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CHAPTER 1

Chemical Reactions and Equations

1. OBJECTIVE QUESTIONS

1. A substance which oxidises itself and reduces other is known as -
(a) oxidising agent (b) reducing agent
(c) both of these (d) none of these

Ans : (b) reducing agent

2. Which of the following reactions involves the combination of two elements?
(a) $CaI + CO_2 \rightarrow CaCO_3$ (b) $4Na + O_2 \rightarrow 2Na_2O$
(c) $SO_2 + \frac{1}{2}O_2 \rightarrow SO_3$ (d) $NH_3 + HCl \rightarrow NH_4Cl$

Ans : (b) $4Na + O_2 \rightarrow 2Na_2O$
Except (b) all other reactions involve compounds.

3. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of-
(a) a combination reaction
(b) a displacement reaction
(c) a decomposition reaction
(d) a double decomposition reaction

Ans : (d) a double decomposition reaction

$$\underset{\text{(blue)}}{CuSO_4} + H_2S \longrightarrow \underset{\text{(black)}}{CuS} + H_2SO_4$$
(double decomposition)

4. Which of the following is a physical change?
(a) Formation of curd from milk
(b) Ripening of fruits
(c) Getting salt from sea water
(d) Burning of wood

Ans : (c) Getting salt from sea water

The changes, which can give back the reactants by physical means are called physical changes. Hence getting of salt from sea water is a physical change.

5. What happens when copper rod is dipped in iron sulphate solution?
(a) Copper displaces iron
(b) Blue colour of copper sulphate solution is obtained
(c) No reaction takes place
(d) Reaction is exothermic

Ans : (c) No reaction takes place

Iron is more reactive than copper, hence Cu will not displace iron from iron sulphate, hence no reaction will take place.

6. A student added dilute HCl to a test tube containing zinc granules and made following observations :
(a) the zinc surface became dull and black
(b) a gas evolved which burnt with a pop sound
(c) the solution remained colourless
(d) the solution becomes green in colour

Ans : (b) a gas evolved which burnt with a pop sound

$$Zn + 2HCl \longrightarrow ZnCl_2 + H_2$$
Hydrogen gas burns with a pop sound.

7. A dilute solution of sodium carbonate was added to two test tubes - one containing dil HCl (a) and the other containing dilute NaOH(b). The correct observation was-
(a) a brown coloured gas liberated in test tube A
(b) a brown coloured gas liberated in test tube B
(c) a colourless gas liberated in test tube A
(d) a colourless gas liberated in test tube B

Ans : (c) a colourless gas liberated in test tube A

$$Na_2CO_3 + 2HCl \longrightarrow 2NaCl + H_2O + CO_2$$
$$Na_2CO_3 + NaOH \longrightarrow \text{no reaction}$$

8. A balanced chemical equation is in accordance with-
(a) Avogadro's law
(b) law of multiple proportion
(c) law of conservation of mass
(d) law of gaseous volumes

Ans : (c) law of conservation of mass

9. The equation
$Cu + xHNO_3 \rightarrow Cu(NO_3)_2 + yNO_2 + 2H_2O$
The values of x and y are-
(a) 3 and 5 (b) 8 and 6

(c) 4 and 2 (d) 7 and 1

Ans : (c) 4 and 2

$Cu + 4HNO_3 \longrightarrow Cu(NO_3)_2 + 2NO_2 + 2H_2O$

10. $Zn + H_2SO_4(dil) \longrightarrow ZnSO_4 + H_2\uparrow$
Above reaction is -
(a) decomposition reaction
(b) single displacement reaction
(c) combination reaction
(d) synthesis reaction

Ans : (b) single displacement reaction

11. The reaction in which two compounds exchange their ions to form two new compounds is -
(a) a displacement reaction
(b) a decomposition reaction
(c) an isomerization reaction
(d) a double displacement reaction

Ans : (d) a double displacement reaction

12. A redox reaction is one in which-
(a) both the substance are reduced
(b) both the substance are oxidised
(c) an acid is neutralised by the base
(d) one substance is oxidised while the other is reduced

Ans : (d) one substance is oxidised while the other is reduced

13. When the gases sulphur dioxide and hydrogen sulphide mix in the presence of water, the reaction is $SO_2 + 2H_2S \rightarrow 2H_2O + 3S$. Here hydrogen sulphide is acting as -
(a) an oxidising agent (b) a reducing agent
(c) a dehydrating agent (d) a catalyst

Ans : (b) a reducing agent

Here H_2S is oxidising in to H_2O, hence behave as a reducing agent.

14. $CuO + H_2 \rightarrow H_2O + Cu$, reaction is an example of -
(a) redox reaction (b) synthesis reaction
(c) neutralisation (d) analysis reaction

Ans : (a) redox reaction

15. In the following equations :
$Na_2CO_3 + x\,HCl \rightarrow 2NaCl + CO_2 + H_2O$, the value of x is-
(a) 1 (b) 2
(c) 3 (d) 4

Ans : (b) 2

$$Na_2CO_3 + 2HCl \longrightarrow 2NaCl + CO_2 + H_2O$$

16. In the equation, $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$ nitric acid is acting as-
(a) an oxidising agent (b) an acid
(c) a nitrating agent (d) a dehydrating agent

Ans : (b) an acid

The reaction represents a neutralisation reaction in which base (NaOH) reacts with an acid (HNO_3) to form salt ($NaNO_3$) and water (H_2O).

17. $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$
The above reaction is an example of a-
(a) combination reaction
(b) double displacement reaction
(c) decomposition reaction
(d) displacement reaction

Ans : (d) displacement reaction

18. White silver chloride in sunlight turns to-
(a) grey (b) yellow
(c) remain white (d) red

Ans : (a) grey

White silver chloride in sunlight turns to grey.

19. Black and white photography uses-
(a) decomposition of silver chloride
(b) decomposition of silver bromide
(c) both
(d) none of these

Ans : (b) decomposition of silver bromide

20. When copper powder is heated it gets coated with-
(a) black copper oxide (b) yellow copper oxide
(c) red copper oxide (d) None of these

Ans : (a) black copper oxide

$$2Cu + O_2 \xrightarrow{\Delta} \underset{\text{Black}}{2CuO}$$

21. Combination of phosphorus and oxygen is an example of -
(a) oxidation (b) reduction
(c) rancidity (d) None of these

Ans : (a) oxidation

$$4P + 3O_2 \longrightarrow \underset{\text{(Oxidation)}}{2P_2O_3}$$

$$4P + 5O_2 \longrightarrow \underset{\text{(Oxidation)}}{2P_2O_5}$$

22. To indicate the presence of gaseous reactant or product, we use the symbol
(a) $(Product)_g$ or $(Reactant)_g$
(b) (Product)↑ or (Reactant)↑
(c) (Product)↓ or (Reactant)↓
(d) Both (a) and (b)

Ans : (d) Both (a) and (b)

The gaseous reactants and products in any chemical reaction can be demonstrated using the symbol(g) or '↑'.

23. When $Ca(NO_3)_2$ is heated, it gives CaO, NO_2(g) and O_2(g). The correct number of moles of $Ca(NO_3)_2$, CaO, NO_2(g) and O_2(g) are present in the reaction

are respectively
(a) 2, 1, 3, 2 (b) 2, 2, 4, 1
(c) 2, 2, 2, 1 (d) 1, 2, 4, 1

Ans : (b) 2, 2, 4, 1

$Ca(NO_3)_2$ on heating gives CaO, $NO_2(g)$ and $O_2(g)$. The balanced chemical equation is as follows:

$$2Ca(NO_3)_2 \longrightarrow 2CaO + 4NO_2(g) + O_2(g)$$

Hence, number of moles of reactant $Ca(NO_3)_2$ and products CaO, $NO_2(g)$ and $O_2(g)$ are present 2, 2, 4 and 1 respectively.

24. Which of the following reaction is characterised by the yellow colour of product?
(a) $Zn(s) + H_2SO_4 \longrightarrow ZnSO_4 + H_2$
(b) $Na_2CO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O + CO_2$
(c) $2Pb_3O_4 \xrightarrow{\Delta} 6PbO(s) + O_2(g)$
(d) $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2(g)$

Ans : (c) $2Pb_3O_4 \xrightarrow{\Delta} 6PbO(s) + O_2(g)$

When red lead oxide (Pb_3O_4) is heated, it gives yellow colour of lead-oxide (PbO).

$$2Pb_3O_4(s) \xrightarrow{\Delta} \underset{\text{(Yellow)}}{6PbO(s)} + O_2(g)$$

25. Which one of the following involve a chemical reaction?
(a) Evaporation of water
(b) Storing on nitrogen gas under pressure
(c) Keeping petrol in a China dish in open
(d) Heating magnesium wire in the presence of air at high temperature

Ans : (d) Heating magnesium wire in the presence of air at high temperature

Only statement (d) follows a chemical reaction. Evaporation of water, storing of nitrogen gas under pressure and keeping petrol in a China dish in open does not involve a chemical reaction.

Heating magnesium wire in the presence of air at high temperature involves a chemical reaction.

$$Mg(s) + O_2(g) \longrightarrow 2MgO(s)$$

26. Ethane (C_2H_6) on complete combustion gave CO_2 and water. It shows that the results are in accordance with the law of conservation of mass. Then, the coefficient of oxygen is equal to
(a) 3 (b) 5/2
(c) 2 (d) 7/2

Ans : (d) 7/2

Balanced chemical equation wrt law of conservation of mass.

$$C_2H_6 + \frac{7}{2}O_2 \longrightarrow 2CO_2 + 3H_2O$$

The coefficient of C_2H_6 is 1, $\frac{7}{2}$ for O_2, 2 for CO_2 and 3 for H_2O.

27. A powdered salt (X) in a dry test tube was heated that evolves brown fumes of nitrogen dioxide and a yellow residue of lead oxide is also formed. The salt (X) is
(a) $MgSO_3$ (b) $Pb(NO_3)_2$
(c) $(NH_4)_2SO_4$ (d) $CaCO_3$

Ans : (b) $Pb(NO_3)_2$

The salt (X) is $Pb(NO_3)_2$. When it is heated, then it evolves brown fumes of nitrogen dioxide and a yellow residue of lead oxide is also formed.

$$\underset{\text{Lead nitrate}}{2Pb(NO_3)_2} \xrightarrow{\Delta} \underset{\text{Lead oxide}}{2PbO(s)} + \underset{\text{Nitrogen dioxide}}{4NO_2(g)} + \underset{\text{Oxygen}}{O_2(g)}$$

28. A reddish brown coloured metal used in electric wires, when powdered and heated strongly in an open China dish, its colour turns black. When hydrogen gas is passed over this black substances, it regain its original colour. Based on this information, the metal and black coloured substances are
(a) copper and copper nitrate
(b) silver and silver oxide
(c) copper and copper oxide
(d) aluminium and aluminium oxide

Ans : (c) copper and copper oxide

The reddish brown metal is copper that changes into a black substance, which is found to be copper oxide. The reaction taking place is:

$$\underset{\substack{\text{Copper}\\\text{(Reddish brown)}}}{2Cu(s)} + \underset{\substack{\text{Oxygen}\\\text{(from air)}}}{O_2(g)} \longrightarrow \underset{\substack{\text{Copper (II)}\\\text{oxide (black)}}}{2CuO(s)}$$

29. When dilute sulphuric acid is added to pieces of iron sulphide, hydrogen sulphide gas is produced and soluble ferrous sulphate is formed. The type of chemical reaction involved is
(a) decomposition reaction
(b) combination reaction
(c) displacement reaction
(d) double displacement reaction

Ans : (d) double displacement reaction

The reactions in which two ionic compounds in the solution react by exchange of their ions to form new compounds are called double displacement reactions.

$$\underset{\substack{\text{Iron}\\\text{sulphate}}}{FeS(s)} + \text{dil.}\underset{\substack{\text{Sulphate}\\\text{acid}}}{H_2SO_4(aq)} \longrightarrow \underset{\substack{\text{Ferrous}\\\text{sulphate}}}{FeSO_4(aq)} + \underset{\substack{\text{Hydrogen}\\\text{sulphide}}}{H_2S(g)}$$

30. Following reaction is used for the preparation of oxygen gas in the laboratory.

$$2KClO_3(s) \xrightarrow[\text{Catalyst}]{\text{Heat}} 2KCl(s) + 3O_2(g)$$

Which of the following statement (s) is (are) correct about the reaction?
(a) It is a decomposition reaction and endothermic in nature.
(b) It is a combination reaction.
(c) It is a decomposition reaction and accompanied by the release of heat.
(d) It is a photochemical decomposition reaction and exothermic in nature.

Ans : (a) It is a decomposition reaction and endothermic in nature.

The given reaction is a decomposition reaction and takes place on absorption of hear.

31. A metal 'M' reacts with an acid according to the equation.

$$M + H^+ \longrightarrow M^{3+} + H_2$$

Which of the following is correct for metal M?

(a) Calcium (b) Aluminium

(c) Barium (d) Potassium

Ans : (c) Barium

1. Balancing of H-atoms : Multiply H^+ on LHS by 2.
$$M + 2H^+ \longrightarrow M^{3+} + H_2$$
2. Balancing charge : Multiply $2H^+$ by 3 and M^{3+} by 2 so that charge on each side is $+6$.
3. Re-balancing of H-atoms: Multiply H_2 on RHS by 3
$$M + 6H^+ \longrightarrow 2M^{3+} + 3H_2$$
4. Balancing of M-atoms: Multiply M LHS by 2
$$2M + 6H^+ \longrightarrow 2M^{3+} + 3H_2$$

This is the required balanced equation and the metal is aluminium (M).

2. FILL IN THE BLANK

1. When calcium carbonate is heated, it decomposes to from ..... and ..... gas.

Ans : calcium oxide, carbon dioxide

2. Precipitation reactions produce ..... salts.

Ans : insoluble

3. Electrolysis of water is a ..... decomposition reaction.

Ans : electric

4. Reactions in which energy is absorbed are known as ..... reactions.

Ans : endothermic

5. The new substances produce in a reaction are called as .....

Ans : products

6. The reaction of sodium sulphate and barium chloride results in the formation of white precipitate of .....

Ans : barium sulphate

7. Two different atoms or groups of atoms (ions) are exchanged in ..... reactions.

Ans : double displacement

8. Precipitation reactions produce ..... salts.

Ans : insoluble

9. Reduction is the ..... of oxygen or gain of hydrogen.

Ans : loss

10. The addition of oxygen to a substance is called .....

Ans : oxidation

11. The digestion of food in the body is an example of ..... reaction.

Ans : decomposition reaction

12. The addition of oxygen to a substance is called .....

Ans : oxidation

13. When calcium carbonate is heated, it decomposes to give ..... and .....

Ans : CaO (s) and CO_2(g)

14. In a ..... reaction two or more substances combine to form a new single substance.

Ans : combination

15. Reactions in which heat is given out along with the products are called ..... reactions.

Ans : exothermic

16. When an element displaces another element from its compound, a ..... reaction occurs.

Ans : displacement

3. TRUE/FALSE

1. A complete chemical equation represents the reactants, products and their physical states symbolically.

Ans : True

2. The reaction of nitrogen and hydrogen gives ammonia. This is an example of a decomposition reaction.

Ans : False

3. A magnesium ribben burns with a dazzling flame in air (oxygen) and changes into a white substance, magnesium oxide.

Ans : True

4. Rusting is a double decomposition reaction.

Ans : False

5. A chemical cannot be reversed.

Ans : True

6. The number of atoms of each element is conserved in any chemical reaction.

Ans : True

7. Oxidation is the loss of electrons from a substance.

Ans : True

8. The term 'aqueous' represents water as solvent.

Ans : True

9. Rusting of iron and rancidity are caused due to oxidation.

Ans : True

10. Reduction is the gain of electrons by a substance.

Ans : True

11. The formation of Cu and H_2O the reaction of copper oxide is an example of a redox reaction.

Ans : True

12. Curdling of milk is a physical change.

Ans : False

13. The reaction between nitrogen and hydrogen to give ammonia is an example of a combination reaction.

Ans : True

14. For word-equations, we do no need to know the formulae for the chemicals involved but in symbol-equations we do.

Ans : True

15. Action of heat on ferrous sulphate is an example of decomposition reaction.

Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1.

	Column I
(A)	$C + O_2 \rightarrow CO_2$
(B)	$AgBr \xrightarrow{light} Ag + Br$
(C)	$Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
(D)	$CH_3CH_2OH \xrightarrow{Cu} CH_3CHO + H_2$

	Column II
(p)	Displacement
(q)	Combination
(r)	Decomposition
(s)	Oxidation

Ans : A-q, B-r, C-p, D-s

2.

	Column A
1.	Ag_2S (Silver sulphide)
2.	$Fe_2O_3 \cdot xH_2O$ (Hydrated ferric oxide)
3.	BHT (Butylated hydroxy-toluene)
4.	$CuCO_3 \cdot Cu(OH)$ (Basic copper carbonate)

	Column B
(a)	Green coating on copper.
(b)	Black coating on silver.
(c)	Reddish brown coating on iron.
(d)	Synthetic antioxidant.

Ans : 1-(b), 2-(c), 3-(d), 4-(a)

5. MULTIPLE MATCHING

DIRECTION : Following question has four statements (A, B, C and D) given in Column I and four statements (p, q, r and s) in Column II. Any given statement in Column I can have correct matching with one or more statement(s) given in Column II. Match the entries in column I with entries in column II.

1. Column II gives type of reaction mention in column I, match them correctly.

	Column I		Column II
(A)	$KClO_3 \xrightarrow{\Delta}$	(p)	O_2
(B)	$ZnCO_3 \xrightarrow{\Delta}$	(q)	H_2O
(C)	$H_2CO_3 \xrightarrow{\Delta}$	(r)	CO_2
(D)	$C_2H_6 \xrightarrow{\Delta}$	(s)	ZnO

	A	B	C	D
(a)	p	s, r	q, r	q, r
(b)	p	q, r	s, r	r, p
(c)	q,r	s,p	p, s	r
(d)	r	q	s	p

Ans : (a) A-p, B-s, r, C-q, r, D-q, r

2.

	Column I		Column II
(A)	$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$	(p)	Reduction reaction

Column I		Column II	
(B)	$Mg \longrightarrow Mg^{2+} + 2e^-$	(q)	displacement reaction
(C)	$Sn^{4+} + 2e^- \longrightarrow Sn^{2+}$	(r)	Redox reaction
(D)	$C + O_2 \longrightarrow CO_2$	(s)	Oxidation reaction

	A	B	C	D
(a)	r, p	p	q	s
(b)	r, p	s	p	s
(c)	s	p, r	q	r, q
(d)	s, p	r	q	p, s

3.

Column I (Compound)		Column II (Oxidation state)	
(A)	$[Fe(CO)_5]$	(p)	+2
(B)	FeO, Fe_2O_3	(q)	+6
(C)	OF_2	(r)	0
(D)	K_2MnO_4	(s)	+3

	A	B	C	D
(a)	r	p, s	p	q
(b)	p	q	s	r
(c)	q	s	p	r
(d)	r	q	s	p

6. ASSERTION AND REASON

DIRECTION : Each of these questions contains an Assertion followed by Reason. Read them carefully and answer the question on the basis of following options. You have to select the one that best describes the two statements.

(a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

(b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

(c) If Assertion is correct but Reason is incorrect.

(d) If Assertion is incorrect but Reason is correct

1. **Assertion :** Stannous chloride is a powerful oxidising agent which oxidises mercuric chloride to mercury.
Reason : Stannous chloride gives grey precipitate with mercuric chloride, but stannic chloride does not do so.

Ans : (c) If Assertion is correct but Reason is incorrect.

2. **Assertion :** Corrosion of iron is commonly known as rusting.
Reason : Corrosion of iron occurs in presence of water and air.

Ans : (b) If both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

Corrosion occurs due to oxidation of iron.

3. **Assertion :** In a reaction.
$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$
Zn is a reductant but itself get oxidized.
Reason : In a redox reaction, oxidant is reduced by accepting electrons and reductant is oxidized by losing electrons.

Ans : (a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

4. **Assertion :** A reducing agent is a substance which can either accept electron.
Reason : A substance which helps in oxidation is known as reducing agent.

Ans : (d) If Assertion is incorrect but Reason is correct

A reducing agent is a substance which oxidizes itself but reduces others i.e., looses electrons.

5. **Assertion :** The balancing of chemical equations is based on law of conservation of mass.
Reason : Total mass of reactants is equal to total mass of products.

Ans : (a) If both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

6. **Assertion (A) :** Carbon dioxide turns lime water milky.
Reason (R) : Carbon dioxide sullies the water.

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

Carbon dioxide reacts with lime water (calcium hydroxide) to form milky precipitate of calcium carbonate.

7. **Assertion (A) :** A chemical reaction becomes faster at higher temperatures.
Reason (R) : At higher temperatures, molecular motion becomes more rapid.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Both A and R are true and R is the correct explanation of (A). A chemical reaction becomes faster at higher temperatures because at high temperature, the movement of particles are greater.

8. **Assertion (A) :** Sodium metal is stored under Kerosene.
Reason (R) : Metallic sodium melts when exposed to air.

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

Sodium is a very reactive metal. It is kept in kerosene to prevent it from coming in contact with oxygen and moisture present. If this happens, it will react with the moisture present in air and form sodium hydroxide. This is a strongly exothermic reaction, and lot of heat is generated.

9. **Assertion (A) :** To dilute sulphuric acid, acid is added to water and not water to acid.
Reason (R) : Specific heat of water is quite large.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The mixing of water to an acid is highly exothermic in nature. If water is added to an acid it produces very large amount of heat which can break the container and some times even causes burnings. So it is advised to add concentrated acid to water very slow manner.

10. **Assertion(A) :** Calcium corbonate when heated gives calcium oxide and water.
Reason (R) : On heating calcium carbonate, decomposition reaction takes place.

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

11. **Assertion(A) :** Brown fumes are produced when lead nitrate is heated.
Reason (R) : Nitrogen dioxide gas is produced as a by product due to the decomposition of lead nitrate.

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

12. **Assertion(A) :** White silver chloride turns grey in sunlight.
Reason (R) : Decomposition of silver chloride in presence of sunlight takes place to form silver metal and chlorine gas.

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

13. **Assertion(A) :** Pungent smelling gas is produced when sulphur burns in air.
Reason (R) : Sulphur trioxide is formed on reaction of sulphur with oxygen.

Ans : (c) A is true but R is false.

14. **Assertion(A) :** In a reaction of copper with oxygen, copper serves as a reducing agent.
Reason (R) : The substance which gains oxygen in a chemical reaction is a reducing agents.

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

15. **Assertion :** The following chemical equation,

$$2C_6H_6 + \frac{7}{2}O_2 \longrightarrow 4CO_2 + 3H_2O$$

is a balanced chemical equation.
Reason : In a balanced chemical equation, the total number of atoms of each element may or may not equal on both side of the equation.

Ans : (e) Both Assertion and Reason are false.

Both Assertion and Reason are false. In a balanced chemical equation, the total number of atoms of each element are equal on both sides of the equation.

The correct balanced chemical equation is,

$$2C_2H_6 + 7O_2 \longrightarrow 4CO_2 + 6H_2O$$

16. **Assertion :** $Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$
The above chemical equation is an example of displacement reaction.
Reason : Aluminium being more reactive than iron, displaces Fe from its oxide.

Ans : (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

$Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$ is a displacement reaction, Here, a highly reactive element (Al) displaces Fe from Fe_2O_3.

17. **Assertion :** In the following chemical equation,

$$CuO(s) + Zn(s) \longrightarrow ZnO(s) + Cu(s)$$

Zinc is getting oxidised and copper oxide is getting reduced.
Reason : The process in which oxygen is added to a substance is called oxidation whereas the process in which oxygen is removed from a substance is called reduction.

Ans : (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

Because the reaction involves both oxidation and reduction in which, CuO is reduced to Cu and Zn is oxidised to ZnO.

18. **Assertion :** Quicklime reacts vigorously with water releasing a large amount of heat.
Reason : The above chemical reaction is an exothermic reaction.

Ans : (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

Because in exothermic reactions, hear is released along with the formation of products.

19. **Assertion :** Photosynthesis is considered as an endothermic reaction.
Reason : Energy gets released in the process of photosynthesis.

Ans : (c) If Assertion is true, but Reason is false.

Assertion is true but Reason is false. Photosynthesis is considered as an endothermic reaction because energy in the form of sunlight is absorbed by the green plants.

CHAPTER 2

Acid Base and Salt

1. OBJECTIVE QUESTIONS

1. Which of the following acid is present in sour milk?
(a) glycolic acid (b) lactic acid
(c) citrus acid (d) tartaric acid

Ans : (b) lactic acid

Lactic acid present in sour milk or curd.

2. An acid (A) with sodium hydrogen carbonate is used in making the cakes fluffy and spongy. It is due to the release of (B) gas in the reaction. Here, X and Y are
(a) A : Oxalic acid : B : CO_2
(b) A : Tartaric acid : B : O_2
(c) A : Succinic acid : B : H_2
(d) A : Tartaric acid : B : CO_2

Ans : (d) A : Tartaric acid : B : CO_2

The acid (A) is tartaric acid that reacts with sodium hydrogen carbonate. It makes cakes fluffy and spongy. It is due to the release of CO_2 gas (B) in the reaction.

$$\underset{\text{(from any acid)}}{NaHCO_3(s) + H^+(aq)} \longrightarrow CO_2(g) + H_2O(l) + \text{sodium salt of acid}$$

3. When CO_2 is passed through lime water, it turns milky. the milkiness in due to formation of
(a) $CaCO_3$ (b) $Ca(OH)_2$
(c) H_2O (d) CO_2

Ans : (a) $CaCO_3$

$$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$$

4. Incorrect statement about acids is/are
(a) they have sour taste
(b) they may change the colour of indicator
(c) they changes the colour or blue litmus to red
(d) they change the colour of red litmus to blue

Ans : (d) they change the colour of red litmus to blue

Acids will change the colour of blue litmus to red but makes no effect on red litmus. Hence, statement (d) is incorrect.

5. When aqueous sodium carbonate (Na_2CO_3) reacts with HCl(aq), it gives
(a) NaOH, H_2(g) and CO_2(g)
(b) NaCl, H_2O and CO_2(g)
(c) $NaHCO_3$, H_2(g) and CO_2(g)
(d) $NaHCO_3$, H_2O and CO_2(g)

Ans : (b) NaCl, H_2O and CO_2(g)

It is an example of acid (HCl) and base (Na_2CO_3) reaction, because Na_2CO_3 is basic in nature. Thus, the reaction gives salt (NaCl), water (H_2O) and CO_2(g).

$$Na_2CO_3(aq) + 2HCl(aq) \longrightarrow 2NaCl(s) + H_2O(l) + CO_2(g)$$

6. Chemical formula of baking soda is-
(a) $MgSO_4$ (b) Na_2CO_3
(c) $NaHCO_3$ (d) $MgCO_3$

Ans : (c) $NaHCO_3$

7. The acid used in making of vinegar is-
(a) formic acid (b) acetic acid
(c) sulphuric acid (d) nitric acid

Ans : (b) acetic acid

6-12% acetic acid is known as vinegar.

