Class- X Session - 2022-23

Subject - Science (086)

Sample Question Paper - 31

with Solution

Max. Marks: 80 **Time Allowed: 3 hours**

General Instructions:

i. *This question paper consists of 39 questions in 5 sections.*
ii. *All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*
iii. ***Section A** consists of 20 objective type questions carrying 1 mark each.*
iv. ***Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.*
v. ***Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words*
vi. ***Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.*
vii. ***Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.*

Section A

1. A hydrocarbon with molecular formula C_4H_{10} has: **[1]**

   a) 10 covalent bonds b) 7 covalent bonds

   c) 13 covalent bonds d) 6 covalent bonds

2. Alternative forms of a gene are called **[1]**

   a) Chromosomes b) Multiples

   c) Loci d) Alleles

3. An element belonging to the 16th group of periodic table is used in the manufacturing of vulcanized rubber. This element reacts with hot and conc. HNO_3 to form sulphuric acid. The concerning element is: **[1]**

   a) Oxygen b) Sulphur

   c) Germanium d) Silicon

4. Fatty foods become rancid because of **[1]**

   A. Oxidation
   B. Reduction
   C. Reaction with Hydrogen
   D. Reaction with oxygen

   a) B and C b) A and D

c) All of these d) A and C

5. The light from a distant object on passing through the convex lens (f-focal length): [1]

a) converges at 2f b) appears to diverge from focus

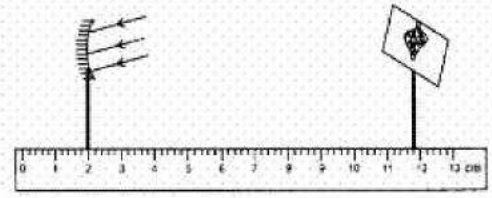
c) converges at focus (f) d) appears to diverge from 2f

6. Donkey is an example of [1]

a) Hermaphrodite b) None of these

c) Dioecious d) Monoecious

7. In the set-up shown below, a clear image of a distant object is obtained on the screen. The focal length of the concave mirror is: [1]



a) 9.4 cm b) 9.9 cm

c) 9.8 cm d) 11.4 cm

8. The process by which blood is cleared of metabolic wastes in case of kidney failure is called: [1]

a) dialysis b) filtration

c) transplantation d) artificial kidney

9. A chain of Yeast cells forms because: [1]

A. Yeast cells do not separate after budding.

B. Daughter cells are unable to survive without parent cells.

C. Buds reproduce as soon as they are formed.

D. Daughter cells stick together with the help of mucus.

a) (B) b) (C)

c) (A) d) (D)

10. The movement of shoot towards light is [1]

a) phototropism b) hydrotropism

c) chemotropism d) geotropism

11. Which among the following alloys contain mercury as one of its constituents? [1]

a) Alnico

b) Stainless steel

c) Zinc amalgam

d) Solder

12. Which of the following statements about transmission of nerve impulse is incorrect? **[1]**

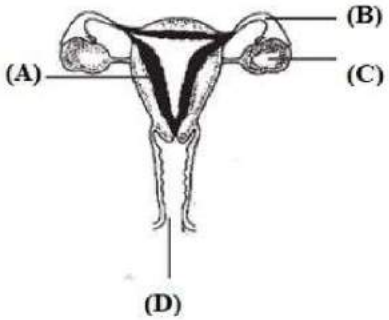
a) Nerve impulse travels from dendritic end towards axonal end

b) At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron

c) A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells

d) The chemicals released from the axonal end of one neuron cross the synapse and generate a similar electrical impulse in a dendrite of another neuron

