of the metals involved in solutions is : $\text{Zn} > \text{Fe} > \text{Cu} > \text{Ag}$
Metal A is more reactive than copper and less reactive than iron.

Metal B is more reactive than iron and less reactive than zinc.

Metal C is more reactive than silver only and less reactive than other metals.

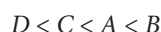
Metal D is the least reactive in nature.

In the light of above information, we can conclude that

(a) Metal B is the most reactive.

(b) Since B is more reactive than iron, it is also more reactive than copper. This means that it would displace copper from copper(II) sulphate solution. The blue colour of solution will slowly fade.

(c) The increasing order of reactivity of metals is :



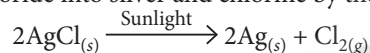
OR

B. (a) The solution of the gas in water is acidic because it turns blue litmus to red.

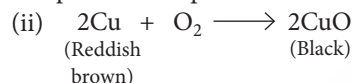
(b) The yellow substance is a non-metal because it forms acidic oxide.

(c) Yellow element – Sulphur; Gas formed – Sulphur dioxide (SO_2).

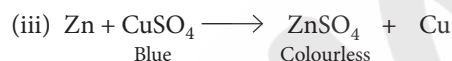
27. (i) When silver chloride is exposed to sunlight, white silver chloride turns grey. This is due to the decomposition of silver chloride into silver and chlorine by the light.



It is photodecomposition reaction.



Copper metal undergoes oxidation, causing change in colour from reddish brown (Cu) to black (CuO).



Zn displaces Cu from CuSO_4 solution. Colour changes from blue to colourless.

28. A. (b) : Citric and tartaric acid are formed in organic substances such as lemon and tamarind respectively and they are edible. Hydrochloric acid though formed inside stomach is not edible. Carbonic acid is a mild acid and is edible in the form of soda water.

B. When blue litmus is added to test tube A, containing dil. HCl, colour of the blue litmus paper changes from blue to red.

When blue litmus is added to test tube B, containing dil. NaOH, no colour change will be observed. Litmus is a natural indicator which changes to red in acidic medium and to blue in basic medium.

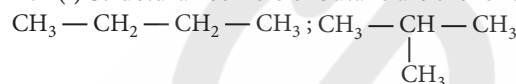
OR

Solution A is basic, i.e., $\text{pH} > 7$.

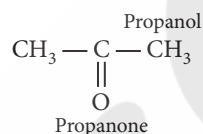
Solution B is acidic, i.e., $\text{pH} < 7$.

C. (c) : As phenolphthalein indicator remains colourless in solution P and blue litmus turns red, solution P is acidic in nature. Solution P cannot be lime water as lime water is basic in nature. As phenolphthalein remains colourless in solution Q and there is no effect on blue litmus paper, solution Q could be a solution of neutral salt. Hence, solution Q cannot give dark pink colour with China rose indicator. As phenolphthalein indicator changes to pink in solution R and there is no effect on blue litmus paper, solution R is basic in nature. Therefore, solution R will give green colour with China rose indicator and it could be window cleaner. Basic substances give red colour with turmeric solution. Hence, solution P cannot give red colour with turmeric solution as it is acidic in nature.

29. A. (i) Structural isomers of butane are the following:



(ii) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$



(iii) (a) Three homologue of alcohol are the following:



Third homologue of alcohol is $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

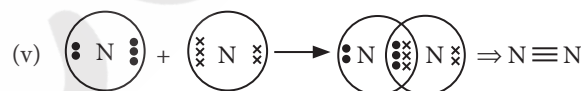
(b) Three homologue of aldehyde are the following:



Third homologue of aldehyde is $\text{CH}_3\text{CH}_2\text{CHO}$.

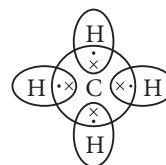
(iv) (a) Benzene

(b) But-1-ene



OR

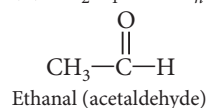
B. (a) Electron dot structure of methane is shown in the figure.



(b) (i) $\text{C}_2\text{H}_6\text{O}$ i.e., $\text{C}_n\text{H}_{2n+2}\text{O}$
or $\text{C}_n\text{H}_{2n+1}\text{OH}$ where, $n = 2$

Thus, $-\text{OH}$ (alcohol) is the functional group present in it.

(ii) $\text{C}_2\text{H}_4\text{O}$ i.e., $\text{C}_n\text{H}_{2n}\text{O}$



Thus $-\text{C}(=\text{O})-\text{H}$ (aldehyde) functional group is present in this compound.

(c) When ethyne is burnt in air, incomplete combustion takes place due to limited supply of oxygen in air which produces sooty flame. Instead ethyne is burnt with oxygen at high temperature to produce clean flame which is used for welding.