8. $CuO + (X) \rightarrow CuSO_4 + H_2O$. Here (X) is-
(a) $CuSO_4$ (b) HCl
(c) H_2SO_4 (d) HNO_3

Ans : (c) H_2SO_4

$$CuO + H_2SO_4 \longrightarrow CuSO_4 + H_2O$$

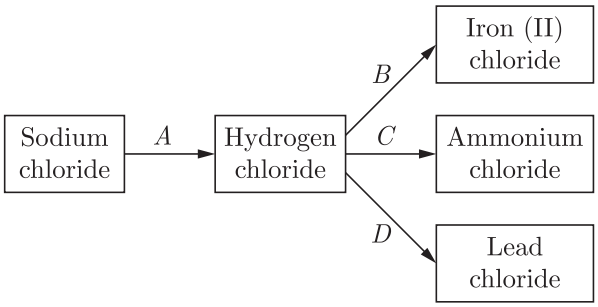
9. Acetic acid was added to a solid X kept in a test tube. A colourless and odourless gas was evolved. The gas was passed through lime water which turned milky. It was concluded that.
(a) Solid X is sodium hydroxide and the gas evolved is CO_2
(b) Solid X is sodium bicarbonate and the gas evolved is CO_2
(c) Solid X is sodium acetate and the gas evolved is CO_2
(d) Solid X is sodium chloride and the gas evolved is CO_2

Ans : (b) Solid X is sodium bicarbonate and the gas evolved is CO_2

$$NaHCO_3(s) + CH_3COOH(aq) \longrightarrow CH_3COO^-Na^+(aq) + CO_2(g) + H_2O(l)$$

$$CO_2(g) + Ca(OH)_2(aq) \longrightarrow \underset{\text{White precipitate}}{CaCO_3(s)} \downarrow + H_2O(l)$$

10. Consider the following reaction:



Here, A, B, C and D respectively are :

(a) $A =$ Conc. HCl; $B =$ Fe; $C = NH_4OH$; $D = PbO$

(b) $A =$ Conc. H_2SO_4; $B =$ Fe; $C = NH_4OH$; $D = Pb(NO_3)_2$

(c) $A =$ Conc. H_2SO_4 $B =$ Fe; $C = NH_3$; $D = Pb(NO_3)_2$

(d) $A =$ Conc. HCl; $B =$ Fe; $C = NH_3$; $D = PbO$

Ans : (c) $A =$ Conc. H_2SO_4 $B =$ Fe; $C = NH_3$; $D = Pb(NO_3)_2$

1. $NaCl + H_2SO_4 \xrightarrow{\Delta < 200^\circ C} NaHSO_4 + HCl \uparrow$
2. $2HCl + Fe \longrightarrow FeCl_2 + H_2$
3. $HCl(g) + NH_3(g) \longrightarrow NH_4Cl$

11. Antacids contain-

(a) weak base (b) weak acid

(c) strong base (d) strong acid

Ans : (a) weak base

Antacids are weak bases which are given when a patient is suffering from acidity. These antacids neutralises the acid and give relief to patient.

12. A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains

(a) NaCl (b) HCl

(c) LiCl (d) KCl

Ans : (b) HCl

The egg-shells are made up of calcium carbonate. When it reacts with HCl it liberates CO_2 gas which turns lime water milky

$$CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$$

1. $2HCl + Pb(NO_3)_2 \longrightarrow \underset{\text{Lead chloride}}{PbCl_2} \downarrow + 2HNO_3$

13. You are having five solutions A, B, C, D and E with pH values as follows:

$A = 1.8$, $B = 7$, $C = 8.5$, $D = 8$ and $E = 5$

Which solution would be most likely to liberate hydrogen with magnesium powder?

(a) Solution A and B (b) Solution A

(c) Solution C (d) All of the above

Ans : (b) Solution A

Solution A would liberate hydrogen with magnesium because pH value is least for A solution i.e. 1.8. Hence, it is the most acidic among all the solutions.

14. In one of the industrial processes used for manufacture of sodium hydroxide, a gas X is formed as by-product. The gas X reacts with lime water to give a compound Y which is used as a bleaching agent in chemical industry. The compound X and Y could be

(a) H_2 and $NaHCO_3$ respectively

(b) CO_2 and $CaOCl_2$ respectively

(c) Cl_2 and $CaOCl_2$ respectively

(d) Cl_2 and $NaHCO_3$ respectively

Ans : (c) Cl_2 and $CaOCl_2$ respectively

The gas released during the manufacture of sodium hydroxide is chlorine, $Cl_2(X)$.

$2NaCl(aq) + 2H_2O(l) \longrightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$

Cl_2 is given off at anode.

$Cl_2(X)$ when reacts with lime water (Y), a compound called bleaching powder, $CaOCl_2$ is obtaived.

$Ca(OH)_2(aq) + Cl_2(g) \longrightarrow CaOCl_2(s)H_2O(l)$

15. Plaster of pairs is made from-

(a) lime stone (b) slaked lime

(c) quick lime (d) gypsum

Ans : (d) gypsum

Plaster of pars is prepared by heating gypsum at 373 K.

$$CaSO_4 \cdot 2H_2O \xrightarrow{373k} CaSO_4 \cdot 1/2H_2O + \frac{3}{2}H_2O$$

16. On prolong supply of $CO_2(g)$ in lime solution (lime-water), it is observed that

(a) lime solution changes to gaseous state

(b) the milkiness of lime water disappears

(c) the milkiness of lime water changes from white to red.

(d) the colour of lime water becomes black

Ans : (b) the milkiness of lime water disappears

On prolong supply of $CO_2(g)$ in lime solution, the milky solution becomes colourless due to formation of $CaCO_3(s)$.

$$\underset{\text{Lime water}}{Ca(OH)_2(aq)} + \underset{\text{in excess}}{CO_2(g)} \longrightarrow \underset{\text{Salt}}{CaCO_3(s)} + H_2O(l)$$

17. When $Ca(OH)_2$ reacts with $CO_2(g)$, it will give $CaCO_3(s)$ and $H_2O(l)$. The nature of $CaCO_3$ is

(a) acidic (b) basic

(c) neutral (d) All are possible

Ans : (b) basic

$CaCO_3$ is basic in nature, as it is the salt of strong base $Ca(OH)_2$ (calcium hydroxide) and a weak acid, H_2CO_3 (carbonic acid).

18. The correct statement regarding universal indicator is

(a) it is an indicator having pH = 7

(b) it gives blue colour at pH = 3

(c) it becomes colourless at pH = 7

(d) it gives orange colour at pH = 3

Ans : (d) it gives orange colour at pH = 3

Universal indicator is mixture of many indicators. Its colour is orange at pH = 3.

19. A blue litmus paper was first dipped in dil. HCl and then in dil. NaOH solution. It was observed that the colour of the litmus paper-

(a) changed to red

(b) changed first to red and then to blue
(c) changed blue to colourless
(d) remains blue in both the solutions

Ans : (b) changed first to red and then to blue

In acid blue litmus changes to red and in basic solution red litmus changes to blue. Hence blue litmus first changes its colour to red and then to blue.

20. Bleaching powder is soluble in cold water giving a milky solution due to-
(a) available chlorine
(b) lime present in it
(c) calcium carbonate formation
(d) The absorption of carbon dioxide from atmosphere

Ans : (b) lime present in it

Bleaching powder is actually a mixture of calcium hypochlorite $CaOCl_2$ and the basic chloride $CaCl_2$ with some slaked, $Ca(OH)_2$.

21. Reaction of an acid with a base is known as-
(a) decomposition (b) combination
(c) redox reaction (d) neutralization

Ans : (d) neutralization

In a neutralization reaction an acid reacts with a base and forms salt and water.

22. Which of the following acid does not react with metals-
(a) sulphuric acid (b) phosphoric acid
(c) carbonic acid (d) nitric acid

Ans : (c) carbonic acid

23. Bleaching powder gives smell of chlorine because it-
(a) is unstable
(b) gives chlorine on exposure to atmosphere
(c) is a mixture of chlorine and slaked lime
(d) contains excess of chlorine

Ans : (b) gives chlorine on exposure to atmosphere

$$CaOCl_2 + CO_2 \longrightarrow CaCO_3 + Cl_2(g)$$

24. When NaOH and HCl are mixed in equal molar quantities, the result is
(a) the formation of salt $+H_2O$
(b) the formation of salt $+H_2(g)$
(c) the formation of salt $+O_2(g)$
(d) All above are correct

Ans : (a) the formation of salt $+H_2O$

When NaOH and HCl are mixed in equal molar quantities, acid-base reaction takes place and we get salt (NaCl) and water.

$$NaOH + HCl \longrightarrow \underset{\text{Salt}}{NaCl} + H_2O$$

25. Acid turn blue litmus-
(a) green (b) red
(c) yellow (d) orange

Ans : (b) red

26. Washing soda has the formula-
(a) $Na_2CO_3 \cdot 7H_2O$ (b) $Na_2CO_3 \cdot 10H_2O$
(c) $Na_2CO_3 \cdot H_2O$ (d) Na_2CO_3

Ans : (b) $Na_2CO_3 \cdot 10H_2O$

27. An aqueous solution turns red litmus solution blue. Excess addition of which of the following solution would reverse the change?
(a) Baking powder
(b) Lime
(c) Ammonium hydroxide solution
(d) Hydrochloric acid

Ans : (d) Hydrochloric acid

28. The organic acid present in tomato is
(a) oxalic acid (b) lactic acid
(c) malic acid (d) tartaric acid

Ans : (a) oxalic acid

The organic acid present in tomato is oxalic acid.

29. Which of the following is acidic in nature-
(a) apple juice (b) soap solution
(c) slaked lime (d) lime

Ans : (a) apple juice

The pH of varies from 3-35 to 4. The lesser the pH the more the acidity. Hence apple juice is , acidic in nature and all other are in basic nature.

30. The reagent used to distinguish iron (II) chloride and iron (III) chloride is
(a) distilled water (b) NaOH
(c) dil. HCl (d) Warm water

Ans : (b) NaOH

Iron (II) chloride is dissolved in water and then sodium hydroxide is added. A dirty green precipitate is obtained which confirms the presence of iron (II) chloride.

$$FeCl_2 + 2NaOH \longrightarrow Fe(OH)_2 + 2NaCl$$

Iron (III) chloride is also dissolved in water and then sodium hydroxide solution is added. A reddish brown precipitate is obtained, which confirms the presence of iron (III) chloride.

31. The pH of a solution is 4.0. What should be the change in the hydrogen ion concentration of the solution, if its pH is to increased to 5.0.
(a) decreases to 1/10 of its original concentration
(b) halved
(c) doubled
(d) increases by 10 times

Ans : (a) decreases to 1/10 of its original concentration

The pH of a solution is 4.0. When pH of a solution increases, the hydrogen ion concentration decreases to 1/10 of its original concentration.

$$PH = -\log[H^+]$$

32. $2NaOH + MgSO_4 \longrightarrow ?$

(a) $MgO + Na_2SO_4$ (b) $Mg(OH)_2 + Na_2SO_4$
(c) $Mg(OH)_2 + Na_2O$ (d) $MgO + Na_2O$

Ans : (b) $Mg(OH)_2 + Na_2SO_4$

$$2NaOH + MgSO_4 \longrightarrow Mg(OH)_2 + Na_2SO_4$$

33. The reaction of metal with acid results in the formation of-
(a) only hydrogen gas
(b) only salt
(c) both salt and hydrogen gas
(d) none of these

Ans : (c) both salt and hydrogen gas

34. Plaster of Paris hardens by-
(a) giving of CO_2 (b) changing into $CaCO_3$
(c) combining with water (d) giving out water

Ans : (c) combining with water

$$\underset{\text{PoP}}{CaSO_4 \cdot \frac{1}{2}H_2O} + \frac{3}{2}H_2O \longrightarrow \underset{\text{Gypsum}}{CaSO_4 \cdot 2H_2O}$$

35. Aqueous solution of copper sulphate reacts with aqueous ammonium hydroxide solution to give.
(a) brown precipitate (b) pale blue precipitate
(c) white precipitate (d) green precipitate

Ans : (b) pale blue precipitate

$CuSO_4(aq) + 2NH_4OH(aq) \longrightarrow Cu(OH)_2(s) + (NH_4)_2SO_4(s)$
When aqueous solution of copper sulphate react with aqueous ammonium hydroxide solution, then pale blue precipitate of $Cu(OH)_2$ are formed.

36. The pH of a solution is 5.0. Its hydrogen ion concentration is decreased by 100 times, the solution will be :
(a) more acidic (b) basic
(c) neutral (d) unaffected

Ans : (c) neutral

$$\begin{aligned} pH &= -\log H^+ \\ 5 &= -\log H^+ \\ 10^{-5} &= [H^+] \end{aligned}$$

When hydrogen ion concentration is decreased by 100 times, then solution will be neutral

$$\begin{aligned} 10^{-5} &= \frac{[H^+]}{10^{-2}} \\ 10^{-5} \times 10^{-2} &= [H^+] \\ 10^{-7} &= [H^+] \end{aligned}$$

2. FILL IN THE BLANK

1. When an acid reacts with a metal carbonate or metal hydrogen carbonate, it gives the corresponding salt, ... gas and ..... .

Ans : carbon dioxide, water

2. The salts of a strong acid and strong base are ..... with pH value of 7. On the other hand, salts of strong base and weak acid are ..... with pH value ..... than 7 and those of a strong acid and weak bases are ..... in nature with pH value ..... than 7.

Ans : neutral, basic, more, acidic, less

3. Anhydrous sodium carbonate is commonly known as .....

Ans : soda ash

4. Binary acid contain ..... atom.

Ans : hydrogen

5. ENO contains ..... and is ..... in nature.

Ans : sodium hydrogen carbonate, basic

6. Alkali reacts with ammonium salts to produce corresponding salt, water and evolve ..... .

Ans : ammonia

7. $Zn(OH)_2$ is ..... base.

Ans : diacidic

8. The strength of acids and bases depends on the number of ..... ions and ..... ions produced respectively, when dissolved in water. Acids like $HClO_4$ which dissociate almost completely in water are called ..... acids.

Ans : hydrogen, hydroxide, strong

9. Acids are ..... in taste and change the colour of blue litmus to ..... .

Ans : sour, red

10. An acid that contains more than one acidic hydrogen atom is called a .....

Ans : polyprotic acid

11. Bases are ..... in taste and change the colour of red litmus to ..... .

Ans : bitter, blue

12. ..... is a natural indicator whereas ..... is a synthetic indicator. A ..... indicator is a mixture of several indicators.

Ans : Litmus, phenolphthalein, universal

13. Oxy acids contains ..... atoms in addition to hydrogen atom.

Ans : oxygen

14. ..... is the fixed number of water molecules chemically attached to each formula unit of a salt in its crystalline form.

Ans : Water of crystallisation

15. When an acid reacts with a metal, ... gas is evolved and a corresponding ..... is formed.

Ans : hydrogen, salt

16. Soda-acid fire extinguisher contains a solution of

sodium hydrogen carbonate and ..... .
Ans : sulphuric acid

17. All alkali are bases but all bases are ..... alkali.
Ans : not

3. TRUE/FALSE

1. Hydrogen chloride gas turns the blue litmus red.
Ans : False

2. Neutral solutions have a pH of 0.
Ans : True

3. Acids and bases neutralise each other to form corresponding salts and water.
Ans : True

4. When a base reacts with a metal, along with the evolution of hydrogen gas a salt is formed which has a positive ion composed of the metal and oxygen.
Ans : False

5. Baking powder is used in baking cakes.
Ans : True

6. Mixing concentrated acids or bases with water is a highly endothermic process.
Ans : False

7. Acidic nature of a substance is due to the formation of $H^+(aq)$ ions in solution.
Ans : True

8. Solution of sodium hydrogen carbonate is acidic in nature.
Ans : False

9. Sodium hydrogen carbonate is used in fire extinguisher.
Ans : True

10. Washing soda on strong heating gives sodium oxide and carbon dioxide.
Ans : False

11. Hydrogen chloride gas turns blue litmus red.
Ans : False

12. Plaster of Paris is obtained by heating gypsum at 373K in a klin.
Ans : True

13. The colour of caustic soda turns pink when phenolphthalein is added.
Ans : True

14. Acidic or basic solutions in water conduct electricity as they produce hydrogen and hydroxide ions respectively.
Ans : True

15. Bleaching powder is used for disinfecting drinking water.
Ans : True

16. Solution of sodium hydrogen carbonate is alkaline in nature.
Ans : True

17. There are a variety of strengths when you study acids and bases.
Ans : True

18. An aqueous solution is one that has compounds dissolved in water.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1. Column II gives nature of acids and bases mention in column I, match them correctly.

Column I		Column II	
(A)	HCl	(p)	strong acid
(B)	HCN	(q)	weak acid
(C)	NaOH	(r)	weak base
(D)	NH_4OH	(s)	strong base

Ans : A-p, B-q, C-s, D-r

2. Column II give acid and base from which salt mention in column I, match them correctly.

Column I		Column II	
(A)	KNO_3	(p)	Nitric acid, silver hydroxide
(B)	$AgNO_3$	(q)	Hydrochloric acid, Magnesium hydroxide
(C)	$MgCl_2$	(r)	Carbonic acid, Ammonium hydroxide
(D)	$(NH_4)_2CO_3$	(s)	Nitric acid, potassium hydroxide

Ans : A-s, B-p, C-q, D-r

3. Column II gives type of reaction mention in column I, match them correctly.

Column I		Column II	
(A)	$NaHCO_3$	(p)	Baking soda
(B)	NaOH	(q)	Alkaline
(C)	$KHSO_4$	(r)	Acidic salt

Column I		Column II	
(D)	$Ca(OH)_2$	(s)	Bitter taste

	A	B	C	D
(a)	p, q, r	q, s	q, r	q, s
(b)	p	q, s	s	r
(c)	q	s	p	r
(d)	r	q	s	p

Ans : (a) A-p, q, r, B-q, s, C-q, r, D-q, s

4.

Column I		Column II	
(A)	Solution of pH 5.5	(p)	Neutral
(B)	Solution of pH 5	(q)	Acidic
(C)	Solution of pH 4	(r)	$[OH^-] = 10^{-3}$
(D)	Solution of pH 7	(s)	Basic

Ans : (d) A-s, B-p, C-q, D-r, s

	A	B	C	D
(a)	s	q, s	p	r
(b)	s, r	q, s	p	r
(c)	p, s	q	r, s	p
(d)	s	p	q	r, s

5.

Column I		Column II	
(A)	Mono basic	(p)	KOH
(B)	Dibasic	(q)	$Ca(OH)_2$
(C)	Diacidic	(r)	H_2SO_4
(D)	Mono acidic	(s)	HNO_3

	A	B	C	D
(a)	s	r	q	p
(b)	p	q	s	r
(c)	q	s	p	r
(d)	r	q	s	p

Ans : (a) A-s, B-r, C-q, D-p

6.

	Column I		Column II
(A)	Plaster of Paris	(p)	$CaSO_4 \cdot 2H_2O$
(B)	Bleaching powder	(q)	$Na_2CO_3 \cdot 10H_2O$
(C)	Washing soda	(r)	$CaSO_4 \cdot \frac{1}{2}H_2O$
(D)	Baking soda	(s)	$CaOCl_2$
(E)	Gypsum	(t)	$NaHCO_3$

Ans : A-r, B-s, C-q, D-t E-p

5. ASSERTION AND REASON

DIRECTION : n the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

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

(c) Assertion (A) is true but reason (R) is false.

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

(e) Both Assertion and Reason are false.

1. **Assertion :** While dissolving an acid or base in water, the acids must always be added slowly to water with constant stirring.
Reason : Dissolving an acid on a base in water in highly exothermic reaction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

2. **Assertion :** On adding H_2SO_4 to water the resulting aqueous solution get corrosive.
Reason : Hydronium ions are responsible for corrosive action.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Because H_2SO_4 is a strong acid, it readily forms hydronium ions when dissolved in water which are responsible for its corrosive action.

3. **Assertion :** Phenolphthalein gives pink colour in basic solution.
Reason : Phenolphthalein is a natural indicator.
Ans : (c) Assertion (A) is true but reason (R) is false.

4. **Assertion :** HCl gas does not change the colour of dry blue litmus paper.
Reason : HCl gas dissolves in the water present in wet litmus paper to from H^+ ions.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

5. **Assertion :** HCl produces hydronium ions (H_3O^+) and chloride ions (Cl^-) in aqueous solution.
Reason : In presence of water, basic give H^+ ions.
Ans : (c) Assertion (A) is true but reason (R) is false.

HCl produces H^+ ions in aqueous solution because in presence of water, acids give H^+ ions. As H^+ ions cannot exist alone so it combines with water molecules and form H_3O^+.

6. **Assertion :** H_2CO_3 is a strong acid.
Reason : A strong acid dissociates completely or almost completely in water.
Ans : (d) Assertion (A) is false but reason (R) is true.
H_2CO_3 carbonic acid is a weak acid.

7. **Assertion :** Sodium hydroxide reacts with zinc to produce hydrogen gas.
Reason : Acids reacts with active metals to produce hydrogen gas.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
Sodium hydroxide being an strong base, reacts with active metal (zinc) to product H_2 gas. The reaction is given as follows:
$Zn(s) + 2NaOH(aq) \longrightarrow Na_2ZmO_2(aq) + H_2(g)$

8. **Assertion :** Salts are the products of an acid-base reaction.
Reason : Salt may be acidic or basic.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

9. **Assertion :** Ammonia solution is an alkali.
Reason : Ammonia solution turns blue litmus paper red.
Ans : (c) Assertion (A) is true but reason (R) is false.
Ammonia gas, which is alkaline, turn the red litmus paper blue.

10. **Assertion :** Weak acids have low electrical conductivity.
Reason : Strong acids and weak acids have equal concentration of hydrogen ions in their solutions.
Ans : (c) Assertion (A) is true but reason (R) is false.

11. **Assertion :** Baking soda creates acidity in the stomach.
Reason : Baking soda is alkaline.
Ans : (d) Assertion (A) is false but reason (R) is true.
Baking soda, being alkaline, neutralises the acidity in the stomach and removes it.

12. **Assertion :** During electrolysis of concentrated aqueous solution of sodium chloride, hydrogen is produced at anode and chlorine gas is produced at cathode.
Reason : Ions get attracted to oppositely charged electrodes.
Ans : (d) Assertion (A) is false but reason (R) is true.

13. **Assertion :** To dilute concentrated sulphuric acid water is added to the acid slowly.
Reason : A lot of heat energy will be given out in the dilution of concentrated sulphuric acid.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Water is never added to concentrated sulphuric acid as it is an exothermic reaction and releases a large amount of heat energy. It also results in spurting of the acid, which can burn your skin. Concentrated sulphuric acid is added to water in small amounts and that too with constant stirring and cooling.

14. **Assertion :** Pure water is neither acidic not basic.
Reason : The pH of a solution is inversely proportional to the concentration of hydrogen ions in it.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

15. **Assertion :** When common salt is kept open, it absorbs moisture from the air.
Reason : Common salt contains magnesium chloride.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Magnesium chloride present in common salt is deliquescent i.e., it absorbs moisture from the air when kept in open.

16. **Assertion :** Gas bubbles are observed when sodium carbonate is added to dilute hydrochloride acid.
Reason : Carbon dioxide is given off in the reaction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

17. **Assertion :** pH of ammonium chloride solution is in acidic range.
Reason : Solution of a salt of weak base and strong acid is acidic.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Ammonium chloride is formed by NH_4OH (weak base) and HCl (strong acid)

18. **Assertion :** When zinc is added to dilute hydrochloric acid, hydrogen is given off.
Reason : Hydrogen chloride molecules contain hydrochloric acid and hydrogen atoms.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
The metal zinc readily reacts with hydrochloric acid to produce hydrogen gas (H_2) and zinc chloride $(ZnCl_2)$.

19. **Assertion :** H_3PO_4 and H_2SO_4 are known as polybasic acids.
Reason : They have two or more than two protons per molecule of the acid.
Ans : (a) Both A and R are true and R is the correct explanation of A.

$$H_3PO_4 \rightleftharpoons H_2PO_4^- + H^+$$
$$H_2PO_4^- \rightleftharpoons H^+ + HPO_4^{2-}$$
$$HPO_4^{2-} \rightleftharpoons H^+ + PO_4^{3-}$$

Similarly bases which give two or more than two hydroxyl ions per molecule are known as polyacidic bases.

20. **Assertion :** If the pH inside the mouth decreases below

5.5, the decay of tooth enamel begins.
Reason : The bacteria present in mouth degrades the sugar and left over food particles and produce acids that remains in the mouth after eating.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

21. **Assertion :** pH = 7 signifies pure water.
Reason : At this pH, $[H^+] = [OH^-] = 10^{-7}$.
Ans : (d) Assertion (A) is false but reason (R) is true.

$$pH = 7,$$

signifies neutral solution.

22. **Assertion :** The aqueous solutions of glucose and alcohol do not show acidic character.
Reason : Aqueous solutions of glucose and alcohol do not give H^+ ions.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

23. **Assertion :** The acidity of $Mg(OH)_2$ is two.
Reason : The acidity of a base is equal to the number of hydroxyl ions.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

24. **Assertion :** Plaster of Paris is used by doctors by setting fractured bones.
Reason : When Plaster of Paris is mixed with water and applied around the fractured limbs, it sets into a hard mass.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Plaster of Paris when mixed with water and applied around the fractured limbs, it sets in to a hard mass and keeps the bone joints in a fixed position. So, it is commonly used for setting fractured bones.

25. **Assertion :** In water, Hydrochloric acid behaves as a weak monobasic acid.
Reason : In water, Hydrochloric acid acts as a proton donor.
Ans : (d) Assertion (A) is false but reason (R) is true.

HCl (Hydrochloric) is a strong acid.

$$HCl \rightleftharpoons H^+ + Cl^-$$

It donate proton in water.

CHAPTER 3

Metals and Non Metals

1. OBJECTIVE QUESTIONS

1. Which of the following metal has highest melting point?
(a) Copper (b) Silver
(c) Sodium (d) Tungsten

Ans : (d) Tungsten

Tungsten has the highest melting point among the metals.

2. The composition of aqua-regia is
(a) Dil.HCl : Conc. HNO_3 :: 3 : 1
(b) Conc. HCl : Dil. HNO_3 :: 3 : 1
(c) Conc. HCl : Conc. HNO_3 :: 3 : 1
(d) Dil.HCl : Dil. HNO_3 :: 3 : 1

Ans : (c) Conc. HCl : Conc. HNO_3 :: 3 : 1

Conc. HCl and conc. HNO_3 in 3 : 1 ratio form aqua-regia. Aqua-regia is a highly corrosive, fuming liquid. It can dissolve all metals even gold and platinum also.

3. Food cans are coated with tin and not with zinc because
(a) zinc is costlier than tin.
(b) zinc has a higher melting point than tin.
(c) zinc is more reactive than tin.
(d) zinc is less reactive than tin.

Ans : (c) zinc is more reactive than tin.

4. An element reacts with oxygen to give a compound with a high melting point. This compound is soluble in water. The element is likely to be-
(a) calcium (b) carbon
(c) silicon (d) iron

Ans : (a) calcium

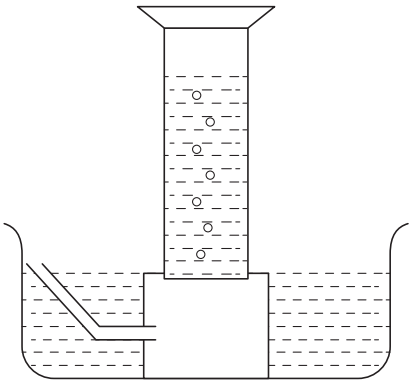
$$2Ca + O_2 \longrightarrow CaO \text{ (ionic compound)}$$
$$CaO + H_2O \longrightarrow Ca(OH)_2$$

5. Which of the following is a characteristic of metals?
(a) They have one to three valence electrons
(b) They have 4 to 8 valence electrons
(c) They are brittle
(d) They are capable to form anions easily

Ans : (a) They have one to three valence electrons

Metal can easily given up their electrons and form electropositive ions. They have one to three valence electrons. They are not brittle and do not form anions.

6. A reactive metal (M) is treated with H_2SO_4(dil). The gas is evolved and is collected over the water as shown in the figure.