13. Which part of the following is a site of implantation? **[1]**



a) B

b) C

c) A

d) D

14. Carbon forms four covalent bonds by sharing its four valence electrons with four univalent atoms, e.g. hydrogen. After the formation of four bonds, carbon attains the electronic configuration of **[1]**

a) helium

b) neon

c) argon

d) krypton

15. Which of the following are combination reactions? **[1]**

i. $2KClO_3 \xrightarrow{Heat} 2KCl + 3O_2$

ii. $MgO + H_2O \longrightarrow Mg(OH)_2$

iii. $4Al + 3O_2 \longrightarrow 2Al_2O_3$

iv. $Zn + FeSO_4 \longrightarrow ZnSO_4 + Fe$

a) (ii) and (iii)

b) (i) and (iii)

c) (iii) and (iv)

d) (ii) and (iv)

16. Which of the following represents a saponification reaction? **[1]**

a) $CH_3COOH + C_2H_5OH \xrightarrow{H_2SO_4} CH_3COO_2H_5$

b) $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$

c) $CH_3COONa + NaOH \xrightarrow{CaO} CH_4 + Na_2CO_3$

d) $2CH_3COOH + 2Na \rightarrow 2CH_3COONa + H_2$

17. **Assertion (A):** The equation V = Ri does not apply to those conducting. devices that do not obey Ohm's law. **[1]**
Reason (R): V = RI is a statement of Ohm's law.

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

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

c) A is true but R is false.

d) A is false but R is true.

18. **Assertion (A):** Baking powder is used in making cake instead of using baking soda. **[1]**
Reason (R): Baking powder contains tartaric acid which reacts with sodium carbonate and removes bitter taste.

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

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

c) A is true but R is false.

d) A is false but R is true.

19. **Assertion (A):** Blood of insects is colourless. **[1]**
Reason (R): The blood of insect does not play any role in transport of oxygen.

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

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

c) A is true but R is false.

d) A is false but R is true.

20. **Assertion (A):** Carbon reacts with oxygen to form carbon dioxide which is an acidic oxide. **[1]**
Reason (R): Non-metals form acidic oxides.

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

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

c) A is true but R is false.

d) A is false but R is true.

Section B

21. When is a person said to have developed cataract? How is the vision of such a person restored? **[2]**

OR

List two main causes of a person developing near sightedness. Show with the help of a ray diagram how this defect can be corrected.

22. Draw ray diagram showing the image formation by a concave mirror when an object placed at infinity. **[2]**

23. What measures are taken to protect the depletion of ozone layer? **[2]**

24. Name the chief organs of excretion in man. Mention the waste products that they excrete. **[2]**

25. Explain the action of dilute hydrochloric acid on the following with chemical equation: **[2]**

    i. Magnesium ribbon

    ii. Sodium hydroxide

    iii. Crushed eggs

26. An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound. Compound A on treatment with an alcohol C in the presence of a little of concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$). Compound D on treatment with NaOH solution gives back B and C. Identify A, B, C and D. **[2]**

Section C

27. i. Which types of metals can be obtained in their pure form by just heating their oxides in air? Give one example. **[3]**

    ii. Consider the reaction given below used to obtain Manganese metal in pure form:

    $3MnO_2(s) + 4Al(s) \longrightarrow 3Mn(l) + 2Al_2O_3(s) + Heat$

    a. What type of reaction is it?

    b. What is the role of aluminium in this reaction?

28. How can you distinguish between plane mirror, convex mirror and concave mirror by merely looking at the image formed in each case? **[3]**

OR

What is atmospheric refraction? Explain with the help of a labelled diagram that the position of a star as seen by us is not its true position.