30. (b) : We know that, focal length

$$f = \frac{R}{2} = \frac{+3}{2} \text{ m} = 1.50 \text{ m}$$

$$\text{Since, } \frac{1}{v} + \frac{1}{u} = \frac{1}{f} \text{ or } \frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{1.50} - \left(\frac{-1}{5.00} \right)$$

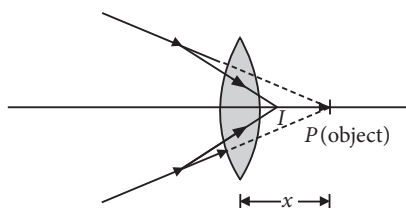
$$\Rightarrow v = 1.15 \text{ m}$$

Thus, the image formed is 1.15 m at the back of the mirror.

$$\text{Magnification, } m = \frac{-v}{u} = \frac{-1.15 \text{ m}}{-5 \text{ m}} = +0.23$$

31. (c) : Red colour is used to paint the danger signals. As we know, visible spectrum has violet, indigo, blue, green, yellow, orange and red colour and these colours are arranged with red on the top and violet at the bottom (near base of the prism) on the basis of wavelength and frequency, and among these colours red colour has largest wavelength ($\approx 750 \text{ nm}$). Thus, here Y will be red.

32. (b) : For virtual object



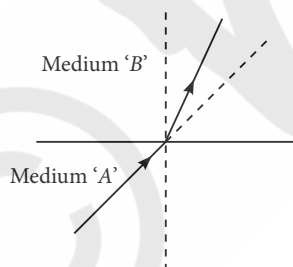
$$u = +x, F = +f$$

$$\therefore \frac{1}{v} - \frac{1}{u} = \frac{1}{F}$$

$$\text{or } \frac{1}{v} - \frac{1}{x} = \frac{1}{f} \text{ or } \frac{1}{v} - \frac{1}{f} = \frac{1}{x}$$

$\therefore v > 0$, it means image is real.

33. (a) When light is incident from medium 'A' to medium 'B' we find, that the ray is reflected towards the normal. This indicates that medium B is denser w.r.t. medium A.



(b) Using formula

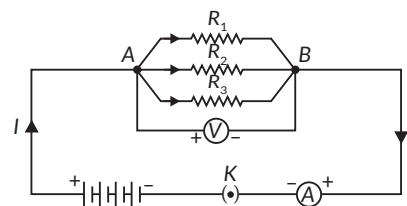
$$\text{Refractive index of B w.r.t. A} = \frac{\text{Speed of light in medium A}}{\text{Speed of light in medium B}}$$

$$\text{Speed of light in medium A} = v_a$$

$$\text{Speed of light in medium B} = v_b$$

$$n_{BA} = \frac{v_A}{v_B} = \frac{v_a}{v_b}$$

34. A. (i) When resistors are connected in parallel.



(ii) According to given circuit, Resistance R_2 and R_3 are in parallel, therefore,

$$\frac{1}{R'} = \frac{1}{R_2} + \frac{1}{R_3}$$

$$\frac{1}{R'} = \frac{1}{10} + \frac{1}{10} \Rightarrow \frac{1}{R'} = \frac{2}{10}$$

$$R' = 5 \Omega$$

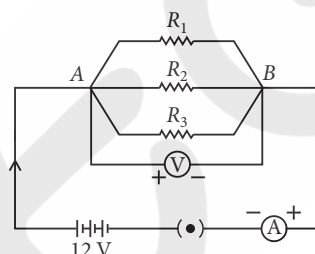
Now, R_1 , R' and R_4 are in series combination,

$$\text{So, } R'' = R_1 + R' + R_4$$

$$R'' = 5 \Omega + 5 \Omega + 5 \Omega \Rightarrow 15 \Omega$$

OR

B.



Here, $R_1 = 10 \Omega$, $R_2 = 20 \Omega$

$R_3 = 30 \Omega$ and $V = 12 \text{ V}$

$$(i) \text{ Current through } R_1, I_1 = \frac{V}{R_1} = \frac{12}{10} = 1.2 \text{ A}$$

$$\text{Current through } R_2, I_2 = \frac{V}{R_2} = \frac{12}{20} = 0.6 \text{ A}$$

$$\text{Current through } R_3, I_3 = \frac{V}{R_3} = \frac{12}{30} = 0.4 \text{ A}$$

(ii) Total circuit resistance

$$\frac{1}{R_{AB}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad (\because \text{they are in parallel})$$

$$= \frac{1}{10} + \frac{1}{20} + \frac{1}{30} = \frac{11}{60}$$

$$R_{AB} = \frac{60}{11} \Omega = 5.45 \Omega$$

$$(iii) \text{ Total current, } I_{AB} = \frac{V}{R_{AB}} = \frac{12}{5.45} = 2.21 \text{ A.}$$

35. (i) Hypermetropia (far-sightedness) : It is the defect due to which the eye is not able to see the nearby objects distinctly though it can see the distant object clearly.