The correct conclusion drawn is/are
(a) the gas is hydrogen
(b) the gas is lighter than air
(c) the gas is SO_2 and is lighter than air
(d) Both (a) and (b)

Ans : (d) Both (a) and (b)

When any reactive metal (M) reacts with the acid H_2SO_4(dil), it evolves hydrogen gas (H_2). It is lighter than air.

$$M(s) + H_2SO_4(\text{dil.}) \longrightarrow M\text{-sulphate} + H_2(g)$$

7. An alloy is
(a) an element
(b) a compound
(c) a homogeneous mixture
(d) a heterogeneous mixture

Ans : (c) a homogeneous mixture

An alloy is a homogeneous mixture of different metals or a metal and a non-metal.

8. When iron filings are heated in a steam of dry hydrogen chloride, the compound formed is $FeCl_x$ where x is-
(a) 1 (b) 2
(c) 3 (d) 4

Ans : (b) 2

9. Silver articles become black on prolonged exposure to air. This is due to the formation of
(a) Ag_3N (b) Ag_3O
(c) Ag_3S (d) Ag_3S and Ag_3N

Ans : (c) Ag_3S

Silver aricle become black because silver reacts with H_2S gas present in air to form black coating of Ag_2S. The reaction is

$$\underset{\text{Silver}}{Ag} + \underset{\substack{\text{Hydrogen}\\ \text{sulphide}}}{H_2S} \longrightarrow \underset{\substack{\text{Silver}\\ \text{sulphide}\\ \text{(black)}}}{Ag_2S} + H_2$$

10. The best malleable metal is-
(a) aluminium (b) silver
(c) gold (d) lead

Ans : (c) gold

11. Which of the following only contain non-metals?
(a) Carbohydrates (b) Proteins
(c) Alloys (d) Both (a) and (b)

Ans : (d) Both (a) and (b)

Carbohydrates contain carbon (C), hydrogen (H) and oxygen (O) as their components, while proteins contain carbon (C), nitrogen (N), hydrogen (H) and oxygen (O) but alloys are mixture of metals and may be some non-metals. Hence, option (d) is the correct answer.

12. Which of the following is not a property of non-metals?
(a) They are neither malleable nor ductile
(b) They are brittle
(c) They are sonorous
(d) They are poor conductor of heat and electricity (except graphite)

Ans : (c) They are sonorous

Almost all the non-metals produce no metallic sound on hitting. Thus, they are not sonorous.

13. Which of the following metal will not give $H_2(g)$ with H_2O?
(a) $Na(s) + 2H_2O \longrightarrow$ (b) $Mg(s) + 2H_2O \longrightarrow$
(c) $Zn(s) + H_2O \longrightarrow$ (d) $Cu + H_2O \longrightarrow$

Ans : (d) $Cu + H_2O \longrightarrow$

Metals placed below the hydrogen in reactivity series, will not give $H_2(g)$ with water (H_2O). Decreasing order of reactivity of metals is
$Na > Mg > Zn > Cu$

14. Metals are refined by using different methods. Which of the following metals are refined by electrolytic refining?
1. Au 2. Cu
3. Na 4. K
(a) 1 and 2 (b) 1 and 3
(c) 2 and 3 (d) 2 and 4

Ans : (a) 1 and 2

Electrolytic refining is used for metals like Cu, Zn, Ag, Au etc.

The method to be used for refining an impure metal depends on the nature of the metal as well as on the nature of impurities present in it.

15. Beakers A, B and C contain zinc sulphate, silver nitrate and iron (II) sulphate solutions respectively. Copper pieces are added to each beaker. Blue colour will appear in case of
(a) beaker A (b) beaker B
(c) beaker C (d) all the beakers

Ans : (b) beaker B

Copper is more reactive than silver thus, displaces silver from its salt solution.

16. Galvanisation is a method of protecting iron from rusting by coating it with a thin layer of
(a) gallium (b) aluminium
(c) zinc (d) silver

Ans : (c) zinc

Galvanisation is a method of protecting iron from rusting by coating it with a thin layer of zinc (Zn) metal.

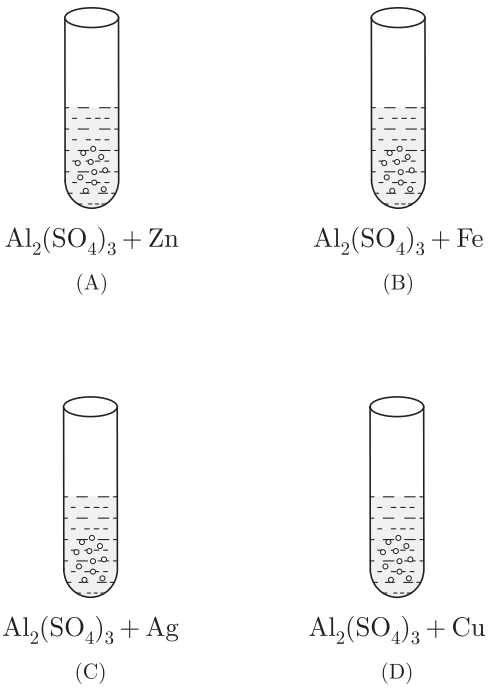
17. Aluminium does not oxidise readily in air because-
(a) it is high in the electrochemical series
(b) it is low in the electrochemical series
(c) the metal does not combine with oxygen
(d) the metal is covered with a layer of oxide which does not rub off

Ans : (d) the metal is cover4ed with a layer of oxide which does not rub off

18. In each test tubes A, B, C and D, 2mL of solution of $Al_2(SO_4)_3$ in water was filled. Clean pieces of zinc was placed in test tube A, clean iron nail was put in test tube B, silver (Ag) was placed in test tube C and a clean copper wire was placed in test tube D.
Which of the following option (s) is/are correct about above experiment?
(a) Zinc is more reactive than aluminium
(b) Copper is more reactive than aluminium
(c) Zinc is more reactive than copper

(d) Zinc, iron, silver and copper are less reactive than aluminium

Ans : (d) Zinc, iron, silver and copper are less reactive than aluminium



Zn, Fe, Ag and Cu are less reactive than aluminium. Aluminium resides at the top of the activity series. While Zn, Fe, Ag and Cu lies below aluminium in the activity series. Thus, being less reactive than aluminium, they cannot displace Al from its salt solution i.e. $Al_2(SO_4)_3$ solution.

19. On the basis of the sequence of the given reactions identify the most and least reactive elements:

$$X + YA \longrightarrow XA + Y \quad ...(1)$$
$$X + YB \longrightarrow XB + Y \quad ...(2)$$
$$Z + XA \longrightarrow ZA + X \quad ...(3)$$

(a) X and Z (b) Y and Z
(c) Z and X (d) Z and Y

Ans : (d) Z and Y

'Z' is the more reactive element and Y is the least reactive element Z easily displaces X, while X easily displaces Y.

20. A metal M has electronic configuration 2, 8, 3 and occurs in earth's crust and its oxide M_2O_3. It is more reactive than zinc. Which of the following options (s) is/are correct?

(a) The metal M is iron
(b) The metal M is lead
(c) The ore form which metal M is extracted in haematite.
(d) The ore form which metal M is extracted is bauxite.

Ans : (d) The ore form which metal M is extracted is bauxite.

Electronic configuration of $M = 2, 8, 3$

Hence, the outer orbital consist of 3 electrons. It is more reactive than zinc. So, it should be aluminium (atomic number = 13). The ore from which metal M is extracted is bauxite.

21. Metal M reacts with oxygen to form metallic oxide MO. This oxide reacts with moisture and carbon dioxide of the atmosphere to form a basic carbonate metal M. The metal 'M' is

(a) Cu (b) Fe
(c) Zn (d) Cr

Ans : (a) Cu

Since, the metal forms an oxide MO, the metal is divalent. Since it forms a basic carbonate when exposed to moisture and carbon dioxide, therefore it must be copper.

$$2Cu + \underbrace{CO_2 + O_2 + H_2O}_{\text{From moist air}} \longrightarrow \underbrace{CuCO_3 \cdot Cu(OH)_2}_{\text{Basic (copper carbonate)}}$$

22. Which of the following methods is suitable for preventing an iron frying pan from rusting?

(a) applying grease
(b) applying paint
(c) applying a coating of zinc
(d) all of the above.

Ans : (c) applying a coating of zinc

23. A student mistakenly used a wet gas jar to collect sulphur dioxide. Which one of the following tests of the gas is likely to fail?

(a) Odour
(b) Effect on acidified $K_2Cr_2O_7$ solution
(c) Solubility test
(d) None of these

Ans : (d) None of these

24. A student puts one big iron nail each in four test tubes containig solutions of zinc sulphate, aluminium sulphate, copper sulphate and iron sulphate. A reddish brown coating was observed only on the surface of iron nail which was put in the solution of

(a) zinc sulphate (b) iron sulphate
(c) copper sulphate (d) aluminium sulphate

Ans : (c) copper sulphate

Fe displaces copper from copper sulphate ($CuSO_4$) solution.

$$CuSO_4 + Fe \longrightarrow FeSO_4 + \underbrace{Cu}_{\text{Reddish brown}}$$

25. Which of the following is not a characteristics of metal?

(a) Malleable
(b) Electro-positive nature
(c) Ductile
(d) None of these

Ans : (d) None of these

All are characteristics of metal.

26. Which of teh following reactions not occur?

(a) $2AgNO_3(aq) + Zn(s) \longrightarrow Zn(NO_3)_2(aq) + 2Ag(s)$
(b) $CuSO_4(aq) + Zn(s) \longrightarrow ZnSO_4(aq) + Cu(s)$

(c) $2AgNO_3(aq) + Fe(s) \longrightarrow Fe(NO_3)_2(aq) + 2Ag(s)$
(d) $CuSO_4(aq) + 2Ag(s) \longrightarrow Cu(s) + Ag_2SO_4(aq)$

Ans : (d) $CuSO_4(aq) + 2Ag(s) \longrightarrow Cu(s) + Ag_2SO_4(aq)$

Silver is less reactive than copper, hence cannot displace copper from its salt solution.

27. Pure gold is-
(a) 24 carats (b) 22 carats
(c) 20 carats (d) 18 carats

Ans : (a) 24 carats

28. When a metal is added to dilute HCl solution, there is no evolution of gas. Metal is-
(a) K (b) Na
(c) Ag (d) Zn

Ans : (c) Ag

Ag is below hydrogen in reactivity series.

29. The correct order of increasing chemical reactivity is-
(a) Zn<Fe<Mg<K (b) Fe<Mg<Zn<K
(c) Fe<Mg<K<Zn (d) Fe<Zn<Mg<K

Ans : (d) Fe<Zn<Mg<K

30. The metal that reacts with cold water is-
(a) mercury (b) sodium
(c) zinc (d) tungsten

Ans : (b) sodium

31. Froth floatation method is used for the concentration of-
(a) oxide ores (b) sulphide ores
(c) sulphate ors (d) halide ores

Ans : (b) sulphide ores

32. Heating of concentrated ore in absence of air for conversion into oxide ore is known as-
(a) roasting (b) calcination
(c) reduction (d) none of these

Ans : (b) calcination

Calcination involves heating of the ore below its of the ore below its fusion temperature in absence of air.

33. Removal of impurities from ore is known as-
(a) crushing and grinding (b) concentration of ore
(c) calcination (d) roasting

Ans : (b) concentration of ore

34. The only metal that is liquid at room temperature is-
(a) mercury (b) sodium
(c) zinc (d) tungsten

Ans : (a) mercury

35. $Zn + H_2O$ (Steam) $\longrightarrow A + B$, In the equation A and B are$^-$
(a) Zn, H only (b) ZnH_2 and O_2
(c) ZnH_2 and O_2 (d) ZnO & H_2

Ans : (d) ZnO & H_2

36. Hydrogen gas is not widely used as a reducing agent because
(a) hydrogen decomposes to atomic hydrogen at higher temperature
(b) risk of explosion with water
(c) hydrogen isomerises to ortho hydrogen at higher temperature.
(d) many metals form hydrides at lower temperatures.

Ans : (b) risk of explosion with water

Hydrogen reacts with oxygen to form water and the reaction takes place with explosion.

37. Alloys are homogeneous mixtures of a metal with a metal or non-metal. Which among the following alloys contain non-metal as one of its constituents?
(a) Brass (b) Bronze
(c) Amalgam (d) Steel

Ans : (d) Steel

Steel alloy contain non-metal as one of its constituent. It contains 99.95% of iron and 0.05% of carbon.

38. Silicon is used in
(a) solar energy devices (b) semiconductors
(c) transistors (d) all of these

Ans : (d) all of these

39. E is an element that's ore is rich in $E_2O_3 \cdot E_2O_3$ is not affected by water. It forms two chlorides, ECl_2 and ECl_3. The element E is
(a) copper (b) zinc
(c) aluminium (d) iron

Ans : (d) iron

The element E is iron (Fe). Since the metal E forms an oxide of formula E_2O_3. Therefore, the valency of the metal is three i.e. metal is trivalent. Out of metals listed, only Al and Fe are trivalent. Since, the E_2O_3 is not affected by water, E may be either aluminium or iron. Since it forms two chlorides, ECl_2 and ECl_3, therefore, metal E must be iron, since it shows a varible valency of 2 and 3. Hence, it forms iron (II) chloride, $FeCl_2$ and iron (III) chloride, $FeCl_3$.

40. What is anode mud?
(a) fan of anode
(b) metal of anode
(c) impurities collected at anode in electrolysis during purification of metals
(d) all of these

Ans : (c) impurities collected at anode in electrolysis during purification of metals

41. Which of the following pairs will give displacement reactions?
(a) $ZnSO_4$ solution and Aluminium metal
(b) $MgCl_2$ Solution and aluminium metal
(c) $FeSO_4$ solution and silver metal
(d) $AgNO_3$ solution and copper metal.

Ans : (d) $AgNO_3$ solution and copper metal.

Copper is more reactive than silver hence displaces

silver from silver nitrate solution.

2. FILL IN THE BLANK

1. Metals combine with oxygen to form ..... oxides.
Ans : Basic

2. On hammering change of metal into thin sheets, is called .....
Ans : Melleability

3. A list of common metals arranged in order of their decreasing reactivity is known as an .....
Ans : Activity series

4. Metals are ..... conductors of heat and electricity. Non-metals are generally .....
Ans : good, insulators

5. Metals above hydrogen in the Activity series can displace ..... from dilute acids.
Ans : Hydrogen

6. The main ore of copper is .....
Ans : Copper pyrites

7. The extraction of metals from their ores and then refining them for use is known as ..... .
Ans : Metallurgy.

8. An alloy is a ..... mixture of two or more metals, or a metal and a non-metal.
Ans : Homogeneous

9. The surface of some metals, such as iron, is corroded when they are exposed to moist air for a long period of time. This phenomenon is known as .....
Ans : Corrosion.

10. Metal oxides which react with both acids as well as bases to produce salt and water are called ..... oxides.
Ans : amphoteric

11. The best conductors of electricity are copper and .....
Ans : Silver

12. Most metals have ..... melting points.
Ans : High

13. Formula of rust is .....
Ans : $Fe_2O_3 \cdot xH_2O$

14. A non-metal, which is liquid at non temperature is .....
Ans : Bromine

15. A ..... reactive metal displaces a ..... reactive metal from its salt solution.
Ans : more, less

16. Bronze is an alloy of copper and .....
Ans : Tin

17. Unwanted material with ore is called as .....
Ans : Gangue

18. Solder is an alloy of ..... and .....
Ans : Tin, lead

19. In electrolytic refining, impure metal is used as .....
Ans : Anode

20. The method of removing volatile matter from carbonate ores is known as .....
Ans : Calcination

21. Most metal oxides are ..... in nature whereas non-metal oxides are ..... or .....
Ans : basic, acidic, neutral

22. An example of a metal which can be cut with a knife is .....
Ans : Sodium

23. Manganese and ..... react with very dilute nitric acid to evolve hydrogen gas.
Ans : Magnesium

24. Froth floatation process is used for the concentration of ..... ores.
Ans : Sulphide

25. $^{35}_{17}B$ is a .....
Ans : non-metal

26. ..... is a metal used for galvanising.
Ans : Zinc

27. An alloy of any metal with mercury is called ..... and the electrical conductivity of an alloy is ..... than that of pure metals.
Ans : Amalgam, less

28. Al_2O_3 and ZnO are ..... oxides.
Ans : amphoteric

29. Stainless steel contains ....., ... and .....
Ans : Iron, chromium, carbon

3. TRUE/FALSE

1. Reaction is done for sulphide areas
Ans : True

2. Aluminium is the most abundant metal in the earth's crust.
Ans : True

3. Reaction takes place in aluminothermic process is also known as thermite reaction
Ans : True

4. Metals can form positive ions by losing electrons to non-metals.
Ans : True

5. Mercury and zinc are purified by liquation method.
Ans : False

6. The presence of carbon in pig iron makes it very soft and malleable.
Ans : False

7. Different metals have same reactivities with water and dilute acids.
Ans : False

8. A more reactive metal displaces a less reactive metal from its salt solution.
Ans : True

9. Metals occur in nature only as free elements.
Ans : False

10. Non-metals have properties similar to that of metals.
Ans : False

11. Hydrogen is the most abundant element in the universe.
Ans : False

12. Non-metals are good conductors of heat and elecrtricity.
Ans : False

13. Non-metals are electronegative elements as they form negative ions by gaining electrons.
Ans : True

14. Gallium and Cesium metals have low melting points.
Ans : True

15. Copper reacts with dilute sulphuric acid to form copper sulphate and hydrogen gas.
Ans : False

16. Aqua-regia can dissolve gold.
Ans : True

17. Silver metal displaces copper from copper nitrate solution to form silver nitrate and copper metal.
Ans : True

18. Ionic compounds are formed by transfer of electrons from a metal atom to a non-metal atom.
Ans : True

19. Electrovalent compounds can conduct electricity in solid state as they have ions.
Ans : True

20. Aluminium oxide can be reduced to aluminium, using carbon (coke) as a reducing agent.
Ans : True

21. In electrolytic refining of copper, pure copper is taken as anode.
Ans : False

22. Solder is an alloy of lead and tin.
Ans : True

23. Iron does not rust in boiled distilled water.
Ans : False

24. Sodium, magnesium and calcium are obtained by electrolysis of their molten chlorides.
Ans : True

25. Lead, copper and silver cannot react with water at all.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	CaO	(p)	Amphoteric oxide
(B)	Al_2O_3	(q)	Neutral oxide
(C)	SO_2	(r)	Basic oxide
(D)	H_2O	(s)	Acidic oxide

Ans : A-r, B-p, C-s, D-q

2.

Column I		Column II	
(A)	Iodine	(p)	liquid metal
(B)	Diamond	(q)	liquid non-metal
(C)	Mercury	(r)	lustrous
(D)	Bromine	(s)	hardest substance

Ans : A-r, B-s, C-p, D-q

3.

Column I		Column II	
(A)	Good conductor of Electricity	(p)	Hydrogen
(B)	Food preservative	(q)	Copper
(C)	Allotrope of carbon	(r)	Nitrogen
(D)	Manufacture of ammonia	(s)	Graphite

	A	B	C	D
(a)	p	s, r	q, r	q, r
(b)	p	s	q	r
(c)	q	s	r	p
(d)	q, s	r	s	r, p

Ans : (d) A-q, s B-r, C-s, D-r, p

4.

Column I		Column II	
(A)	Steel	(p)	Copper
(B)	Brass	(q)	Zinc
(C)	Bronze	(r)	Iron
(D)	Magnalium	(s)	Aluminium

	A	B	C	D
(a)	p	s	q, r	q, r
(b)	r	p, q	p	s
(c)	q	s	p	r
(d)	s	q	r	p

Ans : (b) A-r, B-p, q; C-p, D-s

5.

Column I Ore		Column II Elements	
(A)	Chalcopyrite	(p)	Copper
(B)	Cuprite	(q)	Iron
(C)	Magnetite	(r)	Sulphur
(D)	Chalcocite	(s)	Oxygen

	A	B	C	D
(a)	p, q, r	p, s	q, s	p, r
(b)	p	q	s	p, r
(c)	r	s	p	q
(d)	s	q	r	p

Ans : (a) A-p, q, r, B-p, s C-q, s D-p, r

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

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

(c) Assertion (A) is true but reason (R) is false.

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

(e) Both Assertion and Reason are false.

1. **Assertion :** Different metals have different reactivities with water and dilute acids.
Reason : Reactivity of a metal depends on its position in the reactivity series.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The metals placed at the top of the series are most reactive.

2. **Assertion :** When zinc is added to a solution of iron (II) sulphate, no change is observed.
Reason : Zinc is less reactive than iron.

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

Both Assertion and Reason are false. Zinc being more reactive than iron displaces iron from iron (II) sulphate solution.

Thus, the green colour of the solution fades and iron metal gets deposited.

$$\underset{\text{Zinc}}{Zn(s)} + \underset{\text{Green}}{FeSO_4(aq)} \longrightarrow \underset{\text{(Colourless)}}{ZnSO_4(aq)} + \underset{\text{(Iron deposited)}}{Fe(s)}$$

3. **Assertion :** Gas bubbles are observed when sodium carbonate is added to dilute hydrochloric acid
Reason : Carbon dioxide is given off in the reaction.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Gas bubbles are observed when sodium carbonate is added to dilute hydrochloric acid as CO_2 gas is released.

4. **Assertion :** Food cans are coated with tin and not with zinc.
Reason : Zinc is more reactive than tin.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Food cans are coated with tin not with zinc because zinc is more reactice than tin, it can react with organic acids present in food.

5. **Assertion :** Platinum, gold and silver are used to make jewellery.
Reason : Platinum, gold and silver are least reactive metals.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion

(A).

Platinum, gold and silver are highly malleable lustraus and least reactive, i.e. noble metals, so they are not corroded by air and water easily.

6. **Assertion :** Iron is found in the free state n nature.
Reason : Iron a highly reactive element.
Ans : (d) Assertion (A) is false but reason (R) is true.

7. **Assertion :** Carbon reacts with oxygen to form carbon dioxide which is an acidic oxide.
Reason : Non-metals form acidic oxides.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Carbon being a non-metal form acidic oxides, i.e., their aqueous solution turns blue litmus solution red.

8. **Assertion :** Metals are sonorous.
Reason : They are generally brittle in the solid state; they break into pieces when hammered.
Ans : (c) Assertion (A) is true but reason (R) is false.

Metals are sonorous and hard, while non-metals are brittle.

9. **Assertion :** Coke and flux are used in smelting.
Reason : The phenomenon in which ore is mixed with suitable flux and coke is heated to fusion is known as smelting.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Smelting is a process of applying heat to ore in order to extract a base metal. It is used to extract many metals from their ores, including silver, iron, copper, and other base metals.

10. **Assertion :** Leaching is a process of reduction.
Reason : Leaching involves treatment of the ore with a suitable reagent so as to make it solube while impurities remains insoluble.
Ans : (d) Assertion (A) is false but reason (R) is true.

11. **Assertion :** Lead, tin and bismuth are purified by liquation method.
Reason : Lead, tin and bismuth have low m.p. as compared to impurities.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

12. **Assertion :** Leaching is a process of reduction.
Reason : Leaching involves treatment of the ore with a suitable reagent so as to make it soluble while impurities remains insoluble.
Ans : (d) Assertion (A) is false but reason (R) is true.

Leaching is a process where ore is soluble and impurities are insoluble, widely used extractive metallurgy technique which converts metals into soluble salts in aqueous media.

13. **Assertion :** Levigation is used for the separation of oxide ores from impurities.
Reason : Ore particles are removed by washing in a current of water.
Ans : (c) Assertion (A) is true but reason (R) is false.

Levigation method is commonly used for oxide ores such as haematite, tin stone and native ores of Au, Ag, etc.

14. **Assertion :** Zinc is used in the galvanisation of iron.
Reason : Its coating on iron articles increases their life by protecting them from rusting.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

15. **Assertion (A) :** When a piece of copper metal is added to dilute sulphuric acid, the solution turns blue.
Reason (R) : Copper reacts with dilute sulphuric acid to form copper (II) sulphate solution.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

When a piece of copper metal is added to dilute sulphuric acid, the solution turns blue. It is becasue, copper reacts with dilute sulphuric acid to form blue copper (II) sulphate solution.

16. **Assertion :** Froth floatation process is based on the different wetting nature of ore and gangue particles.
Reason : Mustard oil is used as frother in froth floation process.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

17. **Assertion :** Zinc becomes dull in most air.
Reason : Zinc is coated by a thin film of its basic carbonate in moist air.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

18. **Assertion :** Bronze is an alloy of lead and tin.
Reason : Alloys are heterogeneous mixture of metals with other metals and non-metals.
Ans : (c) Assertion (A) is true but reason (R) is false.

19. **Assertion :** A mineral is called ore, when metal is extracted from it conveniently and economically.
Reason : All ores are minerals but all minerals are not ores.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Minerals are naturally occurring chemical substance in the earth's crust obtained by mining. But a mineral is called an ore only when the metal can be extracted from it conveniently and economically. Thus, all ores minerals but all minerals are not ores.

20. **Assertion :** In alumino thermite process, the metals

like iron melts due to the heat evoloved in the reaction.
Reason : The reaction is
$Fe_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Fe$
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Large amount of heat is evolved which melts iron and can be used for welding.

21. **Assertion :** Zinc oxide amphoteric in nature.
Reason : Zinc oxide reacts with both acids and bases.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

22. **Assertion :** Zinc can easily displace Copper on reacting with a solution of copper sulphate.
Reason : Copper is more reactive metal as compared to Zinc.
Ans : (c) Assertion (A) is true but reason (R) is false.

23. **Assertion :** Magnesium chloride is an ionic compound.
Reason : Metals and non-metals react by mutual transfer of electrons.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

24. **Assertion :** Gold is isolated from other impurities by Arndt forest cyanide process.
Reason : The cyanide which is used here dissolve all possible impurities.
Ans : (c) Assertion (A) is true but reason (R) is false.

The cyanide dissolves gold by forming a complex.

25. **Assertion :** In the metallurgy of Al, purified Al_2O_3 is mixed with Na_3AlF_6 or CaF_2.
Reason : It lowers the melting point of the mixture and brings conductivity.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

In the metallurgy of aluminium, purified Al_2O_3 is mixed with Na_3AlF_3 or CaF_2 which lowers the melting point of the mix and brings conductivity.

26. **Assertion :** Zinc carbonate is heated strongly in presence of air to form zinc oxide and carbon dioxide.
Reason : Calcination is the process in which a carbonate ore is heated strongly in the absence of air to convert into metal oxide.
Ans : (d) Assertion (A) is false but reason (R) is true.

27. **Assertion :** Iron pyrite is not useful in the extraction of Fe.
Reason : SO_2 polluting gas is produced during extraction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Pyrite is composed of iron and sulphur. The sulphur content during extraction may contaminate the metal and reduces the strength.

28. **Assertion :** Usually the sulphide ore is converted to oxide before reduction.
Reason : Reduction of oxides occurs easier.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Usually the sulphide ore is converted to oxide before reduction as oxides are easier to reduce.

29. **Assertion :** While the extraction of copper, one of the steps involved is
$Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$
Reason : In this reaction Cu_2S is the reducing agent whereas Cu_2O is the oxidising agent.
Ans : (c) Assertion (A) is true but reason (R) is false.

The Cu^{2+} ion in both the compounds gets reduced while sulphur gets oxidised.

6. ONE MARK QUESTIONS

CHAPTER 4

Carbon and Its Compound

1. OBJECTIVE QUESTIONS

1. Which of the following gases is called 'marsh gas'-
(a) H_2 (b) CH_4
(c) C_2H_4 (d) C_2H_2

Ans : (b) CH_4

2. Which of the following will contain covalent double bond between its atoms?
(a) H_2 (b) O_2
(c) NaCl (d) Cl_2

Ans : (b) O_2

Oxygen atom has six (6) valence electrons. Thus, to complete its octet, it forms double bond with another oxygen atom to get O_2 molecule.