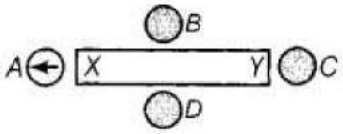
29. Why the leaf is boiled in alcohol for a few minutes using a water bath in an experiment to show that sunlight is necessary for photosynthesis? **[3]**

30. Why are crop fields known as artificial ecosystems? State one more example of an artificial ecosystem. **[3]**

31. 1. Write the function of each of the following parts of human eye : cornea, iris, crystalline lens, ciliary muscles. **[3]**

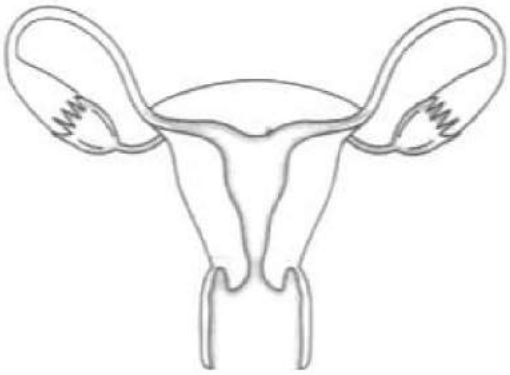
2. Millions of people of the developing countries of world are suffering from corneal blindness. These people can be cured by replacing the defective cornea with the cornea of a donated eye.
A charitable society of your city has organised a campaign in your neighbourhood in order to create awareness about this fact.
If you are asked to participate in this mission how would you contribute in this noble cause?
   1. State the objective of organising such campaigns.
   2. List two arguments which you would give to motivate the people to donate their eyes after death.
   3. List two values which are developed in the persons who actively participate and contribute in such programme.

32. i. The diagram shows a bar magnet surrounded by four plotting compasses. Copy the diagram and mark the direction of the compass needle for each of the cases B, C and D. **[3]**



ii. Which is the North pole, X or Y?

33. Answer the following by carefully studying the figure: **[3]**



i. Identify the image shown above.

ii. Label in the figure the ovary, oviduct, uterus, vagina.

iii. State the functions of the labeled parts in part b.

OR

An individual may have a good health even when the whole of reproductive system is removed. What then is the function of the reproductive system?

Section D

34. What will be the action of the following substances on litmus paper? **[5]**
Dry HCl gas, Moistened NH_3 gas, Lemon juice, Carbonated soft drink, Curd, Soap solution.

OR

i. What is meant by pH?

ii. Water is a neutral substance. What colour will you get when you add a few drops of universal indicator to a test tube containing distilled water?

iii. Two solutions A and B have pH values of 3.0 and 9.5, respectively. Which of these will turn litmus solution from blue to red and which will turn phenolphthalein from colourless to pink?

35. What are reflex actions? Give two examples. Explain a reflex arc. **[5]**

OR

Give an account of any seven diseases caused by the excess and lesser secretions of various endocrine glands.

36. Draw an appropriate schematic diagram showing common domestic circuits and discuss the importance of fuse. Why is it that a burnt out fuse should be replaced by another fuse of identical rating? **[5]**

Section E

37. **Read the text carefully and answer the questions:** **[4]**

In humans, the allele for brown eyes (B) is dominant over that for blue eyes (b). A brown-eyed woman marries a blue-eyed man, and they have six children. Four of the children are brown-eyed and two of them are blue-eyed.

(i) What is the genotype of blue-eyed offspring?

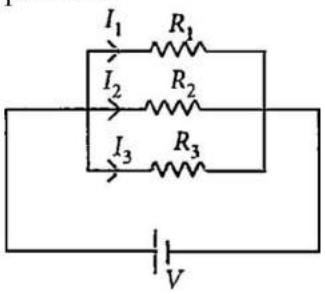
(ii) What is the woman's genotype?

OR

What is the gene carried by the mother's ovum regarding eye color?

38. **Read the text carefully and answer the questions:** **[4]**

If two or more resistances are connected in such a way that the same potential difference gets applied to each of them, then they are said to be connected in parallel.

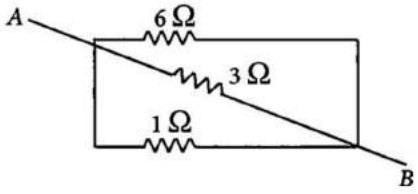


The current flowing through the two resistances in parallel is, however, not the same. When we have two or more resistances joined in parallel to one another, then the same current gets additional paths to flow and the overall resistance decreases.