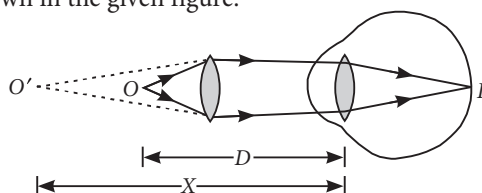
(ii) Hypermetropia is caused due to following reasons:

(a) Shortening of the eyeball.

(b) Focal length of crystalline lens is too long.

(iii) This defect can be corrected by using a convex lens of suitable focal length. So, a person suffering from this defect

wears spectacles having convex lens of suitable focal length. The convex lens of spectacles reduces the divergence of rays of light entering the eye. Hence, this lens makes the rays of light appear to come from the near point of the defective eye as shown in the given figure.



36. (i) Resistance of a conductor depends upon the following factors :

- Length of the conductor : Greater the length (l) of the conductor more will be the resistance (R). $R \propto l$
- Area of cross-section of the conductor: Greater the cross-sectional area of the conductor, less will be the resistance. $R \propto \frac{1}{A}$
- Nature of conductor.

(ii) Metal have very low resistivity and hence they are good conductors of electricity.

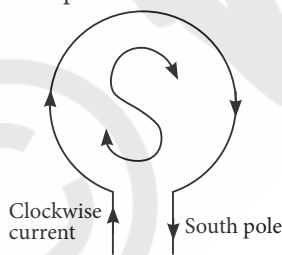
(iii) Alloys are commonly used in electrical heating devices due to the following reasons :

- Alloys have high melting point
- Alloys have higher resistivity than metals
- Alloys do not get oxidised or burn readily.

37. (i) We know if the current at a loop face facing us is in clockwise direction, that face of the coil behaves like south pole. So, the polarity of the loop facing us is south.

(ii) The end B, when looked at from right carries a clockwise current. So, the polarity of the end B of the solenoid will be the south pole.

(iii) By Fleming's left-hand rule, the direction of the magnetic field at the centre of the loop will be perpendicular to the plane of the loop and will be directed inward.



38. A. No change. The focal length of a concave mirror does not depend on the nature of medium.

B. As R is negative for a concave mirror,

$$\text{so } f = \frac{R}{2} = \frac{-15}{2} = -7.5 \text{ cm}$$

C. Given, $R = +32 \text{ cm}$

$$\therefore f = \frac{R}{2} = \frac{32}{2} = +16 \text{ cm}$$

OR

$$\begin{aligned} \text{D. } \frac{1}{u} + \frac{1}{v} &= \frac{1}{f} \Rightarrow \frac{-1}{20} + \frac{1}{15} = \frac{1}{f} \\ \Rightarrow \frac{-3+4}{60} &= \frac{1}{f} \Rightarrow f = 60 \text{ cm} \end{aligned}$$

As, focal length is positive, therefore the mirror is convex.

39. A. Resistance of the lamp = 20Ω

External resistance = 4Ω

(i) As both the lamp and external resistance are connected in series, therefore the total resistance,
 $R = 20 + 4 = 24 \Omega$

$$\text{(ii) Current, } I = \frac{V}{R} = \frac{6}{24} = 0.25 \text{ A.}$$

(iii) (a) Potential difference across the electric lamp
Current through the lamp $\times$ Resistance of lamp
 $= 0.25 \times 20 = 5 \text{ V}$

(b) Potential difference across conductor
 $=$ Current through the conductor $\times$ Resistance of conductor
 $= 0.25 \times 4 = 1 \text{ V}$

(iv) Power of the lamp
 $= (\text{current})^2 \times \text{resistance of lamp}$
 $= (0.25)^2 \times 20 = 1.25 \text{ W}$

OR

B. Power consumed is minimum when current through the circuit is minimum, so the two resistors should be connected in series.

In circuit A, Total resistance, $R = 1 + 2 = 3 \Omega$

$$\text{Voltage across } 2 \Omega = \frac{V_{\text{Total}}}{R_{\text{Total}}} \times 2 \Omega = \frac{6}{3} \times 2 = 4 \text{ V}$$

$$\therefore \text{Power used in } 2 \Omega \text{ resistor, } P = \frac{V^2}{R} = \frac{(4)^2}{2} = 8 \text{ W}$$

In circuit B, voltage across both the resistance is same i.e. 4 V and both are connected in parallel combination.

$$\therefore \text{Power used in } 2 \Omega \text{ resistor} = \frac{V^2}{R} = \frac{(4)^2}{2} = 8 \text{ W}$$

$\therefore$ Power used in 2Ω resistor in each case is same i.e., 8 W.