3. Which of the following can show addition reaction?
(a) C_2H_4 (b) C_2H_6
(c) C_2H_5OH (d) $CH_3CH_2CH_3$

Ans : (a) C_2H_4

Presence of double bond between two carbon atoms is the necessary condition to show addition reaction. Thus, only $C_2H_4(CH_2 = CH_2)$ can show the addition reaction.

4. Which of the following is not the property of homologous series?
(a) They differ by-CH_2 units
(b) They differ by-14 units by mass
(c) They all contain double bond
(d) They can be represented by a general formula

Ans : (c) They all contain double bond

It is not necessary for a homologous series that it must contain the double bond.

5. Which of the following is not a property of carbon?
(a) Carbon compounds are good conductor of heat and electricity
(b) Carbon compounds are poor conductor of heat and electricity
(c) Most of the carbon compounds are covalent compounds
(d) Boiling and melting point of carbon compounds are relatively lower than those of ionic compounds

Ans : (a) Carbon compounds are good conductor of heat and electricity

Carbon compounds are covalently bonded and are poor conductor of heat and electricity. Due to covalent bonds, their boiling and melting points are relatively lower than those of ionic compounds.

6. Correct formula for propanoic acid is
(a) CH_3COOH
(b) $CH_3 - CH_2 - COOCH_3$
(c) $HOOCCH_2CH_3$
(d) CH_3COOCH_3

Ans : (c) $HOOCCH_2CH_3$

The correct formula for propanoic acid is a follows:

$$CH_3 - CH_2 - \underset{\underset{O}{\|}}{C} - OH$$

7. The final product of chlorination of methane in the sun light is-
(a) CH_3Cl (b) CH_2Cl_2
(c) $CHCl_3$ (d) CCl_4

Ans : (d) CCl_4

8. Oils on treating with hydrogen in the presence of palladium or nickel catalyst form fats. This is an example of
(a) addition reaction (b) substitution reaction
(c) displacement reaction (d) oxidation reaction

Ans : (a) addition reaction

9. Carbon exists in the atmosphere in the form of
(a) carbon monoxide only
(b) carbon monoxide in traces and carbon dioxide
(c) carbon dioxide only
(d) coal

Ans : (b) carbon monoxide in traces and carbon dioxide

10. The number of oxygen molecules used in the combustion of 1 molecule of ethanol is-
(a) 1 (b) 2
(c) 3 (d) 4

Ans : (c) 3

11. General formula of alkyne is-
(a) C_nH_{2n+2} (b) C_nH_{2n}
(c) C_nH_{2n-2} (d) C_nH_n

Ans : (c) C_nH_{2n-2}

12. Consider the following statements related to diamond and graphite.
1. Both diamond and graphite are used as abrasives.
2. Diamond and graphite have different arrangements of carbon atoms.
3. The carbon atoms in graphite have a different number of neutrons from those in diamond.
4. The carbon atoms in both graphite and diamond have four single covalent bonds.

The incorrect statement(s) is/are
(a) 1 and 3 (b) 2 and 4
(c) 1, 3 and 4 (d) All of these

Ans : (c) 1, 3 and 4

Diamond has a tetrahedral arrangement whereas graphite has a hexagonal planar arrangement of carbon atoms. In each case, C – C bond is covalent.

Diamond is used as an abrasive, but graphite does not. Diamond and graphite differ in the number and arrangement of carbon atoms but not in the nature of carbon atoms. Graphite also has double bonds along with single bonds.

13. What would happen if graphene is heated in sufficient supply of air?
(a) It aggregates to form graphite
(b) It gets converted into diamond
(c) Carbon dioxide gas is released
(d) It becomes a non-conductor

Ans : (c) Carbon dioxide gas is released

Graphene is an allotrope of carbon and all the allotropes exhibit similar chemical properties. So, when heated in excess of air, it gives carbon dioxide gas.

14. C^{4+} does not exist but Pb^{4+} exists although both belong to the same group. This is because
1. size of carbon is much smaller than Pb.
2. large amount of energy is needed in case of carbon.
3. nucleus cannot hold such a large number of electrons.
4. nucleus cannot hold such a large number of electrons.

The correct statement(s) is/are
(a) Only 1 (b) 1 and 2
(c) Only 3 (d) 2, 3 and 4

Ans : (b) 1 and 2

Size of C is much smaller as compared to Pb and from a nucleus having 6 protons, it is very difficult to remove 4 electrons as a large amount of energy is required for this purpose.

15. Methane, ethane and propane are said to form a homologous series because all are-
(a) hydrocarbons
(b) saturated compounds
(c) aliphatic compounds
(d) differ from each other by a CH_2 group

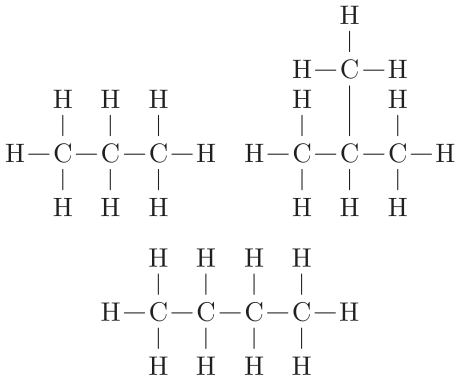
Ans : (d) differ from each other by a CH_2 group

Methane (CH_3), Ethane (H_3CH_3) and propane ($CH_3CH_2CH_3$) differ from each by a CH_2 group. Hence, these are said to form a homologous series.

16. When methane is burnt in an excess of air, the products of combustion are-
(a) C and H_2O (b) CO and H_2O
(c) CO_2 and H_2 (d) CO_2 and H_2O

Ans : (d) CO_2 and H_2O

17. The structures of three hydrocarbons are given below.

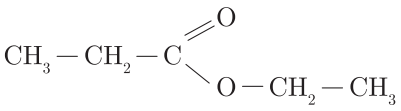


Which statement is correct for all the above three compounds?
(a) They are isomers of each other
(b) They have the same general formula
(c) They have the same physical properties
(d) They react with aqueous bromine

Ans : (b) They have the same general formula

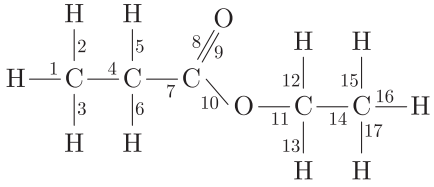
All the given compounds have only C – H and C – C single bonds and hence belongs to the same homologous series, i.e. their general formula is same.
Note: These compounds belong to alkane series, general formula of which is C_nH_{2n+2}.

18. The diagram shows the molecule, ethyl propanoate.



How many bonding pairs of electrons are there in the molecule?
(a) 13 (b) 16
(c) 17 (d) 20

Ans : (c) 17



19. Which compound has an addition reaction with chlorine?

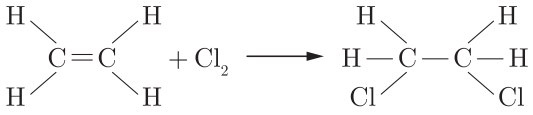
(a) C_2H_4 (b) C_2H_5OH

(c) C_2H_6 (d) CH_3CO_2H

Ans : (a) C_2H_4

Only unsaturated compound, i.e. compound with general formula C_nH_{2n} or C_nH_{2n-2} show addition reaction with chlorine. Thus, $C_2H_4(C_nH_{2n})$ gives an addition reaction with chlorine.

$$C_2H_4 + Cl_2 \longrightarrow C_2H_4Cl_2$$



20. Which one is an example of substitution reaction?

(a) $CH_2 = CH_2 + H_2 \xrightarrow{-h\nu} CH_3 - CH_3$

(b) $CH_3CH_2OH \xrightarrow{KMnO_4(alk.)} CH_3COOH$

(c) $CH_3 + Cl_2 \xrightarrow{h\nu} CH_3Cl + HCl$

(d) $CH \equiv CH + H_2 \xrightarrow{h\nu} CH_2 = CH_2$

Ans : (c) $CH_3 + Cl_2 \xrightarrow{h\nu} CH_3Cl + HCl$

When one atom or group of atoms is replaced by some other atom or group of atoms, it is known as substitution reaction.

Option (c) is an example of substitution reaction, in which one of the hydrogen atom is replaced by chlorine (Cl) atom.

21. The number of 4° carbon atoms in 2, 2, 4, 4-tetramethyl pentane is-

(a) 1 (b) 2

(c) 3 (d) 4

Ans : (b) 2

22. Which of the following is not the use of graphite?

(a) It is used as lubricant

(b) It is used in manufacturing of lead-pencils

(c) It is used in manufacturing of artificial diamond

(d) It is used for making insulated plates

Ans : (d) It is used for making insulated plates

Graphite can not be used for making insulated plates, as it is a good conductor of electricity.

23. Which of the following is the purest form of carbon-

(a) charcoal (b) coal

(c) diamond (d) graphite

Ans : (c) diamond

Diamond is the purest form of carbon.

24. Buckminister fullerene is an allotropic form of

(a) phosphorus (b) sulphur

(c) carbon (d) tin

Ans : (c) carbon

25. One mole of a hydrocarbon X reacted completely with one mole of hydrogen gas in the presence of a heated catalyst.

What could be the formula of X?

(a) C_2H_6 (b) C_5H_{10}

(c) C_3H_8 (d) C_7H_{16}

Ans : (b) C_5H_{10}

Since, the compound reacts completely with one mole of hydrogen; it should be an alkane with one degree of unsaturation. The general formula for alkenes is C_2H_{2n}.

If $n = 5$, C_5H_{10}

Thus, C_5H_{10} is X.

26. Organic compounds will always contain-

(a) carbon (b) hydrogen

(c) nitrogen (d) sulphur

Ans : (a) carbon

27. Compound X is a six carbon compound. When it is burnt, light is fenerated. Here, the colour of the flame is yellow because of the presence of carbon particles. Compound X cannot be

(a) C_6H_{12} (b) C_6H_{14}

(c) C_6H_6 (d) C_7H_{10}

Ans : (b) C_6H_{14}

C_6H_{14} is a saturated hydrocarbon, so colour of the flame during its combustion will be blue. Thus, C_6H_{14} cannot be X.

28. A reaction scheme is shown below:

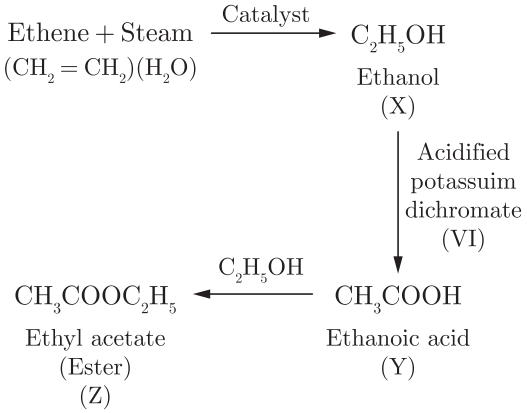
Ethene + Steam $\xrightarrow{\text{Catalyst}} X \xrightarrow[\text{(VI)}]{\text{Acidified potassium dichromate}} Y \xrightarrow{X} Z$

What is the final product Z?

(a) A carboxylic acid (b) An alcohol

(c) An alkene (d) An ester

Ans : (d) An ester



29. Which is a general formula of alkenes-
(a) C_nH_{2n+2} (b) C_nH_{2n}
(c) CnH_{2n-2} (d) None of the above
Ans : (a) C_nH_{2n+2}

30. The functional group represent alcohol is-
(a) $-OH$ (b) $-CHO$
(c) $-COOH$ (d) $> C = O$
Ans : (a) $-OH$

$-OH$	⇒	alcohol
$-CHO$	⇒	aldehyde
$-COOH$	⇒	Carboxylic acid
$>C=O$	⇒	Ketone

31. When ethane is burnt in excess of air, the products of combustion are-
(a) C and H_2O (b) CO and H_2O
(c) CO_2 and H_2 (d) CO_2 and H_2O
Ans : (d) CO_2 and H_2O

CO_2 and H_2O are produced when ethane is burnt in excess of air.

32. When vanaspati oil reacts with hydrogen then it convert into vanaspati ghee. In this process catalyst used is:
(a) Fe (b) Mo
(c) V (d) Ni
Ans : (d) Ni

Catalysts like Pd, Pt, or Ni are used in hydrogenation process.

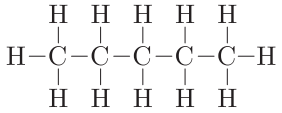
33. Observe the following pairs of organic compounds:
1. C_4H_9OH and $C_5H_{11}OH$
2. $C_7H_{15}OH$ and $C_5H_{11}OH$
3. $C_6H_{13}OH$ and C_3H_7OH

Which of these pair is a homologous series according to increasing order of carbon atom.
(a) (III) only (b) (II) only
(c) (I) only (d) All of these
Ans : (c) (I) only

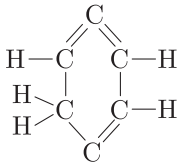
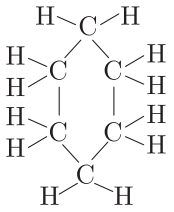
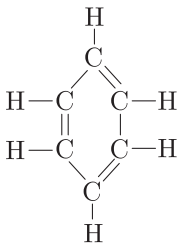
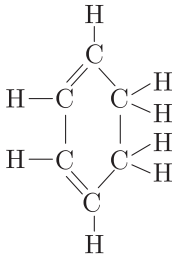
C_4H_9OH and $C_5H_{11}OH$ represent homologous series because they differ from each other by a CH_2 group. $CH_3CH_2CH_2CH_2OH$, $CH_3CH_2CH_2CH_2CH_2OH$

34. Chlorine reacts with saturated hydrocarbons at room temperature in the
(a) absence of sunlight
(b) presence of sunlight
(c) presence of water
(d) presence of hydrochloric acid
Ans : (b) presence of sunlight

35. Pentane has the molecular formula C_5H_{12}. It has
(a) 5 covalent bonds (b) 12 covalent bonds
(c) 16 covalent bonds (d) 17 covalent bonds
Ans : (c) 16 covalent bonds



Pentane has 16 covalent bonds (12 C-H and 4 C-C bonds)

36. Structural formula of benzene is
(a) 
(b) 
(c) 
(d) 
Ans : (c)

2. FILL IN THE BLANK

1. The soft crystalline form of carbon is .....
Ans : Graphite

2. ..... and ..... are the two allotropes of carbon.
Ans : diamond, graphite

3. Next homologue of ethane is .....
Ans : Propane

4. Valency of carbon in ethylene is .....
Ans : 4

5. Ethylene burns in air to form CO_2 and .....
Ans : Water

6. The molecular mass of any two adjacent homologous differ by ..... amu.
Ans : 14

7. Vinegar is ..... % solution of ethanoic acid in water.
Ans : 5 to 8%

8. The purest form of carbon is .....
Ans : Diamond

9. The general formula of alcohols is .....
Ans : $C_nH_{2n+1}OH$

10. C_nH_{2n} is the general formula of .....
Ans : alkenes

11. The ability of carbon to form chains rise to a ..... series of compounds.
Ans : Homologous

12. Hydrogenation of vegetable oil is ..... reaction.
Ans : addition

13. Newly discovered allotrope of carbon is .....
Ans : Fullerene

14. ..... hydrocarbons decolourise brown colour of bromine water.
Ans : unsaturated

15. Soaps react with hard water to form .....
Ans : scum

16. The functional group present in carboxylic acids is .....
Ans : $-COOH$

17. Detergents causes ..... pollution.
Ans : water

3. TRUE/FALSE

1. Unsaturated hydrocarbons normally undergo addition reactions.
Ans : True

2. Unsaturated hydrocarbons give addition reactions.
Ans : True

3. By hydrogenation, vegetable oils into vanaspati ghee
Ans : True

4. Carbon forms covalent bonds with itself and other elements such as hydrogen, oxygen, sulphur, nitrogen and chlorine.
Ans : True

5. Carbon and its compounds are some of our major sources of fuels.
Ans : True

6. The functional group of chloro alkane is $-Cl$.
Ans : True

7. Carbon is a versatile element.
Ans : True

8. The first member of alkyne homologous series is ethyne.
Ans : True

9. When hydrocarbons burn in air, carbon dioxide and hydrogen are produced with heat energy.
Ans : False

10. The next higher homologue of ethanol is pentanol.
Ans : False

11. If a hydrocarbon has double or triple covalent bond, it is saturated.
Ans : False

12. Graphite is a good conductor of electricity.
Ans : True

13. The simplest saturated hydrocarbon is methane.
Ans : True

14. Ethanol is the first member of the alcohol homologous series.
Ans : False

15. Diamond is a good conductor of electricity.
Ans : False

16. Heating ethanol at 443K with excess of conc. H_2SO_4 results in the dehydration of ethanol to give molecules.
Ans : False

17. Graphite is used in pencils.
Ans : True

18. Carbon has the unique ability to form bonds with other atoms of carbon, giving rise to large molecules.
Ans : True

19. Invertase and amylase are two enzymes involved in fermentation of ethanol from sugar.
Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Combustion reaction	(p)	$C_3H_8 + Cl_2 \xrightarrow{\text{Uv light}} C_3H_7Cl + HCl$
(B)	Oxidation reaction	(q)	$CH_2 = CH_2 + H_2 \xrightarrow{Ni/Pd} CH_3 - CH_3$
(C)	Addition reaction	(r)	$2CH_4 + O_2(g) \xrightarrow[\text{Molybdenum oxide}]{300-500^\circ C} HCHO + 2H_2O$

Column I		Column II	
(D)	Substitution reaction	(s)	$C_2H_5OH + 3O_2h \longrightarrow 2CO_2 + 3H_2O$

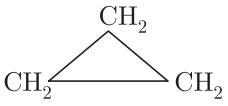
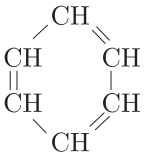
Ans : A-s, B-r, C-q, D-p

2.

Column I		Column II	
(A)	$-CHO$	(p)	Azo Compounds
(B)	$-CONH_2$	(q)	Aldehydes
(C)	$-NH_2$	(r)	Acid amides
(D)	$-N=N-$	(s)	Amines

Ans : A-q, B-r, C-s, D-p

3.

Column I		Column II	
(A)	$CH_2=CH_2$	(p)	Saturated
(B)		(q)	Unsaturated
(C)	$CH_3-CH_2-CH_3$	(r)	Acyclic
(D)		(s)	Cyclic

	A	B	C	D
(a)	q, r	p, s	p, r	q, s
(b)	p, q	q, s	r, s	q, p
(c)	q, s	r, p	q, p	q, r
(d)	p, r	p, q	r, s	r, q

Ans : (a) A-q, r, B-p, s, C-p, r, D-q, s

4.

Column I		Column II	
(A)	Halogentation	(p)	SO_3 + conc. H_2SO_4 Copper
(B)	Brass	(q)	$HI + HIO_3$
(C)	Bronze	(r)	Cl_2 + UV light
(D)	Magnalium	(s)	Fuming nitric acid

	A	B	C	D
(a)	q, r	s	p	q
(b)	q, s	p, r	q	r
(c)	r	p, s	q	s
(d)	p, q	r, s	p	r

Ans : (a) A-q, r, B-s, C-p, D-q

DIRECTION : Match the words/statements in Column A with words/statements in Column B.

5.

	Column A		Column B
(A)	$CH_3OH + CH_3COOH \xrightarrow{H^+} CH_3COOCH_3 + H_2O$	(p)	Addition reaction
(B)	$CH_2=CH_2 + H_2 \xrightarrow{Ni} CH_3-CH_3$	(q)	Substitution reaction
(C)	$CH_4 + Cl_2 \xrightarrow{Sunlight} CH_3Cl + HCl$	(r)	Neutralisation reaction
(D)	$CH_3COOH + NaOh \longrightarrow CH_3COONa + H_2O$	(s)	Esterification reaction

Ans : A-s, B-p, C-q, D-r

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Graphite is slippery to touch.
Reason : The various layers of carbon atoms in graphite are held together by weak van der Wall's forces.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

A graphite crystal consists of various layers of carbon atoms in which each carbon atom is joined to three other atoms by strong covalent bonds. The various layers of carbon atoms in graphite are held together by weak van der Wall's forces making it slippery to touch.

2. **Assertion :** Diamond and graphite are allotropes of carbon
Reason : Some elements can have several different structural forms while in the same physical state. These differing forms are called allotropes.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

3. **Assertion :** Third member of alkane is propane (C_3H_8).
Reason : It is obtained from general formula C_nH_{2n+2}.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion

(A).

C_3H_8 can be obtained from general formula, C_nH_{2n+2}

4. **Assertion :** Carbon shows maximum catenation property in the periodic table.
Reason : Carbon has small size and thus, forms strong C – C bond.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Catenation is the bonding of atoms of the same element into a series, called as Chain. Catenation occurs more readily with carbon, which forms strong covalent bond with other C-atoms to form long chains and structures.

5. **Assertion :** Hydrogenation is the process of converting an oil into a fat, called vegetable ghee.
Reason : Hydrogenation is carried out in presence of a catalyst usually finely divided nickel.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

6. **Assertion :** Carbon monoxide is extremely poisonous in nature.
Reason : Carbon monoxide is formed by complete combustion of carbon.
Ans : (c) Assertion (A) is true but reason (R) is false.

7. **Assertion :** When ethanol is heated at 443 K with exces conc. H_2SO_4, ethene is obtained.
Reason : Conc. H_2SO_4 acts as a dehydrating agent.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

When ethanol is heated with conc. sulphuric acid [H_2SO_4] at 443 K, dehydration takes place and ethene is obtained. In this, conc. H_2SO_4 acts as a dehydrating agent.

8. **Assertion :** CH_3Cl is obtained from CH_4 by the action of Cl_2 in the presence of sunlight.
Reason : It is obtained by addition reaction.
Ans : (c) Assertion (A) is true but reason (R) is false.

CH_3Cl is obtained from CH_4 by substitution reaction by the action of Cl_2 in the presence of sunlight.

9. **Assertion :** In esterification, carboxylic acid and alcohol reacts in the presence of acid to give ester.
Reason : Esterification is the reverse of saponification.
Ans : (c) Assertion (A) is true but reason (R) is false.

In estrification, RCOOH, -H is replaced by -R' of R'OH in the presence of acid to form RCOOR'.

10. **Assertion (A) :** Iso-butane is the isomer of C_4H_{10}.
Reason (R) : Iso-butane has four C and ten-H atom.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

$CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3$ is the structural isomer of butane.

11. **Assertion :** The most of carbon compounds are good conductors of electricity.
Reason : They do not dissociate to form ions and remain as molecules.
Ans : (d) Assertion (A) is false but reason (R) is true.

Carbon compounds are mainly poor conductors of electricity.

12. **Assertion :** Cyclopropane is heterocyclic compond.
Reason : Cyclopropane comes into category of those compounds in which complete ring is formed by carbon atoms only.
Ans : (d) Assertion (A) is false but reason (R) is true.

13. **Assertion :** Acetic acid has six single bond and one double bond.
Reason : It is unsaturated organic compound.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

14. **Assertion :** Carbon has ability to form long carbon chains.
Reason : Carbon has a unique property of ability to form long straight and branched chains called catenation.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

15. **Assertion :** Alcohols have similar chemical properties.
Reason : All alcohols contains similar hydroxy (-OH) functional group.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

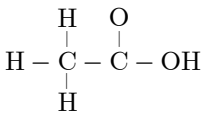
16. **Assertion :** Propene reacts with HBr to give isopropyl bromide.
Reason : Addition of Br_2 to alkene place faster in presence of ionishing substance.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Addition of unsymmetrical addendum on unsymmetrical alkene takes place according to Markownikoff's rule. The negative part of the addendum goes on to less hydrogenated carbon atom.

$$CH_3CH=CH_2 + HBr \longrightarrow CH_3-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3$$

Isopropyl bromide

Acetic acid has structure which has six single bond and only one double bond. It is an unsaturated organic compound.



17. **Assertion :** C_3H_8 and C_4H_{10} are the successive members of homologous series of methane.
Reason : Any two successive members in a homologous series differ in their molecular formula by $\alpha - CH_3$ unit.
Ans : (c) Assertion (A) is true but reason (R) is false.
Assertion is correct but reason is false. Any two successive members in a homologous series differ in their molecular formula by $-CH_2-$ unit.

18. **Assertion :** Carbon compounds can form chain, branched and ring structures.
Reason : Carbon exhibits the property of catenation.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

19. **Assertion :** Soaps are not suitable for washing purpose when water is hard.
Reason : Soaps have relatively weak cleansing action.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

20. **Assertion :** Carbon monoxide is extremely poisonous in nature.
Reason : Carbon monoxide is formed by complete combustion of carbon.
Ans : (c) Assertion (A) is true but reason (R) is false.

21. **Assertion :** Acetic acid is less acidic than alcohol.
Reason : The ion formed after the removal of proton from acetic acid is less stable.
Ans : (e) Both Assertion and Reason are false.
Both Assertion and Reason are false. Acetic acid is more acidic than alcohol because of the more stability of ion formed after the removed of a proton.

22. **Assertion :** Diamond and graphite are allotropes of carbon.
Reason : Some elements can have several different structural forms while in the same physical state. These forms are called allotropes.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

23. **Assertion :** Cooking oil decolourises bromine water.
Reason : Cooking oil is a saturated compound.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

24. **Assertion :** Soap has good cleansing action.
Reason : Soap has short chain of hydrocarbon. Which acts as hydrophobic and long ionic part which acts as hydrophilic.
Ans : (c) Assertion (A) is true but reason (R) is false.
Soap has long chain of hydrocarbon and short chain of ionic part.

CHAPTER 5

Periodic Classification of Elements

1. OBJECTIVE QUESTIONS

1. According to Men deleef periodic law, the properties of elements are periodic function of their-
(a) atomic masses (b) atomic numbers
(c) atomic volumes (d) densities

Ans : (a) atomic masses

2. If the two members of a Dobereiner triad are phosphorus and antimony, the third member of this triad is-
(a) arsenic (b) sulphur
(c) iodine (d) calcium

Ans : (a) arsenic

3. Select the correct pair that have largest and smallest atoms respectively
(a) F and C (b) Li and C
(c) N and O (d) H and Li

Ans : (b) Li and C

The first element in any period has largest size in that period. The size decreases as we move from left to right in any period. Hence, lithium (Li) has largest size, while carbon (C) has smallest size among the given options.

4. Consider the section of the periodic table:

Group number	IA	IIA	IIIA	IVA
Period	1	2	13	14
Second	Li		*C*	
Third	*A*	Mg	Al	Si
Fouth	K	*B*		*D*

Identify A, B, C and D.

	A	*B*	*C*	*D*
(a)	Cs	Be	Ca	C
(b)	Na	Ca	B	Ge
(c)	Na	B	Ca	Ge
(d)	Cs	B	Ca	C

Ans : (b) *A*-Na, *B*-Ca, *C*-B, *D*-Ge

	$A = Na$	$B = Ca$	$C = B$	$D = Ge$
Period	1	2	13	14

	Li	Be	B	C
	Na	Mg	Al	Si
	K	Ca	Ga	Ge

5. The correct order increasing acidic nature of SO_2, SiO_2, P_2O_3 and Al_2O_3 is
(a) $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$
(b) $SO_2 < P_2O_3 < SiO_2 < Al_2O_3$
(c) $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$
(d) $SiO_2 < SO_2 < Al_2O_3 < P_2O_3$

Ans : (c) $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$

Al forms amphoteric oxide. Non-metals (S, P) form acidic oxide. Metalloid (Si) forms basic oxide.