(i) Three resistances, 2 Ω, 6 Ω and 8 Ω are connected in parallel, then what will be the equivalent resistance?

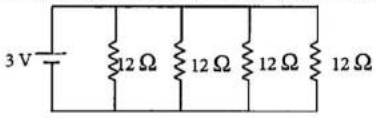
(ii) A wire of resistance 12Ω is cut into three equal pieces and then twisted their ends together, then what will be the equivalent resistance?

(iii) Three resistances are connected as shown. Calculate the equivalent resistance between A and B?



OR

Find the current in each resistance.



39. **Read the text carefully and answer the questions:** **[4]**

In a balanced chemical reaction, equal number of atoms are present on both sides of reaction. A balanced chemical reaction is based on law of conservation of mass which means that total mass of reactants and products participating in a reaction must be equal. For example, a balanced chemical equation of burning of magnesium in oxygen to form magnesium oxide is written as:

$2Mg + O_2 \longrightarrow 2MgO$

The mass of reactants ($2 \times 24 + 32 = 80$) is equal to the mass of products [$2 \times (24 + 16) = 80$].

(i) In a reaction, 35 g of reactant, PQ breaks down into 20 g of product, P and an unknown amount of product, Q. Find the amount of product Q.

(ii) The solid mercury (II) oxide is heated, and liquid mercury and oxygen gas are produced. Mention balanced chemical reaction.

(iii) Which laws are satisfied by a balanced chemical equation?

OR

In the given chemical reaction,

$2C_6H_{6(l)} + 15O_{2(g)} \longrightarrow mCO_{2(g)} + nH_2O_{(l)}$

Find the values of m and n respectively.

SOLUTION

Section A

1. **(c)** 13 covalent bonds
   Explanation: Butane C_4H_{10} has 3 C-C covalent bonds and 10 C-H covalent bonds. Thus, it has 13 covalent bonds.
2. **(d)** Alleles
   Explanation: An alternative form of a gene is known as an allele. Alleles vary in their sequence which may or may not result in a variant phenotype of a particular trait. Alleles represent variations of a gene that is responsible for a particular trait.
3. **(b)** Sulphur
   Explanation: The element is Sulphur. Sulphur is used to manufacture sulphuric acid and in the vulcanization of rubber.
   $S + 2HNO_3 \rightarrow H_2SO_4 + 2NO$
4. **(b)** A and D
   Explanation: The condition produced by aerial oxidation of fats and oils in foods marked by unpleasant smell and test is called rancidity. Fatty foods become rancid because of oxidation means reaction with oxygen.
5. **(c)** converges at focus (f)
   Explanation: The point of convergence of parallel beams from a distant object is called the focus.
6. **(c)** Dioecious
   Explanation: Donkey is dioecious because it has male and female reproductive organs in separate individual.
7. **(c)** 9.8 cm
   Explanation: f = 11.8 - 2 = 9.8 cm
8. **(a)** dialysis
   Explanation: Dialysis is a process used for purifying blood by removing waste and excess fluid from the body. When the kidneys don't work properly, dialysis is used to perform the function of the kidneys. Dialysis is a treatment that filters and purifies the blood using a machine.
9. **(c)** (A)
   Explanation: Yeast cells do not separate after budding because it is only after the formation of a chain of buds get separated.
10. **(a)** phototropism
    Explanation: The term 'phototropism' is composed of two terms that are 'Photo' means light and 'tropism' means growth.
    Hence, the movement of a shoot towards the light is phototropism.
11. **(c)** Zinc amalgam
    Explanation: Generally, alloys containing mercury as one of its constituents are known as amalgam. Zinc amalgam is an alloy of zinc and liquid mercury.
12. **(b)** At the dendritic end electrical impulses bring about the release of some chemicals which generate an electrical impulse at the axonal end of another neuron

Explanation: Chemicals are released from the axonal end and not from the dendritic end.

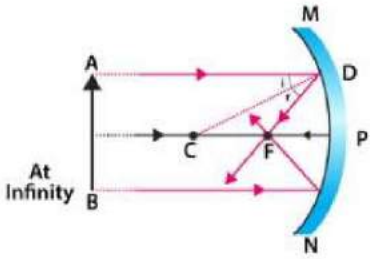
13. **(c)** A
Explanation: Uterus is a site of implantation.
14. **(b)** neon
Explanation: Electronic configuration of carbon is 2, 4 and after sharing four electrons from four univalent atoms, its electronic configuration becomes 2, 8 which is the same as that of Neon.
15. **(a)** (ii) and (iii)
Explanation: A combination reaction is one in which or more reactants combine to form a single product. In reaction (ii), MgO and H_2O combine to form $Mg(OH)_2$. In reaction (iii). Al and O_2 combine to form Al_2O_3. A combination reaction is also known as a synthesis reaction.
Reaction (i) is decomposition reaction and reaction (iv) is displacement reaction.
16. **(b)** $CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$
Explanation: When ester is treated with an alkali, the reaction gives ethanol and sodium ethanoate. This reaction is called saponification reaction.
17. **(c)** A is true but R is false.
Explanation: It is a common error to say that V = Ri is a statement of Ohm's law. The essence of Ohm's law is that the value of R is independent of the value of V. The equation V = Ri is used for. finding the resistance of all conducting devices, whether they obey Ohm's law or not.
18. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Baking powder is used in making cake instead of using baking soda because, baking powder contains tartaric acid which reacts with sodium carbonate and removes bitter taste.
19. **(b)** Both A and R are true but R is not the correct explanation of A.
Explanation: Both A and R are true but R is not the correct explanation of A.
20. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation: Carbon is a non-metal from acidic oxides, i.e., their aqueous solution turns blue litmus solution red.

Section B

21. A person is said to have developed cataract when the eye lens becomes progressively cloudy resulting in blurred vision. The vision of a person having cataract can be restored after getting surgery done on the eye having cataract. The opaque lens is removed from the eye by surgical operation and a new artificial lens is inserted in its place.

OR

Two main causes of a person developing near sightedness also known as Myopia are
i. Excessive curvature of eye lens
ii. Elongation of eyeball
Can be corrected by using concave lens which is a divergent.

22. 

23. Measures taken to protect ozone layer are -
(A) International restrictions in the use and manufacture of CFCS and halons were implemented to reduce the ozone depletion.
(B) The adoption of Vienna convention for the protection of the ozone layers in 1985.
(C) Promotion of an international treaty known as Montreal protocol (1987), to which over 140 countries agreed to the reduction and eventual phasing out of the manufacture and use of most ozone depleting substances.

24. The chief excretory organs and the waste products removed by them are:
1) Kidneys - Urea in the form of urine
2) Lungs - Carbon dioxide
3) Skin - Water and salts as sweat

25. i. When HCl react with Mg, magnesium chloride is formed and hydrogen gas is evolved.
$Mg + 2HCl \longrightarrow MgCl_2 + H_2$

ii. When HCl reacts with NaOH, it gives NaCl and water. This is neutralisation reaction.
$HCl + NaOH \longrightarrow NaCl + H_2O$

iii. Crushed eggs contain calcium carbonate, when reacted with HCl, it gives calcium chloride and carbon dioxide.
$2HCl\ (aq) + CaCO_3\ (s) \longrightarrow CaCl_2 + H_2O + CO_2$

26. A is ethanoic acid, CH_3COOH
B is sodium ethanoate, CH_3COONa
C is methanol, CH_3OH
D is methylethanoate, CH_3COOCH_3

Section C

27. i. Metals low in activity series can be reduced to pure metals just by heating their oxides in presence of air, example mercury (Hg):