6. How many periods are three in the long form of the periodic table-
(a) 6 (b)7
(c) 8 (d) 9

Ans : (b) 7

7. Elements belonging to the same group have similar properties because-
(a) they have similar electronic configuration of the outermost shell
(b) their atomic numbers go on increasing as we move down the group
(c) all of them metallic elements.
(d) none of the above

Ans : (a) they have similar electronic configuration of the outermost shell

8. Which of the following will not represent Dobereiner's triad?
(a) Li, Na, K (b) Be, Mg, Ca
(c) Cl, Br, I (d) N, P, As

Ans : (d) N, P, As

The triad N, P and As will not represent the Dobereiner's triad because the average of atomic masses of nitrogen (N) and arsenic (As) is not equal to the atomic mass of phosphorus (P).

Atomic mass of Nitrogen $= 14$

Atomic mass of Arsenic $= 74.9$

$$\text{Average} = \frac{74.9 + 14.0}{2} \approx 44.5$$

Which of not equal to the atomic mass of P (i.e., 31.0).

9. The element with smallest size in the 4th period is-
(a) chlorine (b) iodine
(c) fluorine (d) bromine

Ans : (d) bromine

On moving along a period atomic radii decreases.

10. Cl, Br, I, if this is Dobereiner's triad and the atomic masses of Cl and I are 35.5 and 127 respectively the atomic mass of Br is-
(a) 162.5 (b) 91.5
(c) 81.25 (d) 45.625

Ans : (c) 81.25

According to Dobereneir's triad the atomic mass of Br will be average of the atomic masses of Cl and I

$$= \frac{35.5 + 127}{2} = 81.25$$

11. Which of the following element if not the member of second period?
(a) Li (b) Ca
(c) F (d) C

Ans : (b) Ca

The member of the second-period elements are Li, Be, B, C, N, O, F and Ne. Thus, calcium (Ca) is not the member of second period. It belongs to 4^{th} period ($Z = 20$).

12. The elements with atomic number 2, 10, 8, 18, 36, 54 and 86 are all-
(a) halogens (b) noble gases
(c) noble metals (d) light metals

Ans : (b) noble gases

13. Which of the following statement is incorrect for atomic size?
(a) Atomic size of B > Be
(b) Atomic size of Be > B
(c) Atomic size of N > O
(d) Atomic size of C > N

Ans : (a) Atomic size of B > Be

In long form of periodic table, atomic size decreases along the period, as we move from left to right in any period due to increase in effective nuclear charge. Thus, atomic size of B is less than of Be. Hence, (a) is the incorrect statement.

14. An element X belongs to group 2 and period 3 of the periodic table. The chemical formulae of its nitrate, sulphate and phosphate respectively will be
(a) $X(NO_3)_3, X_2(SO_4)_3, X_2(PO_4)_3$
(b) $X_3(NO_3)_2, X_2(SO_4)_2, X_2(PO_4)_3$
(c) XNO_3, XSO_4, XPO_4
(d) $X(NO_3)_2, XSO_4, X_3(PO_4)_2$

Ans : (d) $X(NO_3)_2, XSO_4, X_3(PO_4)_2$

An element X belongs to group 2 and period 3. So, it is Mg which idvalent. Thus, the chemical formulae of nitrate is $Mg^{+2}(NO_3^-)_2$, sulphate is $Mg^{2+}SO_4^{2-}$ and phosphate is $MG_3^{2+}(PO_4^{3-})_2$.

15. An element belongs to group 17. It is present in third period and its a atomic number is 17. What is the atomic number of the element belonging to same group and present in fifth period?
(a) 25 (b) 33
(c) 35 (d) 53

Ans : (d) 53

Group 17 and 3rd period $= 17\,(\text{Cl})$

Group 17 and 4th period $= 17 + 8\,(35)$

Group 17 and 5th period $= 35 + 18\,(53)$

16. Consider the following figure:

p	q	r
Ru	Rh	s
Os	lr	Pt

Here, p, q, r and s respectively are:
(a) Fe, Co, Pd, Ni (b) Pd, Co, Ni, Fe
(c) Fe, Co, Ni, Pd (d) Fe, Ni, Co, Pd

Ans : (c) Fe, Co, Ni, Pd

Group Period	8	9	10k
4	Fe	Co	Ni
5	Ru	Rh	Pb
6	Os	lr	Pt

17. Which of the following property increases down the group?
(a) Electronegativity
(b) Electropositive nature of element
(c) Atomic size
(d) Both (b) and (c)

Ans : (d) Both (b) and (c)

Electronegativity decreases, as we move down the group, while electropositive nature and atomic size increases as we move down the group due to addition of an extra main shell.

18. The correct order of first IE of C, N, O, F is-
(a) F>O>N>C (b) C>N>O>F
(c) O>N>F>C (d) F>N>O>C

Ans : (d) F>N>O>C

In a period, the value of ionisation potential increases from left to right with breaks where the atoms have

some what stable configurations hence the correct order will be F>N>O>C

19. The atoms of elements belonging to the same group of periodic table have the same-
(a) number of protons
(b) number of electrons
(c) number of neutrons
(d) number of electrons in the outermost shell

Ans : (d) number of electrons in the outermost shell

20. Which of the following is the correct order of relative size
(a) $I^- > I^+ > I$ (b) $I^- > I > I^+$
(c) $I > I^+ > I^-$ (d) $I^+ > I^- > I$

Ans : (b) $I^- > I > I^+$

21. Newlands could classify elements only upto-
(a) copper (b) chlorine
(c) calcium (d) chromium

Ans : (c) calcium

22. Mendeleev classified elements in-
(a) increasing order of atomic groups
(b) eight periods and eight groups
(c) seven periods and nine groups
(d) eight periods and seven groups

Ans : (c) seven periods and nine groups

23. An element M has an atomic number 9 and atomic mass 17. Its ion will be represented by-
(a) M (b) M^{+2}
(c) M^- (d) M^{-2}

Ans : (c) M^-

The element is halogen and has one less electron than inert gas configuration, hence can be represented as M^- ion.

24. Listed below are the locations of certain elements in group and periods of the periodic table.
Arrange these elements in the expected order of increasing non-metallic character.
1. Element in the fourth period and group IV A
2. Element in the third period and group VI A
3. Element in the fourth period and group VI A
4. Element in the six period and group III A
5. Element in the second period and group VII A

The correct order is:
(a) $1 < 2 < 3 < 4 < 5$ (b) $5 < 4 < 3 < 2 < 1$
(c) $4 < 1 < 3 < 2 < 5$ (d) $5 < 4 < 2 < 1 < 3$

Ans : (c) $4 < 1 < 3 < 2 < 5$

Group Period.	III A	IV A	V A	VI A	VII A	VIII A
1.						
2.						5
3.				2		
4.		1		3		
5.						
6.	4					

Non-metallic character decreases down the group and increases across the period. Hence, increasing order of first non-metallic of these elements are:
$4 < 1 < 3 < 2 < 5$

25. The elements with atomic numbers 3, 11, 19, 37 and 55 belong to
(a) alkali metals (b) alkaline earth metals
(c) halogens (d) nobles gases

Ans : (a) alkali metals

26. If the two members of a Dobereiner triad are chlorine and iodine, the third member of this triad is-
(a) fluorine (b) bromine
(c) sodium (d) calcium

Ans : (b) bromine

27. The most metallic element in the fifth period is-
(a) silver (b) rubidium
(c) gold (d) rhodium

Ans : (b) rubidium

The metallic character decreases as we move from left to right in a period.

28. An element X combines with hydrogen to form a compound XH_3. The element X is placed on the right side of the peridic table. Which of the following statement is correct for element X?
1. Has two valence electrons.
2. Is a metal and is solid.
3. Is a non-metal and is a gas.
4. Has five valence electrons.
5. XH_3 reacts with water to form a basic compound.

(a) 1, 2 and 3 (b) 2, 3 and 4
(c) 3, 4 and 5 (d) 5, 1 and 2

Ans : (c) 3, 4 and 5

Element X is N(nitrogen) because it is placed on the right side of the periodic table and the compound is NH_3. X is non-metal and valence electrons are 5.

$$NH_3 + H_2O \longrightarrow NH_4OH\,(\text{Base})$$

29. Noble gases were included in Mendelev's periodic table in the-
(a) 1 st group (b) 7th group
(c) 8th group (d) none of these

Ans : (d) none of these

30. In the modern periodic table one of the following dos not have appropriate position-
(a) transition elements (b) inert gases
(c) inner transition elements (d) halogens

Ans : (c) inner transition elements

31. The element with the smallest size in the group 13 is-
(a) beryllium (b) carbon

(c) aluminium (d) boron

Ans : (b) carbon

32. The long form of periodic table consists of-
(a) seven periods and eight groups
(b) seven periods and eighteen groups
(c) eight periods and eighteen groups
(d) eighteen periods and eight groups

Ans : (b) seven periods and eighteen groups

2. FILL IN THE BLANK

1. Dobereiner grouped the elements into triads and Newlands gave the .....

Ans : Law of Octaves.

2. The law of triads was given by .....

Ans : Dobereiner

3. Valency of an element is either equal to the number of valence electrons show similar ..... properties.

Ans : eight, chemical

4. According to Modern periodic law, the elements are arranged in the periodic table in the order of their increasing .....

Ans : Atomic number

5. Mendeleev arranged the elements in increasing order of their ..... and according to their ..... properties.

Ans : Atomic masses, Chemical

6. ..... arranged the known elements in order of their increasing atomic weight in the form of a table called Periodic Table.

Ans : Mendeleev

7. The elements in groups, 1, 2 and 13 to 18 are known as ..... elements.

Ans : Main group

8. The valency of an atom is equal to its .....

Ans : Combining capacity

9. ..... showed that group of three elements called triad had similar properties.

Ans : Dobereiner

10. The atomic size in a period .....

Ans : Decreases

11. Mendeleev predicted the existence of some yet to be discovered elements on the basis of ..... in his Periodic Table.

Ans : Gaps

12. Elements in the Modern Periodic Table are arranged in ..... vertical columns called ..... and ..... horizontal rows called .....

Ans : 18, groups, 7, periods.

13. In Modern Periodic Table, there are ..... horizontal rows called ..... and ..... vertical columns called .....

Ans : seven, periods, eighteen, groups

14. Elements with eight electrons in their outermost energy shell are called .....

Ans : Noble gases

15. Anomalies in arrangement of elements based on increasing atomic mass could be removed when element discovered by Moseley.

Ans : atomic

16. If two elements have the same number of valence electrons, then they belong to the same ..... of the periodic table.

Ans : Group

3. TRUE/FALSE

1. As number of shells increases, atomic orbitals become larger and less stable.

Ans :

True

2. Atomic radii decrease from left to right across a row of the periodic table.

Ans : True

3. Atomic radii increase from top to bottom down a column of the periodic table.

Ans : True

4. Fluorine has highest electron affinity in the periodic table.

Ans : True

5. Valency changes down the group.

Ans : False

6. The elements of group 17 are called halogens.

Ans : True

7. Along a period, acidic character of the oxide of the elements increases and their basic character decreases.

Ans : True

8. The elements X with atomic number 15 belongs to third period and group 15.

Ans : True

9. The number of shells increases in a given period from

left to right in the periodic table.

Ans : False.

The number of shells remain same in a given period.

10. The elements silicon, germanium and arsenic are called metalloids.

Ans : True

11. When Mendeleev started his work, 63 elements were known.

Ans : True

12. Dobereiner could identify only three triads of elements. These are: Li, Na, K; Ca, Sr, Ba and Cl, Br, I.

Ans : True

13. Elements are classified on the basis of similarities in their properties.

Ans : True

14. Rows in the periodic table are called periods.

Ans : True

Rows in the periodic table are called periods. The columns of the periodic table are called groups.

15. The columns of the periodic table are called groups.

Ans : True

16. You will find metals on the extreme right side of the periodic table.

Ans : False

Inert gases are found on the far right of the periodic table. Halogens are in the second group form the right. Metals of all types are found around the left and middle side of the periodic table. There may be alkalitransition, or alkaline earth metals across the table.

17. Although the order of elements is based on atomic number, vertical families share similar chemical properties.

Ans : True

18. As nuclear charge increases, atomic orbitals become smaller and more stable.

Ans : True

19. Noble gases are placed extremely left in the periodic table.

Ans : False

Noble gases are placed extremely right in the periodic table.

20. Magnesium is more metallic in nature than sodium.

Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1. Column II give group to which element in column I belong match them correctly.

Column I		Column II	
(A)	Nitrogen	(p)	15
(B)	Aluminium	(q)	16
(C)	Chlorine	(r)	17
(D)	Oxygen	(s)	13

Ans : A-p, B-s, C-r, D-q

2. Column II give period to which element in column I match them correctly.

Column I		Column II	
(A)	Hydrogen	(p)	3
(B)	Sodium	(q)	4
(C)	Calcium	(r)	6
(D)	Barium	(s)	1

Ans : A-s, B-p, C-q, D-r

3. Match the column-

Column I		Column II	
(A)	Element with largest size in second period	(p)	boron
(B)	Element with smallest size in group 13	(q)	fluorine
(C)	Element with maximum non-metallic character.	(r)	bromine
(D)	Element with smallest size in fourth period	(s)	lithium

Ans : A-s, B-p, C-q, D-r

DIRECTION : Following question has four statements (A, B, C and D...) given in Column I and four statements (p, q, r and s) in Column II. Any given statement in Column I can have correct matching with one or more statement (s) given in Column II. Match the entries in column I with entries in column II.

4.

Column I		Column II	
(A)	*s*-block elements	(p)	Alkali metals
(B)	*p*-block elements	(q)	Alkaline earth meals
(C)	Representative elements	(r)	Halogens

Column I		Column II	
(D)	High ionisation energy	(s)	Noble gases

	A	B	C	D
(a)	p, q	r, s	p, q, r	r, s
(b)	p, q	q	s, r	r, p
(c)	s	q, r	p, q	r
(d)	r, q	q	s, q	p, q, r

Ans : (a) A-p,q, B-r,s, C-p, q, r, D-r, s

5.

Column I		Column II	
(A)	He	(p)	P- block
(B)	Cl	(q)	Metal
(C)	Cu	(r)	Noble gas
(D)	Sn	(s)	Non-metal

	A	B	C	D
(a)	p, s	q	r, p	s
(b)	r	q, r	s	p, s
(c)	r	p, s	q	p, q
(d)	r, p	q, r	p, q	s

Ans : (c) A-r, B-p, s, C- q, D-p, q

6.

Column I		Column II	
(A)	Metals	(p)	High I.E.
(B)	Non-metals	(q)	Low I.E.
(C)	Transition Metal	(r)	High E.A
(D)	Noble gases	(s)	Low E.A.

	A	B	C	D
(a)	q, r	p, s	q	p, r
(b)	p	q, s	s	r
(c)	q, r	s	p	p, r
(d)	r	q	q, s	p

Ans : (a) A-q, r, B-p, s C-q, D-p, r

7.

	Column A		Column B
1.	$_{20}Ca$	(a)	3^{rd}
2.	$_{8}O$	(b)	1^{st}
3.	$_{2}He$	(c)	2^{nd}
4.	$_{17}Cl$	(d)	4^{th}
5.	$_{15}P$		

Ans : 1-(d), 2-(c), 3-(b), 4-(a), 5-(a)

8.

	Column A		Column B
1.	$_{11}Na$	(a)	3
2.	$_{9}F$	(b)	4
3.	$_{20}Ca$	(c)	1
4.	$_{13}Al$	(d)	2
5.	$_{6}C$		
6.	$_{8}O$		

Ans : 1-(c), 2-(c), 3-(d), 4-(a), 5-(b), 6-(d)

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Mendeleev's a left the gap under aluminium and silicon and called these Eka-aluminium and Eka-silicon, respectively.
Reason : Dobereiner arranged elements on the basis of increasing atomic number.
Ans : (c) Assertion (A) is true but reason (R) is false.
Dobereiner arranged elements on the basis of increasing atomic weights.

2. **Assertion :** According to Mendeleev, the properties of elements are a periodic function of their atomic masses.
Reason : Atomic number is equal to the number of protons.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

3. **Assertion :** Noble gases are also called inert gases.
Reason : Noble gases have a complete octet.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Noble gases are also called inert gases because they don't need to react with other elements to fill their outer shell (octet), as they already posses full valence shell.

4. **Assertion :** Nitrogen has higher ionization energy than

that of oxygen.
Reason : Nitrogen has smaller atomic size than that of oxygen.
Ans : (c) Assertion (A) is true but reason (R) is false.

Nitrogen has higher ionisation energy as it has stable half filled orbital structure.

5. **Assertion :** Electronegativity of fluorine is greater than that of oxygen.
Reason : The electronegativity of the elements increases along a period since the metallic character increases.
Ans : (c) Assertion (A) is true but reason (R) is false.

Assertion is true but reason is false. Electronegative of flourine is greater than that of oxygen, since the non-metallic character increases along a period from left to right in the modern periodic table.

6. **Assertion :** Be, Mg and Ca can be classified as Dobereiner's triads.
Reason : Atomic mass of Mg is approximately the average of the sum of atomic masses of Be and Ca.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

According to the Dobereiner's traids, the three elements in a traid were arranged in the order of increasing atomic masses, the atomic mass of middle element was roughly the average of the atomic masses of the other two elements. So, taking Be, Mg and Ca as a traid.

Elements	Be	Mg	Ca
Atomic mass	9	24	40

Average atomic mass of first and third element

$$\frac{9+40}{2} = 24.5$$

7. **Assertion :** The elements of the same group have similar chemical properties.
Reason : The elements of the same group have the different number of valence electronic.
Ans : (c) Assertion (A) is true but reason (R) is false.

Assertion is true but reason is false. The elements of same group have similar chemical properties due to the same number of valence electrons.

8. **Assertion :** Elements of group 16 are monovalent.
Reason : Elements of group 16 have seven electrons in their outermost/valence shell.
Ans : (e) Both Assertion and Reason are false.

Both Assertion and Reason are false. Elements of group 16 are divalent as they all have six electrons in their valence shell.

9. **Assertion :** Silicon is a metalloid.
Reason : Silicon shows only properties of non-metals.
Ans : (c) Assertion (A) is true but reason (R) is false.

10. **Assertion :** According to Mendeleev, periodic properties of elements is a function of their atomic number.
Reason : Atomic number is equal to the number of protons.
Ans : (d) Assertion (A) is false but reason (R) is true.

According to Mendeleev, periodic properties of elements is a function of their atomic masses.

11. **Assertion :** Ionization enthalpy is the energy released to remove an electron from an isolated gaseous atom in its ground state.
Reason : Element has a tendency to lose of gain the electrons to attain the stable configuration.
Ans : (d) Assertion (A) is false but reason (R) is true.

Assertion is false but reason is true.
Ionization enthalpy is the energy required to remove an electron from an isolated gaseous atom in its ground state.

12. **Assertion :** Group 1 (1s) elements are known as the alkali elements.
Reason : s-orbital can accommodate only two electrons.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Group I elements are known as alkali metals as the hydroxides of these metals are soluble in water and these solutions are highly alkaline in nature.

13. **Assertion :** Noble gases have zero valency.
Reason : Noble gases have stable electronic configuration.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** In triad, the three elements have same gaps of atomic masses.
Reason : Elements in a triad have similar properties.
Ans : (d) Assertion (A) is false but reason (R) is true.

In a triad, the atomic mass of the middle element is the mean of the atomic masses of the first and third elements.

15. **Assertion :** Sixth and seventh periods in the periodic table contains 14 elements.
Reason : In the periodic table, 14 elements of sixth and seventh periods are known as lanthanoids and actinoids.
Ans : (d) Assertion (A) is false but reason (R) is true.

Sixth period contains 32 elements and seventh period is incomplete and like sixth, the period would have 32 elements.

16. **Assertion :** Mendeleev's arranged elements in horizontal rows and vertical coloumns.
Reason : Mendeleev's ignored the order of atomic weight thinking that the atomic measurements might be incorrect.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Mendeleev's arranged elements in horizontal rows

and vertical columns. He ignored the order of atomic weight thinking that the atomic measurements might be incorrect and placed the elements with similar properties.

17. **Assertion :** Smaller the size of an atom greater is the electro-negativity.
Reason : Electronegativity refers to the tendency of atom to share electrons with other atom.
Ans : (c) Assertion (A) is true but reason (R) is false.

Assertion is true but reason is false.
Electro-negativity refers to the tendency of atom to attract bonding electrons

18. **Assertion :** Fluorine has greater atomic radius than nitrogen.
Reason : Atomic radius decreases along a period.
Ans : (d) Assertion (A) is false but reason (R) is true.

19. **Assertion :** Elements in the same vertical column have similar properties.
Reason : Elements have periodic dependence upon the atomic number.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

20. **Assertion :** Smaller the size of an atom, greater is the electronegativity.
Reason : Electronegativity refers to the tendency of atom to share electrons with other atom.
Ans : (c) Assertion (A) is true but reason (R) is false.

Electronegativity refers to the tendency of atom to attract bonding electrons.

21. **Assertion :** The atomic and ionic radii generally decreases towards right in a period.
Reason : The ionisation enthalpy increases on moving towards left in a period.
Ans : (c) Assertion (A) is true but reason (R) is false.

The ionisation enthalpy increases on moving towards the extreme right element in period and atomic and ionic radii decreases in a period from left to right.

22. **Assertion :** Elements in the same vertical column have similar properties.
Reason : Elements have periodic dependence upon the atomic number.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

23. **Assertion :** Be and Al show some similar properties.
Reason : The metallic radius of Be is less than the metallic radius of Al.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Be and Al show diagonal relationship because Be resemble in their properties with Al. Metallic radius of the Be (111 pm) is less than the metallic radius of Al (143 pm). Although smaller size is the reason for the anomalous behaviour of Be but not a reason for its diagonal relation with Al.

24. **Assertion :** According to Mendeleev, periodic properties of elements is a function of their atomic number.
Reason : Atomic number is equal to the number of protons.
Ans : (d) Assertion (A) is false but reason (R) is true.

According to Mendeleev' periodic properties of elements is a function of their atomic masses.

25. **Assertion :** The highest I.E. in a period is shown by noble gas.
Reason : Noble gases are at the extreme right of the period.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Both assertion and reason are true but reason is not the correct explanation of assertion.
Noble gases have completely filled electron shells and very stable electron configuration.

26. **Assertion :** Noble gases are highly reactive.
Reason : Noble gases have stable closed shell electronic configuration.
Ans : (d) Assertion (A) is false but reason (R) is true.

Inert gases (noble gases) are very less reactive due to stable closed shell electronic configuration like ns^2np^6 or ns^2.

CHAPTER 6

Life Process

1. OBJECTIVE QUESTIONS

1. Vocal cords occur in:
(a) pharynx (b) glottis
(c) bronchial tube (d) larynx

Ans : (d) larynx

2. What is the mode of nutrition in fungi?
(a) Autotrophic (b) Heterotrophic
(c) Saprophytic (d) Parasitic

Ans : (c) Saprophytic

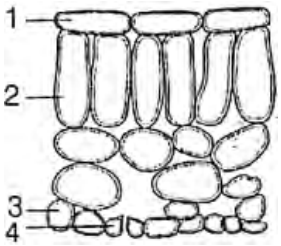
Fungal organisms feed on dead matter. They release chemicals to break complex organic matter into simple forms and absorb them. This is called saprophytic mode of nutrition.

3. How many pairs of salivary glands are found in humans?
(a) Two (b) Three
(c) Six (d) Four

Ans : (b) Three

There are three pairs of salivary glands present in humans, namely the parotid gland, submandibulars and sublingual glands.

4. The diagram shows the arrangement of cells inside the leaf of a green plant. (No cell contents are shown). Which cells normally contain chloroplasts?



(a) 1 and 2 (b) 1 and 4
(c) 2 and 3 (d) 2 and 4

Ans : (d) 2 and 4

The palisade mesophyll cell (2) and guard cell (4) contain chloroplasts that absorbs sunlight. Most of the chloroplasts are concentrated in the palisade cells to absorb maximum amount of sunlight required for photosynthesis.

5. In the cardiac cycle, diastole is:
(a) The number of heart beats per minute
(b) The relaxation period after contraction of the heart
(c) The forceful pumping action of the heart
(d) The contraction period after relaxation of the heart.

Ans : (b) The relaxation period after contraction of the heart

6. Blood vessel carry blood from lungs to heart through:
(a) Pulmonary artery (b) Pulmonary vein
(c) Coronory artery (d) None of these

Ans : (b) Pulmonary vein

7. Which of the following structures is involved in gaseous exchange in woody stem of a plant?
(a) Stomata (b) Lenticel
(c) Guard cell (d) Epidermis

Ans : (b) Lenticel

The guard cells regulate the opening and closing of stomata to maintain the flow of respiratory as well as photosynthetic gases (CO_2 and O_2) in the plants.

8. Which substances are produced by anaerobic respiration in yeast?

	Carbon dioxide	**Alcohol**	**Lactic Acid**	**Water**
(a)	✓	✓	×	×
(b)	✓	×	✓	×
(c)	×	✓	×	✓
(d)	×	×	✓	✓

Key ✓ = produced, × = not produced.

Ans : (a)

During anaerobic respiration in yeast, following equation shows the products synthesised:
$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$

9. Which cell organelle is involved in breakdown of glucose to produce energy for metabolic activities?
(a) Mitochondria (b) Chloroplast
(c) Endoplasmic reticulum (d) Golgi body

Ans : (a) Mitochondria

Mitochondria performs the cellular respiration in which the glucose is broken down to liberate energy in the form of ATP for other metabolic activities.

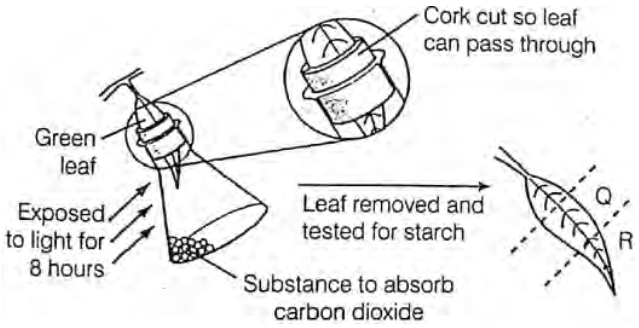
10. From which structure, the free oxygen gas produced during photosynthesis is released?
(a) Epidermis (b) Stomata

(c) Cortex (d) Guard cell

Ans : (b) Stomata

The oxygen gas produced during photosynthesis is released into the surroundings through stomata.

11. A plant is kept in the dark for two days. A leaf is used in an experiment to investigate the effect of two factors on photosynthesis as shown in the diagram.



What are the colours of Q and R, when the leaf is tested for starch, using iodine solution?

	Q	R
(a)	Blue/black	Brown
(b)	Brown	Brown
(c)	Blue/black	Blue/black
(d)	Brown	Blue/black

Ans : (b) Q-Brown, R-Brown

Some alkali solution is kept in the flask, which absorbs CO_2, so no photosynthesis occurs and apical region of leaf will show negative results for starch test. Part Q of leaf remains in dark within the cut part of cork and no photosynthesis occurs here. It also shows negative result of starch test.

12. Villi present on the internal wall of intestine help in the

(a) emulsification of fats

(b) breakdown of proteins

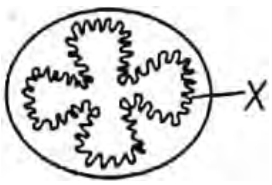
(c) absorption of digested food

(d) digestion of carbohydrates

Ans : (c) absorption of digested food

The small finger-like projections. i.e. villi present in intenstine increase the surface area for better absorption of digested food.

13. The diagram represents a section through the small intestine.



What is the role of the structure labelled X?