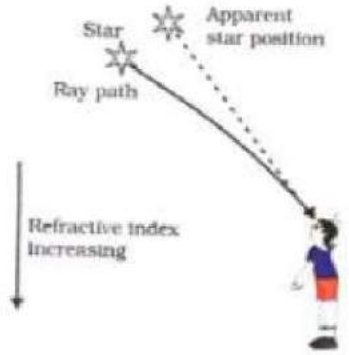
$$\underset{\text{Mercurous oxide}}{2HgO(s)} \xrightarrow{\text{Heat}} \underset{\text{Mercury}}{2Hg(l)} + O_2(g)$$

ii. a. The given reaction is a displacement reaction.
b. Aluminium is more reactive than manganese used as a reducing agent, as Al is capable of replacing Mn from MnO_2.

28. 1. If image is of same size, laterally inverted and erect, it is plane mirror.
    2. If image is bigger or smaller in size and inverted or erect, it is concave mirror.
    3. If image is smaller in size and erect as in rear view mirror , it is convex mirror.

OR

Atmospheric refraction:- The refraction of light caused by the earth's atmosphere (having their layers of varying optical densities) is called atmospheric refraction. Light from a star is refracted as it leaves space and enters the earth's atmosphere. Air higher up in the sky is rare but that near the Earth's surface is denser. So, as the light from a star comes down the dense air bends the light more. Therefore, the apparent position to the star is slightly different from its actual position.

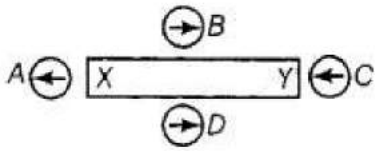


29. Water bath is a must to boil the leaf in ethanol as precaution. A water bath is being used here for heating alcohol because alcohol is a highly inflammable liquid. So, if alcohol is heated directly over a flame, then it will catch fire at once.This boiling alcohol will extract (or remove) chlorophyll from the green leaf.
30. Crop fields are man-made as some biotic and abiotic components are manipulated by humans. Therefore, they are known as artificial ecosystems. Another example of an artificial ecosystem is an Aquarium.
31. 1. Functions of following parts of human eye are given below :
        1. Cornea - It is a thin membrane which provides 67% of the eye's focussing power.
        2. Iris - It controls amount of light entering the eye by controlling the size of pupil similar to the aperture of a camera which has capacity to decrease or increase the amount of light entering eye.
        3. Crystalline lens - It helps to focus light on retina for image formation.
        4. Ciliary muscles - It contracts and relax in order to change the lens shape for focussing image at retina. when it contracts the lens become thicker and when it relaxes the lens become flat.
    2. 1. The objective of organising such compaigns is to guide, educate and help those people who are suffering from corneal blindness that they can be cured by corneal replacement surgery.
        2. 1. Come to participate in this campaign because, if someone get his vision through your eyes, it is an incredible help.
            2. As eye is one of the most valuable sense organs through which an individual

can achieve so many things in his/her life, so try to realise the situation that these people are sufferinng from.

3. The persons who actively participate and contribute in such programme are strong hearted and very much helpful for the people living in such situations.

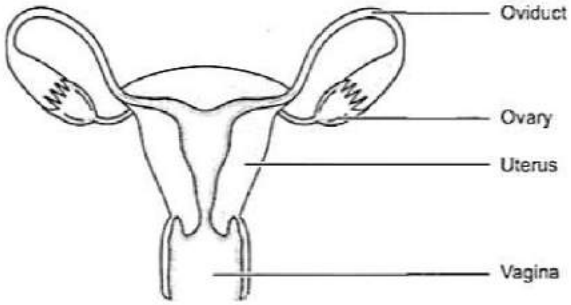
32. i.



ii. The North Pole is **X.**

33. i. The figure represents the female reproductive system.

ii. The figure with labelled part is as shown.



iii. The ovary is the female primary sex organ that produces ova or eggs. They secrete female hormones oestrogen and progesterone. The oviduct receives the egg released from the ovum and it is the site of fertilisation. The uterus is a muscular organ where implantation of zygote occurs and it takes care of the developing embryo. The vagina is a muscular tube-like structure which receives the sperms and through which the baby is delivered.

OR

The main function of the reproductive system is to produce the gametes for the sexual reproduction. Reproductive system is not necessary for the survival of the individual. So even if reproductive system is fully removed, the persons may have a good health. That is why the persons who are sterile cannot reproduce but can survive.

Section D

34. i. **Dry HCl gas:** No change on litmus paper. This is because litmus paper changes colour only if ions such as hydrogen (H^+) or hydronium (H_3O^+) ions are present in a solution. HCl can only furnish ions when it reacts with water. Thus, dry HCl gas does not change the colour of litmus paper.
    ii. **Moistened NH_3 gas:** Red litmus turns blue as it is basic in nature.
    iii. **Lemon Juice:** Blue litmus turns red as it contains citric acid.
    iv. **Carbonated soft drinks:** Blue litmus turns red as it contains carbonic acid.
    v. **Curd:** Blue litmus turns red as it contains lactic acid.
    vi. **Soap solution:** Red litmus turns blue as it is basic in nature.

    OR

    i. The p in pH stands for "**potenz**" which means **power** in German. pH is a number which indicates the acidic or basic nature of a solution.
    ii. Water will turn universal indicator solution green as its pH value is 7.
    iii. As the pH value of solution A is 3.0, i.e. acidic in nature hence, it turns litmus solution from blue to red and phenolphthalein indicator in basic medium change its color to pink

35. The sudden involuntary movement in a voluntary organ; in response to a stimulus; is called reflex action.
    Examples of reflex action:
    i. Moving your hand away from a hot iron plate
    ii. Blinking of eyes

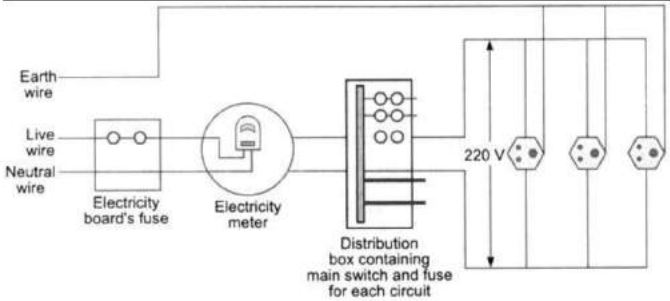
Reflex Arc: The path of electrical impulse during a reflex action is called the reflex arc. A reflex arc is composed of a sensory neuron, spinal cord, motor neuron, and muscle. It involves the following steps:

i. The sensory neuron picks signals from the stimulus and carries the signals to the spinal cord.
ii. Spinal cord process the signals and sends a message through the motor neuron.
iii. A motor neuron transmits the signals to the effector's muscle so that the muscle can take immediate action.

OR

Diseases	Causes	Symptoms / Characteristics
1) Gigantism	Over production of growth promoting hormone in childhood.	Growth of bones at the joints. Abnormal height ranging from six and a half feet upwards.
2) Acromegaly	Over production of growth promoting hormone in adult.	Development of coarse skin, large nose, thick lips, huge hands and feet.
3) Dwarfism	Deficiency of growth promoting hormone in children.	Stunted growth, retarded sexual development.
4) Diabetes insipidus	Deficiency of antidiuretic hormone (ADH)	Large quantities to dilute urine are produced. It is accompanied by a desire to drink large quantities of water.
5) Goitre	Absence of iodine in the diet.	Enlargement of thyroid gland.
6) Exophthalmic goitre	Over-secretion of thyroxine, weight, accelerated heart beat, etc.	Big swelling in the neck region and the bulging of eyes, loss of weight, accelerated heart beat, etc.
7) Diabetes mellitus	Deficiency of insulin.	Excretion of sugar in the urine.