(a) They help to move the food along

(b) They make a large surface area for absorption

(c) They protect against bacteria

(d) They move mucus over the surface

Ans : (b) They make a large surface area for absorption

Structure X shows microvilli, which increases the surface area for absorption of digested products i.e., amino acids, glucose etc.

14. Choose the forms in which most plants absorb nitrogen:

1. Proteins
2. Nitrates and nitrites
3. Urea
4. Atmospheric nitrogen

Choose the correct option.

(a) 1 and 2 (b) 2 and 3

(c) 3 and 4 (d) 1 and 4

Ans : (b) 2 and 3

Most plants absorb nitrogen in the form of nitrates, nitrites and urea. All of these are taken up from the soil by the plant.

15. Only two of the following Statements accurately describe what happens in the mouth.

1. Amylase breaks down large starch molecules into smaller maltose molecules.
2. Chewing increases the surface area of food for digestion.
3. Saliva emulsifies fats into smaller droplets.
4. Teeth breakup large insoluble molecules into smaller soluble molecules.

which statements are correct?

(a) 1 and 2 (b) 2 and 3

(c) 3 and 4 (d) 1 and 4

Ans : (a) 1 and 2

Statement 1 and 2 are correct. Saliva cannot do emulsify fats and teeth do not break molecules or do not change insoluble ones into soluble ones. They only help in the churing of food.

16. When a person eats some egg white, proteins and water enter the stomach. Which substances are found leaving the stomach and leaving the small intestine?

	Leaving the Stomach	**Leaving the Small Intestine**
(a)	Amino acids and water	Amino acids and water
(b)	Fatty acids, glycerol and water	Fatty acids, glycerol and water
(c)	Protein and water	Fatty acids and glycerol
(d)	Protein, amino acids and water	Water

Ans : (d) Protein, amino acids and water, Water

In stomach, egg white is broken down to amino acids. It contains albumin protein which is not completely broken down. Some of it is further hydrolysed in intestine, from where amino acids are absored by food.

17. In photosynthesis, which substances are used up, which are produced and which are necessary, but remain unchanged after the reaction?

	Used up	**Produced**	**Remain Unchanged**
(a)	Carbon dioxide	Water	Oxygen
(b)	Chlorophyll	Carbon dioxide	Water
(c)	Oxygen	Starch	Cellulose
(d)	Water	Oxygen	Chlorophyll

Ans : (d) Used up-Water, Produced-Oxygen, Remain Unchanged-Chlorophyll

Equation of photosynthesis shows the reactants and products:

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

18. What is the final product of photosynthesis?

(a) Protein (b) Fat

(c) Starch (d) Mineral salt

Ans : (c) Starch

The final product of photosynthesis in plants is glucose and water. The glucose produced is stored as starch in storage organs.

19. During vigorous physical exercise, lactic acid is formed from glucose inside the muscle cells because

(a) there is lack of oxygen

(b) there is lack of water

(c) there is excess of carbon dioxide

(d) none of the above

Ans : (a) there is lack of oxygen

Muscle cells respire anaerobically to produce lactic acid in the scarcity of oxygen during excessive physical exercise.

20. The following changes take place in an athlete's body during a 100 m race. Which change occurs first?

(a) Increased availability of oxygen to muscles

(b) Increased breathing rate

(c) Increased carbon dioxide concentration in the blood

(d) Increased production of carbon dioxide by muscles

Ans : (d) Increased production of carbon dioxide by muscles

In order to provide energy for 100 m race, respiration increases in athletes muscles and carbon dioxide is produced, i.e.

$$6CO_2 + C_6H_{12}O_6 \longrightarrow 6H_2O + 6CO_2 + \text{Engery}$$

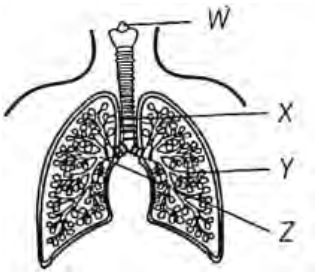
21. Major function of contractile vacuole is:

(a) Excretion (b) Circulation

(c) Osmoregulation (d) All the above

Ans : (c) Osmoregulation

22. The diagram shows part of the human gas exchange system.



What are W, X, Y and Z?

	Bronchus	**Bronchiole**	**Larynx**	**Trachea**
(a)	W	X	Z	Y
(b)	X	Z	Y	W
(c)	Y	W	X	Z
(d)	Z	Y	W	X

Ans : (d)

Larynx is at the beginning of trachea. After trachea, bronchi are found which further branch into bronchioles.

23. Instrument used to measure blood pressure is

(a) barometer (b) potometer

(c) thermometer (d) sphygmomanometer

Ans : (d) sphygmomanometer

Blood pressure is measured by sphygmomanometer.

24. In which order do these events occur in human nutrition?

(a) Digestion → ingestion → absorption → assimilation

(b) Digestion → ingestion → assimilation → absorption

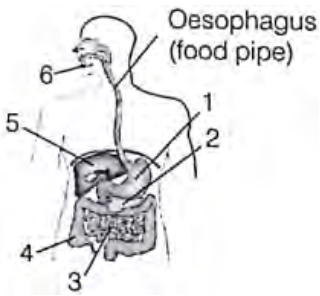
(c) Ingestion → digestion → absorption → assimilation

(d) Ingestion → digestion → assimilation → absorption

Ans : (c) Ingestion → digestion → absorption → assimilation

After ingestion, food is digested in buccal cavity, stomach and small intestine. Then the products of digestion, i.e. glucose and amino acids are absorbed from the ileum region into the blood which carries these products to body tissues and cells where assimilation occurs.

25. The diagram shows the human gut. Which numbered structures secrete digestive enzymes?

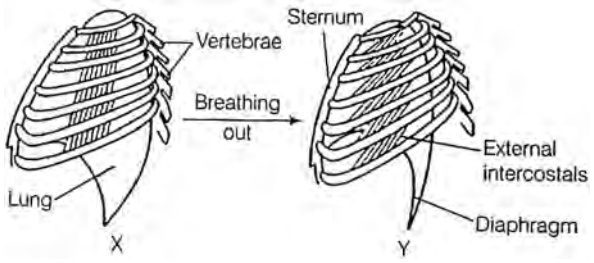


(a) 1, 2, 3 and 4 (b) 1, 2, 3 and 6
(c) 2, 3, 4 and 5 (d) 2, 3, 5 and 6

Ans : (b) 1, 2, 3 and 6

1 is stomach which secretes pepsin in gastric juice.
2 is pancreas which secretes trypsin and amylase.
3 is small intestine in which lipase and peptidase are secreted while 6 is salivary gland which secretes amylase in saliva.

26. The diagram shows the ribs and some of the muscles used in breathing.



which muscles relax in moving from position X to position Y?

	Diaphragm	External Intercostals
(a)	No	No
(b)	No	Yes
(c)	Yes	No
(d)	Yes	Yes

Ans : (d)

During exhalation, the diaphragm arches upwards as a result of muscle relaxation. The external intercostal muscles are also relaxed to move the ribcage back into position.

27. Which of the following is not a disorder of the circulatory system?
(a) Atherosclerosis (b) Arteriosclerosis
(c) Arthritis (d) Angina

Ans : (c) Arthritis

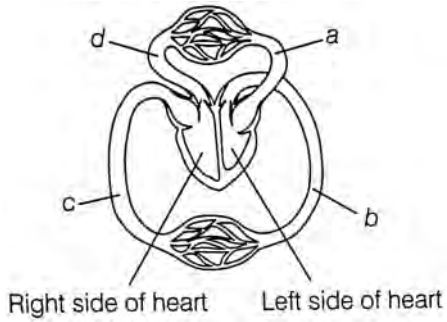
Arthritis is the inflammation of joints causing pain and stiffness.

28. Which of the following is responsible for the transport of water and minerals from roots to aerial parts of the plant?
(a) Xylem (b) Phloem
(c) Cortex (d) Both (a) and (b)

Ans : (a) Xylem

In rooted plants, tranport of water and minerals occurs through xylem.

29. The diagram represents a part of human circulatory system. Where is the blood pressure highest?



Ans : (b)

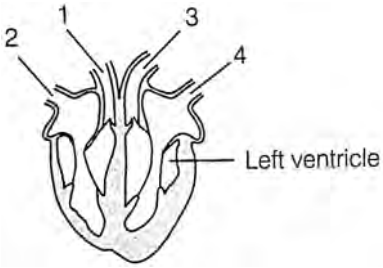
The lungs receive low pressure of blood from right side of the heart, with thinner ventricle wall as compared to the thicker wall of left ventricle. From the left ventricle, blood is pushed into aorta (B), which has normal blood pressure of about 16 KPa. Pressure in D is less than 4 Kpa.

In the Pulmonary vein A, the blood pressure is evenless, after being passed through the alveolare capillaries.

30. Urea is formed in:
(a) Liver (b) Spleen
(c) Kidney (d) Lungs

Ans : (a) Liver

31. The diagram shows a vertical section through the heart.



what are the functions of the numbered blood vessels?

	Carries blood of body	Carries blood to lungs	Carries blood from lungs	Carries blood from body
(a)	1	2	3	4
(b)	1	3	4	2
(c)	2	4	3	1
(d)	3	1	4	2

Ans : (d)

Vessel 1 is pulmonary artery and carries blood to lungs. Vessel 2 is vena cava and carries blood from body to heart. Vessel 3 is aorta and carries blood from heart to body. Vessel 4 is pulmonary vein and carries blood from lungs to heart.

32. What is the correct route for blood flow in a human?
(a) Left atrium → Left ventricle → Lungs → Right ventricle → Right atrium
(b) Left atrium → Left ventricle → Right ventricle → Right atrium → Lungs
(c) Right atrium → Right ventricle → Left ventricle → Left atrium → Lungs
(d) Right atrium → Right ventricle → Lungs → Left atrium → Left ventricle

Ans : (d) Right atrium → Right ventricle → Lungs → Left atrium → Left ventricle

The correct route for blood flow in humans is

Right atrium → right ventricle → lungs → left atrium → left ventricle.

33. What may happen if a young plant is dug up and re-planted in another place?
(a) The leaves lose less water
(b) The roots cannot take up mineral salts
(c) The stem cannot transport water
(d) The surface area of the root is reduced

Ans : (d) The surface area of the root is reduced

Digging up a plant may damage roots and affect mineral uptake. Wilting occurs if roots are damaged. Stem can still transport water.

34. Which of the following is not a purpose of transpiration?
(a) Supplies water for photosynthesis
(b) Helps in translocation of sugar in plants
(c) Cools leaf surface
(d) Transports minerals from the soil to all the parts of the plant

Ans : (b) Helps in translocation of sugar in plants

Transpiration is the loss of water in vapour form from the leaves. Translocation of sugars in plant is not performed by transpiration process.

35. The table shows the characteristics of blood in one blood vessel of the body.

Oxygen concentration	**Carbon dioxide concentration**	**Pressure**
High	Low	High

which blood vessel contains blood with these characteristics?
(a) Aorta (b) Pulmonary artery
(c) Pulmonary vein (d) Vena cava

Ans : (a) Aorta

Oxygenated blood is carried back to the left atrium through the pulmonary vein and is pumped into the left ventricle before leaving the heart through the aorta. The thick muscular wall of the left ventricle of the heart contracts to generate the highest pressure possible to pump blood into the aorta and to the rest of the body.

36. What are the functions of the Xylem?

	Carrying sygars	**Carrying water**	**Carrying mineral ions**	**Giving support**
(a)	✓	×	×	✓
(b)	✓	✓	×	×
(c)	×	✓	✓	×
(d)	×	✓	✓	✓

Key ✓ = a function of xylem, × = not a function of xylem

Ans : (d)

Xylem is a part of vascular tissue which not only supports a stem, but also transport water and mineral ions. Phloem is involved in the transport of sugars dissolved in water.

37. Excretion is carried out by nephridia in:
(a) cockroach (b) amoeba
(c) earthworm (d) human

Ans : (c) earthworm

38. Which chambers of human heart contain oxygenated blood?
(a) Left atrium and left ventricle
(b) Left atrium and right ventricle
(c) Right atrium and left ventricle
(d) Right atrium and right ventricle

Ans : (a) Left atrium and left ventricle

Left atrium receives oxygenated blood from pulmonary vein. This blood enters left ventricle before being pushed into aorta in order to supply the whole body.

39. The process of conversion of glucose into pyruvic acid occurs in
(a) mitochondria (b) cytoplasm
(c) outside the cell (d) chloroplast

Ans : (b) cytoplasm

During aerobic respiration, the glucose is converted into pyruvic acid in the cytoplasm of respiring cells.

40. Which process occurring in human body does not involve energy from respiration?
(a) Contraction of heart muscle
(b) Diffusion of oxygen from the alveoli into the blood
(c) Digestion of bread
(d) Maintaining a constant body temperature

Ans : (b) Diffusion of oxygen from the alveoli into the blood

Exchange of O_2 and CO_2 at the site of alveoil occurs due to diffusion gradient as the inhaled air carries more O_2 than blood and blood contains more CO_2 than the atmospheric air. Processes in other options are all energy requiring.

41. The sites of exchange of wastes, nutrients, gases and hormones between the blood and body cells are the:
(a) arteries (b) arterioles

(c) capillaries (d) veins

Ans : (c) capillaries

42. The rate at which oxygen moves from the alveoli of our lungs into our blood:
(a) depends on the difference in oxygen concentration between the alveoli and the blood.
(b) depends on the color of the alveoli.
(c) depends on the availability of energy to transport gases across the membrane.
(d) none of the above

Ans : (a) depends on the difference in oxygen concentration between the alveoli and the blood.

43. The function of the glomerulus and Bowman's capsule of the nephron is to:
(a) reabsorb water into the blood
(b) eliminate ammonia from the body
(c) reabsorb salts and amino acids
(d) filter the blood and capture the filtrate

Ans : (d) filter the blood and capture the filtrate

44. Structural and functional unit of kidney is
(a) renal pelvis (b) nephridia
(c) nephron (d) hilum

Ans : (c) nephron

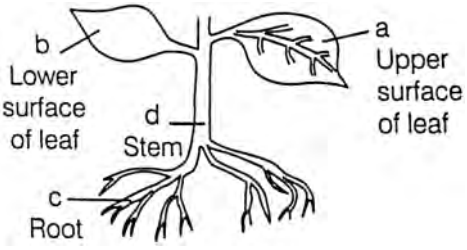
Nephron is the structural and functional unit of kidney.

45. Choose the incorrect pair.
(a) Ultrafiltration-Glomerulus
(b) Concentration of urine-Collecting duct
(c) Transport of urine-Ureter
(d) Storage of urine-Urinary bladder

Ans : (b) Concentration of urine-Collecting duct

Concentration of urine takes place in Henle's loop not in collecting duct.

46. The diagram shows parts of a flowering plant. Where does the most transpiration take place?



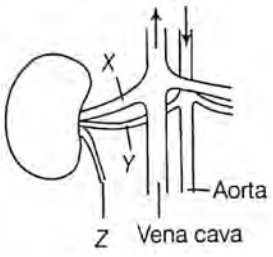
Ans : (b) Lower surface of leaf

Since, lower surface of leaf contains most of the stomata, water vapours moves out of stoma. This increases transpiration rate.

47. The correct order of air reaching from atmosphere to the lungs is through:
(a) external nares, larynx, trachea and air sac
(b) laryx, trachea, air sac and external nares
(c) trachea, air sac, external nares and larynx
(d) air sac, trachea, larynx and external nares

Ans : (a) external nares, larynx, trachea and air sac

48. In the figure given along side, the structures associated with human kidneys are marked (X, Y and Z). The relative concentrations of urea in these structures is

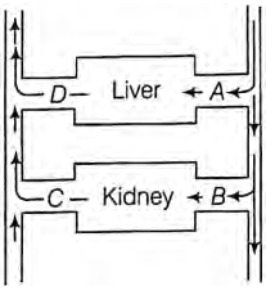


(a) X is sometimes higher than Y
(b) Y is always higher than Z
(c) Y is always lower than Z
(d) Z is sometimes lower than X

Ans : (c) Y is always lower than Z

Structure Y is renal artery which transports urea from the body tissues to kidney for removel. After filteration from blood in kidneys, concentration of urea increases in water (Z) containing urine thus, maintaining a constant level.

49. The diagram given below represents the liver, kidney and some associated blood vessels. Identify the vessel from the labelled parts A-D in which the blood will contain the lowest concentration of urea.



(a) A (b) B
(c) C (d) D

Ans : (c) C

When the kidney filters the blood, renal vein, i.e. part C has the lowest concentration of urea.

50. Proteins $\xrightarrow{A}$ Peptones
Identify the enzyme A involved in the above reaction.
(a) Salivary amylase (b) Bile juice
(c) Pepsin (d) Lipase

Ans : (c) Pepsin

Proteins present in food are converted to peptones with the help of pepsin enzyme. It is secreted by gastric glands found in stomach wall.

51. Digestion of food in human starts from:
(a) Duodenum (b) Small intestine
(c) Mouth (d) Large intestine

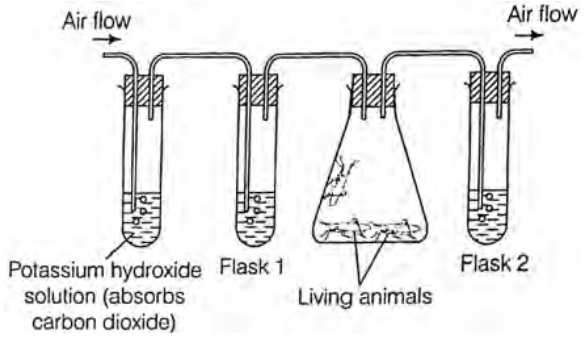
Ans : (c) Mouth

52. Which one indicates hypertension or high Blood Pressure (BP)?
(a) 120/80 (b) 110/70
(c) 130/80 (d) 140/90

Ans : (d) 140/90

Person having blood pressure 140/90, shows hypertension or high blood pressure. The normal blood pressure for humans is 120/80.

53. An experiment is set up as shown. Flasks 1 and 2 contain lime water. Air is pumped through the flasks.



What is the appearance of lime water in flasks 1 and 2 after a period of ten minutes?

	Flask 1	Flask 2
(a)	Clear	Clear
(b)	Clear	White/Cloudy
(c)	White/Cloudy	Clear
(d)	White/Cloudy	White/Cloudy

Ans : (b)

Living animals respire and produce carbon dioxide which causes lime water in flask 2 to become milky white. Potassium hydroxide solution in flask 1 absorb carbon dioxide but remains clear.

54. Flame cells are the excretory structures in
(a) arthropods (b) platyhelminths
(c) anneelids (d) crustaceans

Ans : (b) platyhelminths

Flame cells are the excretory organs of organisms belonging to phylum Platyhelminthes.

55. Dialysing unit (artificial kidney) contains a fluid which is almost same as plasma except that is has
(a) high glucose (b) high urea
(c) no urea (d) high uric acid

Ans : (c) no urea

The dialysing fluid has the same composition as that of blood plasma except that it is devoid of nitrogenous waste such as urea.

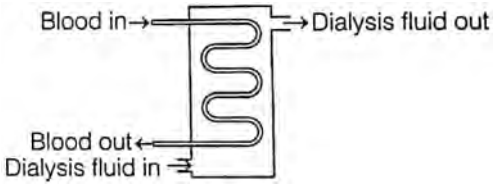
56. The movement of water and dissolved minerals from the roots of the leaves is best explained by:
(a) Cohesion-tension theory
(b) Translocation
(c) Tensile strength
(d) Pressure-flow hypothesis

Ans : (a) Cohesion-tension theory

57. Which of the following is not a component of plasma?
(a) water (b) globulins
(c) fibrinogen (d) platelets

Ans : (d) platelets

58. Figure given below is representing the dialysis machine for removing nitrogenous wastes in patient with a kidney failure.



which substances out of the following in the dialysis fluid should be at a lower concentration than in the blood of patient?
(a) Glucose and urea
(b) Glucose and amino acids
(c) Salts and urea
(d) Glucose and salts

Ans : (c) Salts and urea

The dialysis fluid contains glucose, water, ions and various substances in the same concentration as the blood except urea and excess salts, which have low concentration in the dialysis fluid when compared to blood. Urea is a nitrogenous waste to be removed from the body along with the excess salts

59. Veins can be differentiated from arteries because the veins:
(a) have valves (b) have hard walls
(c) have pure blood in them (d) have thick walls

Ans : (a) have valves

60. Most often during a kidney disorder, the colour of urine changes from yellow to others. A patient is secreting dark colured urine which turns to blue or black later. This is due to the presence of which of the following?
(a) Homogentisic acid (b) Methaemoglobin
(c) Coproporphyrin (d) Both (a) and (b)

Ans : (a) Homogentisic acid

The build up of homogenetisic acid in body occurs due to a rare genetic disorder i.e. Alkaptonuria. This causes the urine to run dark blue or black when exposed to air.

61. Main excretory organ of humans is
(a) kidney (b) lungs
(c) skin (d) liver

Ans : (a) kidney

Kidney is the main excretory organ of human beings, while other act as accessory excretory organs.

62. Which of the following is used in manufacturing of varnishes, glazing agents, etc?
(a) Tannin (b) Resins
(c) Essential oil (d) Rubber

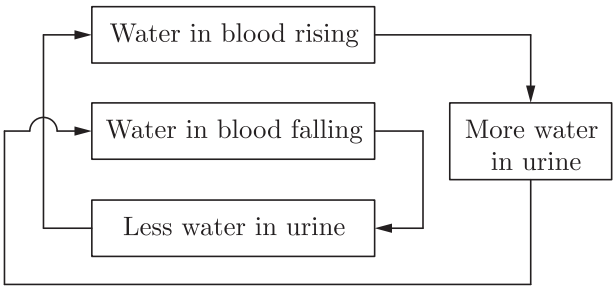
Ans : (b) Resins

Resins are used in manufacturing of varnishes, glazing agents, etc.

63. In amoeba the digestion is intracellular because:
(a) Amoeba is unicellular
(b) Amoeba is multicellular
(c) Amoeba is found in a pond
(d) Amoeba is a microscopic animal

Ans : (a) Amoeba is unicellular

64. Observe the figure given below which represents the control of water concentration in the blood.



This is negative feedback system because
(a) It decreases the amount of water in the blood
(b) It increases any change occurring in the amount of water in the blood
(c) It reverses any change occurring in the amount of water in the blood
(d) It increases the amount of water in the blood

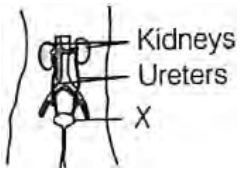
Ans : (c) It reverses any change occurring in the amount of water in the blood

The figure represents negative feedback control of water concentration in the blood. This system regulates any change that occurs in water concentration of the blood through feedback mechanism.

65. What is the term used when vessels open and let more blood through?
(a) Vasoconstriction (b) Vasodilatation
(c) Increased permeability (d) None of these

Ans : (b) Vasodilatation

66. The diagram given along side shows the human excretory system. Identify the function of part labelled as X.



(a) To excrete urea (b) To produce urea
(c) To produce urine (d) To store urine

Ans : (d) To store urine

'X' given in the diagram is the part of human excretory system called urinary bladder. Its main function is to store urine temporarily until it passed out through urethra.

67. Example(s) of liquid waste product in plants is/are
(a) rubber (b) clove oil
(c) gum (d) All of these

Ans : (d) All of these

All of these given options are examples of liquid waste products in plants.

68. A healthy woman consumes a litre of water at once.
1. How will be the internal environment of her body affected by this?
2. A corrective measure to bring the arising condition to normal state is.

Select the correct option for (i) and (ii) from those given below:

	(i)	(ii)
(a)	Plasma becomes diluted	Concentration of the urine formed.
(b)	Osmotic pressure of the plasma decreases	Increase in the volume of urine formed.
(c)	The body cells undergo shrinkage	Less water is reabsorbed by the kidneys.
(d)	Osmotic pressure of the plama increases	Formation of dilute urine occurs.

Ans : (b) (i)-Osmotic pressure of the plasma decreases, (ii)- Increase in the volume of urine formed.

When a healthy person consumes very little water, the osmotic pressure of the plasma will decrease due to increased amount of water. As a result, the body will increase the volume of urine formation. The woman would thus, have to urinate frequently.

69. The breakdown of pyruvate to give carbon-di-oxide, water and energy takes place in:
(a) cytoplasm (b) mitochondria
(c) chloroplast (d) nucleus

Ans : (b) mitochondria

70. Digestion of starch starts from:
(a) Stomach (b) Intestine

(c) Oesophagus (d) Mouth

Ans : (d) Mouth

71. The process of transpiration in plants helps in:
(a) Opening of stomata
(b) Absorption of CO_2 from atmosphere
(c) Upward conduction of water and minerals
(d) Absorption of O_2 from atmosphere

Ans : (c) Upward conduction of water and minerals

72. Root cap has no role in water absorption because:
(a) It has no direct connection with the vascular system
(b) It has no cells containing chloroplasts
(c) It has no root hairs
(d) It has loosely arranged cells.

Ans : (c) It has no root hairs

73. Which substances will be present in the glomerular filtrate from the kidneys of a mammal?

	Glucose	**Protein**	**Salts**
(a)	✓	✓	×
(b)	×	✓	✓
(c)	✓	×	✓
(d)	×	×	✓

Key ✓ = present, × = absent

Ans : (c)

In mammals, the glomerular filterate will consist of glucose and salts by the filteration of blood plasma. The proteins are not present in glomerular filterate because they are relatively larger in physical size.

2. FILL IN THE BLANK

1. In human, the right lung is ..... lobed.

Ans : 3

2. Carbonic anchydrase regulates the formation of .....

Ans : bicarbonates

3. Principal waste product of metabolism in humans is .....

Ans : Water

4. ..... valve separates the left atrium from the left ventricle.

Ans : tricuspid

5. Energy rich compound generated during photosynthesis is ..... .

Ans : ATP

6. Ninety percent of the water lost by the plants during transpiration is through the ..... of the leaf.

Ans : stomata

7. Blood circulation in humans is called ..... circulation.

Ans : double

8. Pressure in the arteries during ventricular relaxation is called ..... pressure.

Ans : diastolic

9. ..... are regarded as complete photosynthetic units of plants.

Ans : Chloroplasts

10. Starch changes blue in ..... solution.

Ans : iodine

11. ..... are the lymphatic capillaries arising from the small intestine.

Ans : lacteals

12. ..... are fat soluble vitamins.

Ans : Vitamin A, D, E and K

13. Two ..... are present on both sides of the stomata.

Ans : gard cells

14. Largest digestive gland in the human body is ..... .

Ans : liver

15. The structural and functional units of lungs is ..... .

Ans : alveoli

16. The ..... prevents the entry of food into the respiratory tract.

Ans : epiglottis

17. ..... (of bile juice) help in emulsification of fats.

Ans : Bile salts

18. In ..... , waste is removed by diffusion.

Ans : kidney

19. Synthesis of ATP using light energy in photosynthesis is ..... .

Ans : photophosphorylation

20. Diffusion is insufficient to meet ..... requirement of multicellular organisms like humans.

Ans : oxygen

21. ..... node is present near the opening of superior and inferior vena cavae.