36.



A fuse in a circuit prevents damage to the appliances and the circuit due to overloading. Otherwise, the appliances or the circuit may be damaged.
When current in the circuit exceeds the value of fuse rating, the fuse wire burns due to overloading. This causes a gap in the circuit and the current stops flowing in the circuit.
This is done due to the reason so that the circuit or the appliances to be connected in the circuit continue functioning without any damage in future.

Section E

37. **Read the text carefully and answer the questions:**

In humans, the allele for brown eyes (B) is dominant over that for blue eyes (b). A brown-eyed woman marries a blue-eyed man, and they have six children. Four of the children are brown-eyed and two of them are blue-eyed.

(i) bb

The genotype is a set of genes in DNA responsible for unique traits or characteristics while the phenotype is the physical appearance or characteristic of an organism.

(ii) Bb

According to the given passage, some children show recessive traits, i.e., homozygous. So, the woman must be heterozygous.

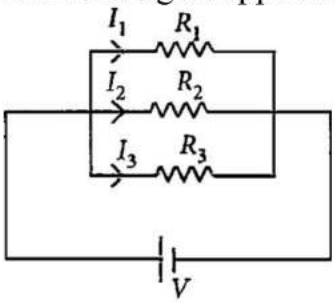
OR

B or b

Human ova are haploid, hence they only contain one copy of each gene. Since the woman has a Bb genotype her ova would contain either B or b allele.

38. **Read the text carefully and answer the questions:**

If two or more resistances are connected in such a way that the same potential difference gets applied to each of them, then they are said to be connected in parallel.



The current flowing through the two resistances in parallel is, however, not the same. When we have two or more resistances joined in parallel to one another, then the same current gets additional paths to flow and the overall resistance decreases.

(i) The equivalent resistance in the parallel combination is lesser than the least value of the individual resistance.

The equivalent resistance of parallel combinations

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

$\Rightarrow$ Rp = $\frac{8}{7}\Omega$

Thus equivalent resistance is less than 2Ω.

(ii) Resistance of each piece $= \frac{12}{3} = 4\Omega$

$\frac{1}{R_p} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} \Rightarrow R_p = \frac{4}{3}\Omega$

(iii)All the three resistors are in paralle.

$\therefore \frac{1}{R_p} = \frac{1}{6} + \frac{1}{3} + \frac{1}{1} = \frac{1+2+6}{6} = \frac{9}{6} R_P = \frac{6}{9} = \frac{2}{3}\Omega$

OR

All are in parallel.

$\frac{1}{R_p} = \frac{1}{12} \times 4 = \frac{1}{3} \Rightarrow R_p = 3\Omega$

$I = \frac{3}{3} = 1$ A

So, current in each resistor $I' = \frac{3}{12} = \frac{1}{4}$ A

39. **Read the text carefully and answer the questions:**

In a balanced chemical reaction, equal number of atoms are present on both sides of reaction. A balanced chemical reaction is based on law of conservation of mass which means that total mass of reactants and products participating in a reaction must be equal. For example, a balanced chemical equation of burning of magnesium in oxygen to form magnesium oxide is written as:

$2Mg + O_2 \longrightarrow 2MgO$

The mass of reactants ($2 \times 24 + 32 = 80$) is equal to the mass of products [$2 \times (24 + 16) = 80$].

(i) $\underset{35\ g}{PQ} \longrightarrow \underset{20g\ +\ ?}{P + Q}$

According to law of conservation of mass,

Mass of PQ = Mass of P + Mass of Q

$\therefore$ Mass of Q = (35 - 20)g = 15 g

(ii) 2 moles of mercury (II) oxide produce 2 moles of mercury and one mole of oxygen gas.

$2HgO_{(s)} \longrightarrow 2Hg_{(l)} + O_{2(g)}$

(iii) The law of conservation of mass is satisfied by a balanced chemical equation.

OR

12 and 6