Ans : Sinu-auricular

22. A plant pigment known as ..... is involved in the phenomenon of photoperiodism.

Ans : phytochrome

23. Man is ..... in nutrition.

Ans : heterotrophic

24. ..... involves the intake of complex material prepared by other organisms.
Ans : Heterotrophic

25. Contraction of heart is known as .....
Ans : systole

26. The major function of the ..... blood cells is to transport oxygen.
Ans : red

27. The semiliquid mixture of partially digested food found in the stomach is called ..... .
Ans : chyme

28. The functional unit of the mammalian kidney is the ..... .
Ans : nephron

29. ..... are the solid bodies in fruits in which waste is stored.
Ans : raphides

30. ..... veins pour their ..... blood into left atrium.
Ans : Pulmonary, oxygenated

31. Glomerulus occurs in ..... capsule.
Ans : Bowman's

32. Kidney eliminate the excretory waste materials as their aqueous solution, called ..... .
Ans : urine

33. ..... secretes bile and cholesterol.
Ans : liver

34. ..... movements occur along the gut.
Ans : Peristaltic

35. Second heart sound heard as ..... is due to closure of ..... valves at the beginning of ventricular diastole.
Ans : Dup/Dubb, semilunar

36. The thin double-walled sac enclosing the heart is called .....
Ans : pericardium

37. Rings of ..... present in trachea, bronchi and bronchioles prevent their collapse when air is not passing through them.
Ans : cartilage

3. TRUE/FALSE

1. Fermentation is a form of aerobic respiration.
Ans : False

2. The lacteals contain absorbed carbohydrates.
Ans : False

3. Teeth are the only part of the digestive system that physically breaks down food.
Ans : False

4. The loss of water by a plant is called transpiration.
Ans : True

5. Blood is not a tissue because it is a fluid.
Ans : False

6. Bowman's capsule is found in heart.
Ans : False

7. Arteries are the widest blood vessels.
Ans : True

8. Birds and mammals have tow-chambered heart.
Ans : False

9. Grass-eating animals need a longer small intestine to allow the cellulose to be digested.
Ans : True

10. Only animals have tissues.
Ans : False

11. Some organs are used in more than one system.
Ans : True

12. Fishes respire through skin.
Ans : False

13. Translocation is the transportation of the products of photosynthesis.
Ans : True

14. Essential amino acids cannot be synthesized in human body.
Ans : True

15. Stretching of inner wall of guard cells, open the stomata.
Ans : True

16. The systems in an organism work independently.
Ans : False

17. Veins are thick walled.
Ans : False

18. Respiration is the only source of energy for all organisms.
Ans : False

19. Carbon-di-oxide cannot be transported with

haemoglobin.
Ans : False

20. In a general sense, digestion is simply hydrolysis of complex polymers to monomers.
Ans : True

21. Leucocytes play an important role in blood coagulation.
Ans : False

22. Circulatory system also performs the function of homeostasis.
Ans : True

23. In humans, protein digestion is completed in the mouth.
Ans : False

24. Only the multicellular organisms require transporting mechanisms.
Ans : False

25. External respiration may be called breathing.
Ans : True

26. The exchange of nutrients and waste products between the blood and cells occurs within the arteries.
Ans : False

27. In humans, the alveoli are the functioning units of external respiration.
Ans : True

28. Trypsin digests proteins into amino acids.
Ans : False

29. Living organisms must maintain a constant internal environment.
Ans : True

30. Deficiency of folic acid causes scurvy.
Ans : False

31. A complete digestive tract consists of an oral and an anal opening.
Ans : True

32. Stomata are tiny pores present on the surface of leaves.
Ans : True

33. The liquid portion of the blood is called plasma.
Ans : True

34. Generally gravitational water is utilized by the plants.
Ans : False

35. Humans have an open circulatory system.
Ans : False

36. In photosynthesis, carbon-di-oxide is given out by diffusion process.
Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Nutrition	(p)	The increase in cell size and/or number
(B)	Synthesis	(q)	The movement of materials within the cell or within the organism.
(C)	Growth	(r)	The process of obtaining food
(D)	Transport	(s)	Combining small molecules to create larger more complex molecules.

Ans : A-r, B-s, C-p, D-q

2.

Column I		Column II	
(A)	Regulation	(p)	The removal of metabolic waste from an organism
(B)	Reproduction	(q)	The chemical process of oxidizing organic molecules to release energy.
(C)	Respiration	(r)	Ther replication of an organism
(D)	Excretion	(s)	The control and coordination of chemical processes within the organism

Ans : A-s, B-r, C-q, D-p

3.

Column I	Column II

(A)	Stomach	(p)	The structure is the site where the chemical breakdown of proteins first occurs.
(B)	Large intestine	(q)	This organ absorbs most of the water from the undigested food.
(C)	Small intestine	(r)	This organ is the section of the alimentary canal where most of the food is absorbed into the blood.
(D)	Excretion	(s)	This organ secretes the chemical bile, which is used to emulsify fats.

Ans : A-p, B-q, C-r, D-s

4.

Column I		Column II	
(A)	Pancreas	(p)	This organ secretes the chemical enzymes amylase, protease and lipase.
(B)	Rectum	(q)	This is a storage site for faces before being egested from the body.
(C)	Oesophagus	(r)	This tube structure transports food from the oral cavity to the stomach.
(D)	Oral cavity	(s)	The structure where mechanical digestion of food first occurs.

Ans : A-p, B-q, C-r, D-s

5.

Column I (Animal)		Column II (Respiratory Organ)	
(A)	Fish	(p)	Trachea
(B)	Birds	(q)	Gills
(C)	Aquatic	(r)	Lungs
(D)	Earthworm	(s)	Moist cuticle

Ans : A-q, B-r, C-p, D-s

6.

Column I (Region of digestive system)		Column II (Digestive Organ)	
(A)	Mouth	(p)	Pancreatic juice
(B)	Stomach	(q)	Intestinal juice
(C)	Duodenum	(r)	Gastric juice
(D)	Small intestine	(s)	Saliva

Ans : A-s, B-r, C-p, D-q

7.

Column I		Column II	
(A)	Autotrophic	(p)	Leech
(B)	Hetetrophic nutrition	(q)	Paramaecium
(C)	Parasitic nutritrion	(r)	Deer
(D)	Digestion in food vaculoes	(s)	Green plant

Ans : A-s, B-r, C-p, D-q

8.

	Column I		Column II
(A)	Phloem	(p)	Excretion
(B)	Nephron	(q)	Translocation of food
(C)	Veins	(r)	Clotting of blood
(D)	Platelets	(s)	Deoxygenated blood

Ans : A-(q), B-(p), C-(s), D-(r)

5. ASSERTION AND REASON

DIRECTION : The following question consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(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.

(e) Both Assertion and Reason are false.

1. **Assertion :** in the daytime, CO_2 generated during respiration is used up for photosynthesis.
Reason : There is no CO_2 release during day.

Ans : (a) Both A and R are true and R is the correct explanation of A

In night, dark reaction of photosynthesis occurs, in which the products of light reaction, i.e. CO_2, ATP, NADPH and H_2O are utilised. CO_2 is reduced for the production of carbohydrates.

2. **Assertion :** Raw materials needed for photosynthesis are carbon dioxide, water and minerals.
Reason : Nutrients provide energy to an organism.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

Raw materials needed for photosynthesis are carbon dioxide, water and minerals like nitrogen, phosphorus, iron and magnesium.

Nutrients are the substances required for proper growth and maintenance of a living body but they provide energy to an organism.

Hence, both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

3. **Assertion :** Lungs always contain a residual volume of air.
Reason : It provides sufficient time for oxygen to be absorbed and for carbon dioxide to be released.
Ans : (a) Both A and R are true and R is the correct explanation of A.

During the breathing cycle, when air is taken in and let out, the lungs always contain a residual volume of air. It provides sufficient time for oxygen to be absorbed and for carbon dioxide to be released.

Both Reason and Assertion are true and Reason is the correct explanation of Assertion.

4. **Assertion :** Transpiration is a necessary evil.
Reason : It causes water loss but helps in absorption and upward movement of water and minerals.
Ans : (a) Both A and R are true and R is the correct explanation of A.

Transpiration is a necessary evil. It is so because water is lost in the form of vapours from the aerial parts of the plant through transpiration. But, it helps in absorption and upward movement of water and minerals creating transpiration pull.

5. **Assertion :** Translocation of sugar occurs through the phloem.
Reason : It is achieved by diffusion of sugars through phloem.
Ans : (c) A is true but R is false.

The transport or movement of soluble products (sugar) of photosynthesis from leaves to other parts of the plant is termed as translocation. It occurs in the part of vascular tissue known as phloem. The tanslocation in phloem is mainly achieved by utilising energy by expenditure of ATP.

Assertion is true, but Reason is false.

6. **Assertion :** Digestion breaks large complex molecules to simple smaller molecules which can be easily absorbed.
Reason : Digestion is necessary for the absorption of all molecules.
Ans : (c) A is true but R is false.

Digestion breaks large complex organic molecules to simple smaller ones which can be easily absorbed. However, certain molecules such as glucose, vitamin C etc, do not need any digestion before their absorption.

7. **Assertion :** Energy is used during the process of respiration.
Reason : Respiration stores energy in the form of ATP.
Ans : (d) A is false but R is true.

Respiration involves the oxidation of glucose inside the mitochondria to produce energy, which is stored in the high energy bonds of ATP molecules as biologically useful energy.

8. **Assertion :** During physiology of excretion, deamination does not take place in liver.
Reason : Deamination is a process to make use of excess of amino acids which cannot be incorporated into protoplasm.
Ans : (d) A is false but R is true.

9. **Assertion :** Egestion is the removal of nitrogenous waste products from the body.
Reason : Excretion is the discharge of undigested matter from the digestive tract.
Ans : (e) Both Assertion and Reason are false.

Egesstion is the discharge of undigested matter from the digestive tract *via* anus. While, excretion is the removal of nitrogenous waste products from the body. Thus, both Assertion and Reason are false.

10. **Assertion :** The muscular walls of ventricles are thicker than auricles.
Reason : This helps in preventing the back flow of blood.
Ans : (c) A is true but R is false.

Since ventricles have to pump blood into various organs, they have thicker muscular walls than atria do. Valves prevent back flow of blood.

11. **Assertion :** In human heart, there is no mixing of oxygenated and deoxygenated blood.
Reason : Valves are present in the heart which allows the movement of blood in one direction only.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

There is no mixing of oxygenated and deoxygenated blood due to presence of inter-auricular and inter-ventricular septum. On the other hand, valves are present in the heart which allows the movement of blood in one direction only.

12. **Assertion :** In woody plants, gaseous exchange occurs through lenticels.
Reason : Lenticels are specialised cells found along with stomata on the stem of woody plants.
Ans : (c) A is true but R is false.

In woody plants, gaseous exchange occurs through the small pores found on stems called lenticels. Stomata on the stem aid in gaseous exchange, in herbaceous plants.

Assertion is true, but Reason is false.

13. **Assertion :** Excretory unit of kidney is nephrons.
Reason : It has no role in secretion of urine.
Ans : (c) A is true but R is false.

Nephrons are the basic filtration unit of kidneys. They carry out filtration, selective reabsorption and tubular secretion to from urine in kidney, which is then passed out through the urethra, via the ureters and urinary bladder.

14. **Assertion :** Muscles of stomach wall possess thick layers of muscles.
Reason : These muscles help in mixing the food with the enzymes presents in the alimentary canal.
Ans : (a) Both A and R are true and R is the correct explanation of A.

The lining of alimentary canal has muscles that contract rhythmically in order to push the food forward. This is known as peristaltic movement.

15. **Assertion :** Artificial kidney is a device used to remove nitrogenous waste products from the blood through dialysis.
Reason : Reabsorption does not occur in artificial kidney.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

Kidney failure can be managed by artificial kidney. It is a device used to remove nitrogenous waste products from the blood through dialysis.

Artificial kidney is different from natural kidney as the process of reabsorption does not occur in artificial kidney.

Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

16. **Assertion :** Respiration is a biochemical process opposite to photosynthesis.
Reason : Energy is released during respiration.
Ans : (a) Both A and R are true and R is the correct explanation of A.

Respiration is defined as the process of biochemical oxidation of nutrients at cellular level. It occurs in the presence of specific enzymes at optimum temperature in the cells to release energy for various metabolic activities.

Both Reason and Assertion are true and Reason is the correct explanation of Assertion.

17. **Assertion :** The release of energy in aerobic process is much more than in anaerobic process.
Reason : Each glucose molecule produces 2 molecules of ATP and 38 molecules of ATP in aerobic and anaerobic respiration, respectively.
Ans : (c) A is true but R is false.

In aerobic process, 38 molecules of ATP released per one glucose molecule is much more than the 2 molecules of ATP per one glucose molecule in anaerobic process.

Assertion is true, but Reason is false.

18. **Assertion :** In plants there is no need of specialised respiratory organs.
Reason : Plants do not have great demands of gaseous exchange.
Ans : (a) Both A and R are true and R is the correct explanation of A.

19. **Assertion :** Plants have low energy needs.
Reason : Plant bodies have large proportion of dead cells.
Ans : (a) Both A and R are true and R is the correct explanation of A.

Because plants have a large proportion of dead cells in many tissues. So, their energy needs are low and they can afford to have slow transport system.

20. **Assertion :** Walls of the intestine has numerous villi.
Reason : These villi increase the surface area of digestion.
Ans : (c) A is true but R is false.

All the digested food is taken up by the walls of intestine, which has numerous villi. These increase the surface area of absorption. Assertion is true, but Reason is false.

21. **Assertion :** Mitochondria help in photosynthesis.
Reason : Mitochondria have enzymes for dark reaction.
Ans : (d) A is false but R is true.

22. **Assertion :** Blood pressure is arterial blood pressure.
Reason : It is measured by sphygmomanometer.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

23. **Assertion :** Lymph, also known as tissue fluid is colourless.
Reason : It lackes erythrocytes.
Ans : (a) Both A and R are true and R is the correct explanation of A.

Lymph is similar to plasma of blood but is colourless due to lack of erythrocytes.

Erythrocytes contain haemoglobin, which imparts red colour to blood. Due to its absence, lymph is colourless.

24. **Assertion :** The main organ of human excretory system is kidney.
Reason : Kidneys perform the function of removing excess water and nitrogenous wastes from the body.
Ans : (a) Both A and R are true and R is the correct explanation of A.

The main organ of human excretory system is kidney. The major function performed by kidneys is to remove excess water and nitrogenous wastes from blood in the form of urine.

Thus, both Assertion and Reason are true and Reason is the correct explanation of Assertion.

25. **Assertion :** Lipases help in emulsification of fats.
Reason : Lipases hydrolyses fats and oils.
Ans : (d) A is false but R is true.

Bile helps in emulsification of fats whereas lipases are the enzymes which hydrolyze fats and oils.

26. **Assertion :** Humans are not truly aerobic.
Reason : They produce lactic acid nanerobically.

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

Human are aerobically respiring animals, but sometimes anaerobic respiration takes place in certain tissues like skeletal muscles, which do not get immediately as much oxygen as it requires. Therefore, the muscles respire anaerobically and produce lactic acid from glucose.

27. **Assertion :** Photorespiration decreases net photosynthesis.
Reason : Rate of respiration in dark and light is almost same in all plants.
Ans : (d) A is false but R is true.

28. **Assertion :** HCl converts pepsinogen into active enzyme pepsin.
Reason : Pepsin converts protein into proteoses and peptones.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

HCl creates an acidic medium, which facilitates the action of the enzyme pepsin. The active enzyme pepsin converts proteins into proteoses and peptones.

29. **Assertion :** Autotrophic nutrition occurs in green plants.
Reason : Green plants self-manufacture their
Ans : (a) Both A and R are true and R is the correct explanation of A.

Autotrophic nutrition occurs in green plants. Food is self-manufactured by them using CO_2, light energy trapped by chlorophyll and water as raw materials.

Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

30. **Assertion :** Haemoglobin is the respiratory pigment in human beings.
Reason : It transports oxygen in the human body.
Ans : (a) Both A and R are true and R is the correct explanation of A.

Haemoglobin is the respiratory pigment in human beings. It takes up oxygen from the air in the lungs and carries it to tissues.

Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

31. **Assertion :** Interauricular septum separates left from right atrium.
Reason : Interventricular septum separates left from right ventricle.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

There are four chambers of the heart. The left and right atria are separated by an interauricular septum. The two inferior chambers of the heart, i.e., right and left ventricles are separated by an interventricular septum.

32. **Assertion :** Blood of insects is colourless.
Reason : The blood of insect does not play any role in transport of oxygen.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

33. **Assertion :** All the arteries carry oxygenated blood from the heart to various organs.
Reason : Pulmonary vein carries deoxygenated blood to the heart.
Ans : (e) Both Assertion and Reason are false.

The arteries carry oxygenated blood from the heart to various organs, except pulmonary artery.

The veins collect deoxygenated blood from different organs and bring back to the heart, except pulmonary vein.

Both Assertion and Reason are false.

34. **Assertion :** Human body produces highly toxic substances, which if not eliminated may cause the death.
Reason : Excretory substance removes nitrogenous waste from the body.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

The biological process which involves the removal of harmful metabolic wastes from the body is called excretion. If these harmful wastes are not removed from the body, then it may cause the death of the organisms.

35. **Assertion :** Amoeba is an omnivore organism.
Reason : Lion is a carnivore organism.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

Amoeba is an omnivore organism, its mode of nutrition is holozoic. Lion is a carnivore organism because it eats other animals (meat eaters). Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

36. **Assertion :** Liver is known as the smallest gland of the body.
Reason : It secretes salivary amylase.
Ans : (e) Both Assertion and Reason are false.

Liver is known as the largest gland of the body, which secretes bile juice. Salivary galnds secrete salivary amylase. Both Assertion and Reason are false.

37. **Assertion :** Carbohydrate digestion mainly takes place in small intestine.
Reason : Pancreatic juice contains the enzyme lactase.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

38. **Assertion :** Valves are present in the arteries.
Reason : Arteries carry oxygenated blood from heart to different body parts except pulmonary artery.
Ans : (d) A is false but R is true.

Valves are absent in arteries, whereas it is present in veins, which prevent back flow of blood.

39. **Assertion :** Plants lack excretory organs.
Reason : Plants usually absorb essential nutrients.

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

40. **Assertion :** Haemodialysis can save the life of patients with kidney failure.
Reason : Waste products like urea can be removed from the blood by haemodialysis.
Ans : (a) Both A and R are true and R is the correct explanation of A.

In case of kidney failure, haemodialysis is the process of purifying blood (or removing waste products like urea) by an artificial kidney. This can save the life of the patient.

41. **Assertion :** In humans, major amount of water is absorbed by the tubular part of nephron.
Reason : Absorption of water depends on the dissolved waste to be excreted from the body.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

Major amount of water is selectively reabsorbed by the tubular part of nephron in humans. It depends on the amount of excess water present in the body and dissolved waste to be excreted from the body.

42. **Assertion :** Photosynthesis is an anabolic process.
Reason : The process of photosynthesis occurs in chlorophyll.
Ans : (c) A is true but R is false.

Photosynthesis is an anabolic process as it takes CO_2 and H_2O then assembles them into glucose. The process of photosynthesis occurs in chloroplast.

43. **Assertion :** In humans, there is a complex respiratory system.
Reason : Human skin is impermeable to gases.
Ans : (b) Both A and R are true but R is not the correct explanation of A.

Humans need more oxygen to maintain their high metabolic rates. Thus, a complex respiratory system has evolved so as to meet this need.

44. **Assertion :** Alveoli contain an extensive network of blood vessels.
Reason : Alveoli is the site where exchange of gases occurs.
Ans : (a) Both A and R are true and R is the correct explanation of A.

The alveoli of lungs are richly supplied with blood and are the sites where exchange of gases $(O_2$ and $CO_2)$ occurs between blood and atmosphere.

45. **Assertion :** Excretion is the biological process by which harmful wastes are removed from an organism's body.
Reason : The mode of excretion is completely same in both unicellular and multicellular organisms.
Ans : (c) A is true but R is false.

Excretion is the biological process by which harmful metabolic wastes are removed from the body. The mode of excretion is completely different in unicellular organisms. In unicellular organisms, waste products are diffused into surrounding water through body surface. While, in multicellular organisms, specialised organs perform the function of excretion. Thus, Assertion is true, but Reason is false.

46. **Assertion :** Plants excrete various waste products during their life processes.
Reason : They produce urea just like humans.
Ans : (c) A is true but R is false.

Like human beings and other organisms, plants also excrete various waste products during their life processes. The waste products include gums, CO_2, O_2, resins, rubber, etc.

Urea is produced in humans liver and excreted in the form of urine through urethra. Plants do not produce urea.

Thus, Assertion is true, but Reason is false.

47. **Assertion :** In anaerobic respiration, one of the end product is alcohol.
Reason : There is an incomplete breakdown of glucose.
Ans : (a) Both A and R are true and R is the correct explanation of A.

48. **Assertion :** Bile is essential for digestion of lipids.
Reason : Bile juice contains enzymes.
Ans : (c) A is true but R is false.

CHAPTER 7

Control and Coordination

1. OBJECTIVE QUESTIONS

1. Cytokinins are known to:
(a) inhibit cytoplasmic movement
(b) help in retention of chlorophyll
(c) influence water movement
(d) promote abscission layer formation

Ans : (b) help in retention of chlorophyll

2. Brain stem is formed by the union of:
(a) optic lobes
(b) cerebellum with optic lobes
(c) corpora striata
(d) none of the above

Ans : (d) none of the above

3. The pineal body is considered as:
(a) an endocrine gland
(b) an organ concerned with voluntary actions
(c) an organ concerned with vision
(d) a vestige of third eye and endocrine gland

Ans : (d) a vestige of third eye and endocrine gland

4. Autonomic nervous system control:
(a) reflex action (b) sense organs
(c) internal organs (d) skeletal muscle

Ans : (c) internal organs

5. Which of the following acts both as Endocrine (ductless) and Exocrine (with duct) gland?
(a) pancreas (b) liver
(c) adrenal (d) kidney

Ans : (a) pancreas

6. Which part of the human brain controls body temperature?
(a) Pituitary (b) Diencephalon
(c) Hypothalamus (d) None of these

Ans : (c) Hypothalamus

Hypothalamus controls and regulates temperature of body, urge of eating, drinking. sleeping, etc.

7. Coordination via the nervous system tends to differ from that produced by the endocrine system because the nervous system:
(a) is quick, precise and localized
(b) is slower and more pervasive
(c) does not require conscious activity
(d) has long-lasting effects

Ans : (a) is quick, precise and localized

8. Growth of pollen tube towards ovule during fertilisation is an example of
(a) phototropism (b) geotropism
(c) chemotropism (d) hydrotropism

Ans : (c) chemotropism

Growth of pollen tube towards ovule during. fertilisation is an example of chemotropism.

9. Which part of the human brain is most well-developed?
(a) Forebrain (b) Hindbrain
(c) Diencephalon (d) None of these

Ans : (a) Forebrain

Forebrain or cerebrum is the most well-developed part of the human brain.

10. An action potential traveling along an axon:
(a) moves rapidly in both directions.
(b) moves faster than a neurotransmitter.
(c) is slowed by myelin.
(d) travels through the blood.

Ans : (b) moves faster than a neurotransmitter.

11. Which of the following comments applies to the brains of most animals?
(a) Within the brain, neurons exchange information with one another.
(b) Brains usually lie as near as possible to the important sensory structures in an animal.
(c) Brains send action potentials to the hindmost portion of the animal by means of major nerves.

(d) All of the above

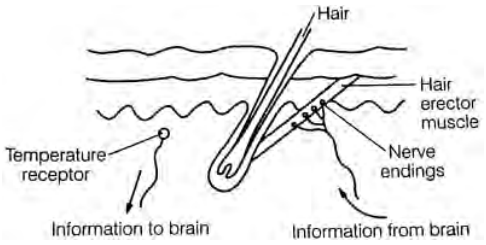
Ans : (d) All of the above

12. Female sex hormone is termed as
(a) androgen (b) insulin
(c) oestrogen (d) None of these

Ans : (c) oestrogen

Oestrogen is a female sex hormone.

13. The given diagram shows some of the features of human skin.

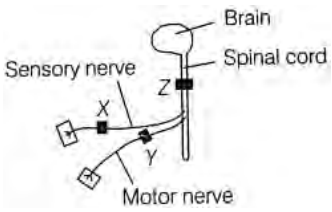


which part of the brain coordinates the information labelled in the diagram?
(a) Medulla (b) Hypothalamus
(c) Cerebrum (d) Cerebellum

Ans : (b) Hypothalamus

Hypothalamus is responsible for the regulation of body temperature and osmotic pressure in blood. It uses the negative feedback control mechanism. The hypothalamus acts like a thermostat by sending the changes in body temperature. It sends out signals to different body parts with mechanisms to control and adjust the temperature.

14. The diagram shows the central nervous system, which has been blocked in three different places by a drug used as an anaesthetic.

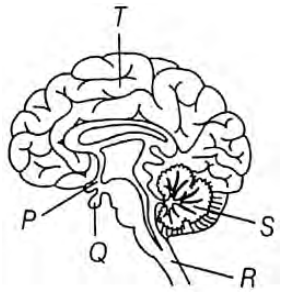


Three men had on anaesthetic block at X, Y or Z One of the men can move his leg in response to a pinprick, but does not feel it. Where is the anaesthetic block in this man?
(a) At X (b) At Y
(c) At Z (d) No block

Ans : (c) At Z

Response to a pin prick is a reflex action, but the pain is felt by brain. Hence the block at Z stops feeling in the brain.

15. Observe the figure given below. In the figure, some parts are labelled as P, Q, R, S and T. Given below are functions associated with these parts.



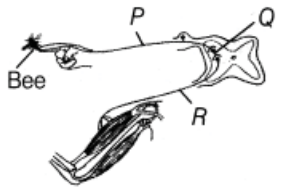
Parts of brain	Functions
P	Master hormone producers
Q	Controls body temperature
R	Controls unconscious activities
S	Helps to control balance
T	In conscious behaviour

which part of the brain is matched with incorrect function?
(a) P and S (b) P, Q and T
(c) R and T (d) P, R and T

Ans : (b) P, Q and T

Part P (hypothalamus) controls body temperature. Part Q (pituitary) is the master hormone producer. Part T helps in memory storage and conscious behaviour.

16. The diagram shows a reflex arc in which a bee sting causes the arm to be moved quickly.



If the relay neurone is damaged, how will the transmission of nerve impulses in the reflex arc be affected?
(a) Impulses cannot pass from $P - Q$
(b) Impulses cannot pass from $P - R$
(c) Impulses cannot pass from $Q - P$
(d) Impulses cannot pass from $R - Q$

Ans : (b) Impulses cannot pass from $P - R$

P is the sensory neurone, Q is relay neurone and R is motor neurone. If Qdamaged, then nerve impulse cannot pass from P to R.

17. Adrenaline hormone is secreted in the body during emergency situations. What would be the effects of

increased concentration of adrenaline on body?

	Concentration of glycongen in the liver	Concentration of glucose in the blood
(a)	Decrease	Increase
(b)	Increase	Increase
(c)	No effect	Decrease
(d)	Increase	No effect

Ans : (a)

Adrenaline is secreted by body during fight or flight response. It increases the blood glucose level. This happens by increasing the rate of breakdown of glycogen to glucose in the liver and muscles.

18. A child is frightened by a loud noise and shouts for help. In which order, the different types of neurons involved will act?

(a) Motor neurone ⟶ Relay neurone ⟶ Sensory neurone

(b) Motor neurone ⟶ Sensory neurone ⟶ Relay neurone

(c) Sensory neurone ⟶ Motor neurone ⟶ Relay neurone

(d) Sensory neurone ⟶ Relay neurone ⟶ Motor neurone

Ans : (d) Sensory neurone ⟶ Relay neurone ⟶ Motor neurone

The sensory neurone transmits impulses produced by a stimulus detected by the sensory organ to the spinal cord. The relay neurone helps to transfer these impulses to the motor neurone.

The motor neurone transmits the impulses in receives to an appropriate effector. This produces the required response to the stimulus.

19. Following are certain reflex actions occurring in our body.

1. Moving to the side of road when a speeding car approaches.
2. Closing of eyes in response to a sudden bright light.
3. Shouting when we are suddenly disturbed or get scared
4. Withdrawing hands on touching a hot surface. The reflex arc given below, will be occurring for,
5. Receptors (sense organs) $\xrightarrow[\text{neurons}]{\text{Sensory}}$ Spinal cord $\xrightarrow[\text{neurons}]{\text{Motor}}$ Targets/effectors.

(a) 1 and 2 (b) 1, 2 and 3

(c) 1, 2, 3 and 4 (d) 2 and 4

Ans : (c) 1, 2, 3 and 4

The reflex arc occurring is common to all these responses. The stimulus is received by sense organs and sent through sensory neurons to spinal cord. The information is processed and forwarded *via* motor neurone to effector organs.

20. In comparison with other cells, nerve cells show a higher degree of:

(a) Metabolism (b) Growth

(c) Contractility (d) Irritability

Ans : (d) Irritability

21. The photoreceptor cells of the eye are located in the:

(a) Sclera (b) Iris

(c) Retina (d) Optic nerve

Ans : (c) Retina

22. Which of the following receptors is incorrectly paired with what is senses?

(a) Chemoreceptors-chemicals

(b) Photoreceptors-pain

(c) Thermoreceptors-heat

(d) Nociceptors-pain

Ans : (b) Photoreceptors-pain

23. The role of the axon is to:

(a) integrate signals from the dendrites

(b) release neurotransmitter

(c) conduct the action potential to the synaptic terminal

(d) synthesize cellular components

Ans : (c) conduct the action potential to the synaptic terminal

24. The major hormones involved in the maintenance of blood glucose levels are produced by the:

(a) Liver (b) Pancreas

(c) Spleen (d) Gall bladder

Ans : (b) Pancreas

25. Breathing rate in mammals is controlled by a part of the brain called the:

(a) Thalamus (b) Hypothalamus

(c) Medulla oblongata (d) Cerebellum

Ans : (c) Medulla oblongata

26. The natural plant hormones were first isolated from:

(a) cotton fruits, spinach leaves, rice plant

(b) avena coleoptile, spinach leaves, fungus Gibberella

(c) corn germ oil, human urine

(d) human urine, rice plant

Ans : (b) avena coleoptile, spinach leaves, fungus Gibberella

27. A high concentration of synthetic auxins is generally used for:

(a) weed control

(b) enhancing root initiation

(c) controlling of cell enlargement

(d) preventing the growth of the lateral buds

Ans : (a) weed control

28. In reflex action, the reflex arc is formed by:

(a) brain ⟶ spinal cord ⟶ muscles

(b) receptor ⟶ spinal cord ⟶ muscles
(c) muscles ⟶ receptor ⟶ brain
(d) muscles ⟶ spinal cord ⟶ receptor

Ans : (b) receptor ⟶ spinal cord ⟶ muscles

29. Which controls the balance of human body?
(a) cerebrum (b) cerebellum
(c) optic lobes (d) spinal cord

Ans : (b) cerebellum

30. In our body, calcium and phosphorus ions are controlled by:
(a) thyroid gland (b) pituitary gland
(c) adrenal gland (d) parathyroid gland

Ans : (c) adrenal gland

31. Hormone from thyroid gland is:
(a) thyroxine (b) thyrodine
(c) parathyroxin (d) thyroprotein

Ans : (a) thyroxine

2. FILL IN THE BLANK

1. A feedback mechanism regulates the action of the ..... .
Ans : hormones

2. ..... hormone is applied to cuttings to induce root initiation in horticulture.
Ans : Auxin

3. ..... movements are growth movements of plants in response to a stimulus from a specific direction.
Ans : Tropic

4. Receptors are structures which are able to detect ..... .
Ans : stimuli

5. Neurons that carry information to an effector are called ..... neurons.
Ans : motor

6. A hormone is a chemical secreted by an .....
Ans : endocrine gland

7. The initial depolarization of the nerve cell membrane.
Ans : sodium

8. The ..... of the neuron secretes the neurotransmitter substance.
Ans : axon

9. Touch me not shows ..... movement.
Ans : nastic

10. Temporal lobe of cerebrum is region for ..... reception.
Ans : auditory

11. Motor nerves transmit response from ..... organs to ..... nervous system in the form of impulse.
Ans : sensory, central

12. ..... and ..... show thermonastic movements.
Ans : Tulips, crows

13. The functional junction between two neurons is called ..... .
Ans : synapse

14. The response of a plant to a stimulus of water is called .....
Ans : hydrotropism

15. Coordination in plants take place by means of chemical substance called ..... .
Ans : phytohormone

16. Endocrine glands secrete their secretion in ..... .
Ans : blood

17. Reflex are formed in spinal cord also sends information input to ..... .
Ans : brain

18. ..... coordinates the activity of picking up pencil for writing.
Ans : cerebellum

19. Positive geotropism of root is due to greater growth on ..... side as compared to ..... side.
Ans : upper, lower

20. Human growth hormone regulates the many body processes involved in ..... and .....
Ans : growth, development

21. The hormone which controls the development of male secondary sexual character is called ..... .
Ans : estosterone

22. A ..... mechanism regulates the action of hormones.
Ans : feed back

23. An axon terminal passes the electrical stimulus to a dendrite of next neuron through ..... reaction.
Ans : chemical

24. Hormones are carried by ..... to target organs where they perform a specific function.
Ans : blood stream

25. Sneezing is a ..... .
Ans : reflex action

26. The nervous system uses ..... to transmit messages.
Ans : electrical impulses

27. ..... performs control and coordination in plants.
Ans : Phytohormones

28. ..... promotes senescence and is found in high concentration in ripened fruits.
Ans : thylene

29. Apical dominance - Auxin; reversal of dwarfism .....
Ans : GA

30. If the dark period is interrupted by flashes of light ..... plant will not flower.
Ans : Short day

31. ..... hormone increases heartbeat rate when we get a fright.
Ans : Adrenalin

32. Short day plants come to flower ..... a critical photoperiod.
Ans : Below

33. ..... is the irreversible increase in size, volume or weight of an organ or organism.
Ans : Growth

3. TRUE/FALSE

1. The central nervous system consists of the brain and spinal cord.
Ans : True

2. From a functional perspective, the nervous system provides slow, long-term coordination.
Ans : False

3. All animals have complex nervous systems.
Ans : False

4. One-celled organisms can respond to stimuli.
Ans : True

5. The human brain is the largest of all animals.
Ans : False

6. The main thinking part of brain is hind brain.
Ans : False

7. Functioning of various organs in uniformity is called coordination.
Ans : True

8. The path through which signals are transmitted from a receptor to a muscle or a gland is called reflex arc.
Ans : True

9. Thyroxine regulatres the blood-sugar.
Ans : False

10. Motor neurons carry signals from receptors to spinal cord.
Ans : False

11. Brain is the structural and functional unit of nervous system.
Ans : False

12. Centres of hearing, smell, memory, sight, etc., are located in fore brain.
Ans : True

13. Feeling hunger is a reflex action.
Ans : False

14. Brains can work 24 hours a day with no rest.
Ans : False

15. Immediate response to stimulus is shown as Mimosa pudica.
Ans : True

16. Sensory neurons carry signals from spinal cord to muscles.
Ans : False

17. Portions of your brain are responsible for specific functions.
Ans : True

18. The nervous system is closely associated with every system in your body.
Ans : True

19. Involuntary actions like salivation, vomiting, blood pressure are controlled by the medulla in the hind brain.
Ans : True

20. Cerebellum does not control posture and balance of the body.
Ans : False

21. A neuron transmits electrical impulses not only to another neuron but also to muscle and gland cells.
Ans : True

22. 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.
Ans : True

23. Apical dominance is the function of Auxin.
Ans : True

24. Sugarcane is short day plant.
Ans : True

25. Photoperiodism was first studied by Garner and Allard.
Ans : True

26. Auxin 'b' isolated from corn germ oil.
Ans : True

27. Growth inhibitors are Ethylene and ABA.
Ans : True

28. Blue light effective in phototropism.
Ans : True

29. Mimosa plant showing seismonfastic movement.
Ans : True

30. Bending of Tentacles in Drosera is Thigmonasty.
Ans : True

31. Only the vertebrates have a nervous system.
Ans : False

32. The propagation of a nerve impulse is due to changes in the permeability of the nerve cell membrane that allows for a voltage difference across the membrane.
Ans : True

33. Rise in sugar level in blood stops secretion of insulin by pancreas.
Ans : True

34. Growth hormone is secreted by adrenal gland.
Ans : False

35. Fore-brain is centre of intelligence, control of movements, hearing, smell and sight.
Ans : True

36. Stems are positively geotropic while roots are negatively geotropic.
Ans : False

37. Sudden action in response to something in the environment is called reflex action.
Ans : True

38. Cytokinins are present in greater concentration in young fruits and seeds.
Ans : True

39. Junction between two neurons is called synapse.
Ans : True

40. Spinal cord originates from Cerebellum.
Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Parthenocarpy	(p)	Photoperiodism
(B)	Apical dominance	(q)	Development of seed less fruit
(C)	Extreme cold treatment	(r)	Vernalization
(D)	Response to length of the day	(s)	Auxin

Ans : A-q, B-s, C-r, D-p

2.

Column I		Column II	
(A)	Auxin	(p)	GA_3
(B)	Gibberellin	(q)	IAA
(C)	Cytokinin	(r)	ABA
(D)	Dormin	(s)	Zeatin

Ans : A-q, B-p, C-s, D-r

3.

Column I		Column II	
(A)	Cerebrum	(p)	controls the pituitary
(B)	Cerebellum	(q)	controls vision and hearing
(C)	Hypothalamus	(r)	controls the rate of heart beat
(D)	Midbrain	(s)	seat of intelligence
		(t)	maintains body posture

Ans : A-t, B-t, C-p, D-q

4.

Column I		Column II	
(A)	Hypothalamus	(p)	relaxin
(B)	Anterior pituitary	(q)	estrogen
(C)	Testis	(r)	FSH and LH
(D)	Ovary	(s)	testosterone
		(t)	gonadotropin releasing hormone

Ans : A-t, B-r, C-s, D-q

5.

Column I (Animal)		Column II (Respiratory Organ)	
(A)	Cyton	(p)	The body of the nerve cell that contains the organelles.
(B)	Dendrite	(q)	Receives the stimuli sent from another nerve or the outside environment.
(C)	Axon	(r)	The long, thin section of the nerve cell where the impulse is transmitted across.
(D)	Myelin sheath	(s)	A fatty substance that covers the axon of the nerve cell and speeds.

Ans : A-p, B-q, C-r, D-s

DIRECTION : Match the word in Column A with its related information in Column B.

6.

	Column I		Column II
1.	Dendrite	(a)	the impulse is converted into a chemical signal for onward transmission.
2.	Axon	(b)	blood pressure and vomiting
3.	Nerve endings	(c)	where information is acquired
4.	Fore brain	(d)	walking in a straight line
5.	Cerebellum	(e)	through which information travels as an electrical impulse
6.	Medulla	(f)	hearing and sight

Ans : 1-(c), 2-(a), 3-(e), 4-(f), 5-(d), 6-(b)

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

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

(c) Assertion (A) is true but reason (R) is false.

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

(e) Both Assertion and Reason are false.

1. **Assertion :** Suppression of growth of auxiliary buds is called apical dominance.
Reason : It is due to effect of downward movement of Auxin from apical region towards the lower side.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

2. **Assertion :** Phototropism is a directional growth movement.
Reason : It occurs in the direction of light.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Phototropism is the movement or bending of light towards light. Hence, it is known as directional growth movement.

3. **Assertion :** Plants lack the nervous system, but they do coordinate.
Reason : It is so because of hormones.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Plants lack the nervous system, but coordinate *via* the hormones.

4. **Assertion :** Reflex actions are automatic and repid responses to stimuli.
Reason : These actions are controlled by brain.
Ans : (c) Assertion (A) is true but reason (R) is false.

Reflex actions are automatic and rapid response to stimuli. These actions are controlled by spinal cord, not by brain.

5. **Assertion :** Olfactory receptors detect taste.
Reason : Olfactory receptors are present in cerebellum.
Ans : (e) Both Assertion and Reason are false.

Gustatory receptors detect taste, while olfactory receptors detect smell. Both Assertion and Reason are false.

6. **Assertion :** Cytokinins are present in highest concentration in fruits and seeds.
Reason : Cytokinins are responsible for promoting cell division.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Cytokinins are the hormones, which promote cell division. Highest concentrations of cytokinins occurs in fruit and seeds, i.e., areas of rapid cell division.

7. **Assertion :** Abscisic acid is responsible for wilting of leaves.
Reason : It is a growth inhibitor.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Abscisic acid is responsible for wilting of leaves

because it is a growth inhibitor.

8. **Assertion :** Medulla oblongata causes reflex actions like vomiting, coughing and sneezing.
Reason : It has many nerve cells which control autonomic reflexes.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

9. **Assertion :** Transmission of the nerve impulse across a synapse is accomplished by neurotransmitters.
Reason : Transmission of the nerve impulse across a synapse is accomplished by neurotransmitters.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

10. **Assertion :** A person has lost most of its intelligence memory and judgement.
Reason : A person has operated a tumour located in the cerebrum.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

11. **Assertion :** Males have more stature than females during puberty.
Reason : This is because of presence of thyroxin in the blood of femalses.
Ans : (c) Assertion (A) is true but reason (R) is false.
Males has more stature than females because of action of male sex hormone called testosterone, which is secreted by testis in males. Testosterone controls the development of secondary sexual characters in males. Thyroxin increases the metabolic rate of the body and maintains BMR.

12. **Assertion :** Phototropism is caused by auxin.
Reason : When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Auxin promotes phototropism. When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side fo the shoot which is away from light. Thus, the plant appears to bend towards light while growing.

13. **Assertion :** Gibberellins induce internodal growth in dwarf plant varieties.
Reason : Gibberellins when applied to normal plants, it increases the length of the plant.
Ans : (c) Assertion (A) is true but reason (R) is false.
Gibberellin induces internodal growth and overcome the phenotypic expression of dwarfism in certain plants. It has little or no effect when they are applied to the normal plant.

14. **Assertion :** Senescence is delayed by the application of cytokinin in plants.
Reason : Cytokinin prevents the breakdown of chlorophyll, proteins and nucleic acid.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

15. **Assertion :** In short day plant, day length should be less than critical day length.
Reason : Long night should be continuous.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

16. **Assertion :** Unlike cabbage, sunflower plant has long internode with leaves that are far apart.
Reason : Sunflower produces sufficient amounts of Gibberellins during its growing period.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

17. **Assertion :** Antheorozoids of Funaria show chemotropic movement.
Reason : This is a paratonic movement of locomotion.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

18. **Assertion :** Seismonastic movement shown by Mimosa pudica plant.
Reason : It is due to change in turgidity of cells of pulvinus.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

19. **Assertion :** Plant hormones arc growth regulator.
Reason : Growth regulators promote or inhibit the growth.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
Plant hormones are chemical compound produced naturally in plants which control the growth and other physiological functions at a site far away from the place of secretion and required in very small amount. It can have promoting or inhibiting effect on a process and hence, it is a growth regulator.

20. **Assertion :** Auxins are in the grwoing tips of the plant.
Reason : Auxin concentration is highest at the tip of the root.
Ans : (c) Assertion (A) is true but reason (R) is false.
Auxin, a plant hormone is synthesized at the grwoing tips of the plant i.e. tip of coleoptiles. in buds and in growing tips of leaves and roots. The concentration of auxin found at the tip of the root is significantly lower than the concentration found at the top of coleoptiles.

21. **Assertion :** A receptor is a specialized group of cells

in a sense organ that perceive a particular type of stimulus.
Reason : Different sense organs have different receptors for detecting stimuli.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

22. **Assertion :** Abscisic acid is a stress hormone.
Reason : Stimulation of ABA occurs in adverse conditions.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Absicsic is a stress hormone as its production is stimulated by drought, water logging and other adverse (stressful) conditions.

23. **Assertion :** Units which make up the nervous system are called neurons.
Reason : Nerve impulses are carried by dendrites towards the cell body.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Both the statements are true. Nervous system is the system of conducting tissues that receives the stimulus and transmits it to other parts of the body forming a network of nerves. It is involved in receiving information (sensation) and generating responses to that information (motor response). The units which make up the nervous system are called nerve cells or neurons. Nerve impulses are always transmitted across a synapse from the axon terminals of one neuron to the dendrite/cell body of the next neuron.

24. **Assertion :** Cyton region of nerve fibre collects information for the brain.
Reason : Nerve fibres can either have or lack myelin sheath.

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

25. **Assertion :** Animals can react to stimuli in different ways.
Reason : All animals have a nervous system and an endocrine system involving hormones.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

26. **Assertion :** The effect of auxin hormone on the growth of root is exactly opposite to that on a stem.
Reason : Auxin hormone increases the rate of growth in root and decreases the rate of growth in stem.

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

27. **Assertion :** Insulin regulates blood sugar level.
Reason : Insufficient secretion of insulin will cause diabetes.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

28. **Assertion :** Nerve impulse is a one way conduction.
Reason : Nerve impulse is transmitted from dendrite to axon terminals.

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

Nerve impulse are always transmitted across a synapse from the axon terminals of one neuron to the dendrite/cell body of the next neuron but never in the reverse direction. Since, the neurotransmitter is present only in the axon terminals and not in the dendrite or cell body, it cannot be released from the dendrite or cell body even if the impulse reaches there.

29. **Assertion :** Our body maintains blood sugar level.
Reason : Pancreas secretes insulin which helps to regualte blood sugar levels in the body.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Pancreas secretes insulin which helps to regulate blood sugar levels in the body. If the sugar level in blood rises, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

30. **Assertion :** Failure of secretion of growth hormone from an early age causes dwafrism in the patient.
Reason : Growth hormone stimulates the body growth and elongation of long bones.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Growth hormone is secreted by the anterior lobe of pituitary gland. It stimulates body growth. The failure of secretion of growth hormone from an early age causes dwafrism while excessive secretion of this hormone from childhood leads to gigantism.

CHAPTER 8

How Do Organisms Reproduce

1. OBJECTIVE QUESTIONS

1. The anther contains
(a) sepals (b) ovules
(c) carpel (d) pollen grains

Ans : (d) pollen grains

2. The development of a seedling from an embryo under appropriate condition is called
(a) regeneration (b) germination
(c) vegetative propagation (d) pollination

Ans : (b) germination

Germination is a process occurring in plants in which the embryo develops into a seedling under appropriate condition.

3. Site of fertilization in mammals is
(a) ovary (b) uterus
(c) vagina (d) fallopian tube

Ans : (d) fallopian tube

4. Which of the following organisms do not depend on reproduction to exchange genetic information
(a) animals (b) plants
(c) bacteria (d) fungi

Ans : (c) bacteria

5. By which method, asexual reproduction occurs in Amoeba
(a) fission (b) budding
(c) germination (d) all of these

Ans : (a) fission

6. Which of the following is not an outcome of variations present in population?
(a) Bacterial resistance to heat
(b) Different colour of eyes
(c) Maintenance of body design fearures
(d) Survival of species over time

Ans : (c) Maintenance of body design fearures

Variations are not responsible for maintenance of body design fearures.

7. Asexual reproduction produces offspring that are
(a) genetically identical to their parents
(b) genetically identical to their siblings
(c) none of the above
(d) both (a) and (b)

Ans : (d) both (a) and (b)

8. Which of the following have buds on their leaves as vegetative reproducing structure?
(a) Rose (b) Strawberry
(c) Bougaincillea (d) Bryophyllum

Ans : (d) Bryophyllum

Bryophyllum reproduces by the buds present in their notches along the leaf margin of Bryophyllum which falls on the soil and develops into new plants.

9. The development of offspring from any part of body is called
(a) asexual reproduction
(b) sexual reproduction
(c) vegetative reproduction
(d) all the above

Ans : (a) asexual reproduction

10. The process of development of organism like itself is called
(a) budding (b) flowering
(c) reproduction (d) none of the above

Ans : (c) reproduction

11. Budding and fission are processes used by
(a) diocious species
(b) hermaphroditic organisms
(c) organisms requiring new gene combinations for each generation
(d) asexually reproducing species

Ans : (d) asexually reproducing species

12. Seminiferous tubules are composed of
(a) Spermatogonia (b) Glandular epithelium
(c) Sensory epithelium (d) Germinal epithelium

Ans : (d) Germinal epithelium

13. The migration of pollen grains to stigma is called as
(a) fertilization (b) pollination
(c) fusion (d) reproduction

Ans : (b) pollination

14. Cowper's glands are found in
(a) male mammals (b) female mammals
(c) male amphibians (d) female amphibians

Ans : (a) male mammals

15. Which of the following helps in transport and nutrition of sperms?
(a) Mucus (b) Blood
(c) Urine (d) Glandular secretions

Ans : (d) Glandular secretions

Glands like prostate and seminal vesicles add their secretions to vas deferens so sperms are easily transported and nurtured till maturation.

16. Which of the following is embedded in the uterine wall?
(a) Zygote (b) Embryo's head
(c) Placenta (d) Eggs

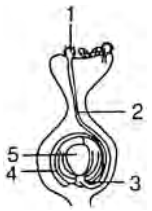
Ans : (c) Placenta

Placenta is embedded in the uterine wall.

17. Acrosome is made up of
(a) mitochondria (b) centrioles
(c) golgi bodies (d) ribosomes

Ans : (c) golgi bodies

18. The diagram shows the cross-section through the carpel of a flower just before fertilisation.



Where will the male and female gametes be just before fertilisation?

	Male gamete	Female gamete
(a)	1	5
(b)	1	4
(c)	2	4
(d)	3	5

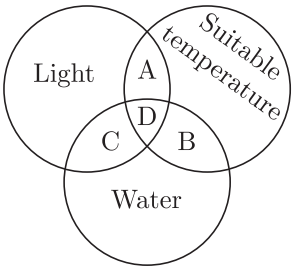
Ans : (d)

The pollen grain germinates to form a pollen tube. This tube grows downward through the tissues the style and ovary wall. As the pollen tube grows, its nucleus divides forming two male gametes. These gametes are released into the ovule. This happens when pollen tube enters the ovule through the micropyle.

19. Oral-contraceptives prevent the
(a) fertilization
(b) ovulation
(c) implantation
(d) entrance of sperms in vagina

Ans : (b) ovulation

20. Which conditions are necessary to activate enzymes when a seed germinates?



(a) *C* (b) *A*
(c) *D* (d) *B*

Ans : (d) *B*

The seeds usually germinates in the soil where light is not needed. However, suitable temperature and water both are needed providing favourable conditions for seed to germinate by activating the enzymes.

21. Fertilization occurs in human beings in
(a) uterus (b) ovary
(c) oviduct (d) vagina

Ans : (c) oviduct

22. Menstrual cycle is generally of
(a) 21 days (b) 28 days
(c) 38 days (d) 40 days

Ans : (b) 28 days

23. Progesterone is secreted by
(a) corpus luteum (b) thyroid
(c) thymus (d) testes

Ans : (a) corpus luteum

24. Given below are certain adaptations in fruits of certain plants. On the basis of information given below, identify the agent of pollination in both situations.
1. Small, dry and light seeds with a parachute of fine hair.
2. Brightly-coloured, sweet and juicy but hard seeds.

(a) 1-insects, 2-animals (b) 1-water, 2-insects
(c) 1-wind, 2-animals (d) 1-birds, 2-insects

Ans : (c) 1-wind, 2-animals

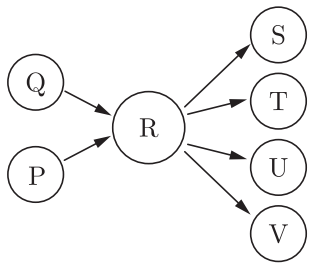
The seeds pollinated by birds are small, dry and light so they can easily float in air and carried away.

They harm feni hair (papers) to increase buoyancy in air.

For animal dispersal the seeds are Brightly coloured, sweet and juicy to attract birds and animals.

They are hard so they can pass through animals undigested into the soil.

25. The diagram represents gametes P and Q fusing to give cell R. This cell then produces gametes S, T, U and V.



Which statement about the number of chromosomes in the cells and gametes is corrects.

(a) The number of chromosomes in P and Q are different

(b) The number of chromosomes in P and Q are same

(c) The number of chromosomes in S in one quarter of chromosomes in R

(d) The number of chromosomes in T is half the number of chromosomes in Q

Ans : (b) The number of chromosomes in P and Q are same

P and Q are haploid gametes white R is zygote and dipolid. Zygote give rise to an individual which further produces gametes by meiosis. in which chromosome number is half i.e. haploid.

26. Like animals, plants produce

(a) many more sperm than eggs

(b) a few more sperm than eggs

(c) equal numbers of sperm and eggs

(d) fewer sperm than eggs

Ans : (a) many more sperm than eggs

27. The vegetative reproduction in sweet potato is done by

(a) stem (b) leaf

(c) root (d) flower

Ans : (c) root

28. Among all the methods of contraception, which one can prevent the implantation of the fertilised egg?

(a) Coil (mechanical) (b) Condom (mechanical)

(c) Spermicide (chemical) (d) Vasectomy (surgical)

Ans : (a) Coil (mechanical)

The coil is an IUD (Intra Uterine Device) made up of a loop or ring of plastic or steel. It is inserted into the uterus by a doctor. It prevents the implantation of the fertilised egg into the uterine wall.

29. In mammals the testes lie in scrotal sacs due to

(a) presence of urinary bladder

(b) presence of rectum

(c) long vas-deferens

(d) requirement of low temperature for spermatogenesis

Ans : (d) requirement of low temperature for spermatogenesis

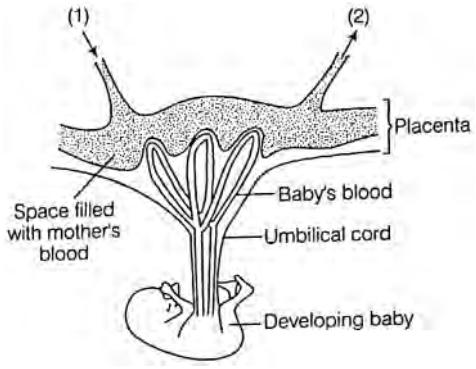
30. Tunica albuginea is the covering around

(a) ovary (b) testes

(c) kidney (d) heart

Ans : (b) testes

31. The diagram shows the arrangement of blood vessels in the uterus wall and placenta of a pregnant women.



Which of the following will increase in concentration in the blood at it flows from 1 and 2?

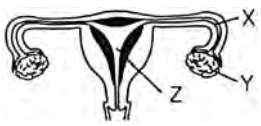
(a) Amino acids (b) Carbon dioxide

(c) Glucose (d) Oxygen

Ans : (b) Carbon dioxide

As the mother's blood passes through placenta, most of the carbon dioxide from foetal blood diffuses into it. Thus the concentration of CO_2 increases in the materanal blood.

32. The diagram show a section through the female reproductive system.



During pregnancy, where does mitosis occur in the cells of the embryo.

	X	Y	Z
(a)	✓	✓	✓
(b)	✓	✓	×
(c)	✓	×	✓
(d)	×	×	✓

Key ✓ = takes place, × = does not take place.

Ans : (c)

X is the Fallopian tube or oviduct, where after

fertilisation, zygote develops into embryo by mitosis Z is the uterus, where embryo is implanted. it grows in size to foetus and child by mitosis.

2. FILL IN THE BLANK

1. During the birth process, the pituitary hormone ..... signals the uterus to contract.
Ans : Oxytocin

2. ..... bearing anthers which produce ....., are the male reproductive parts of a flower.
Ans : Stamen, pollen grains

3. The process of release of eggs from ovary is called .....
Ans : Ovulation

4. In many in vertebrate organisms, both sexes are found in the same individual. This is called .....
Ans : Hermaphroditism

5. The development of the ..... egg and ..... fertilization freed the animals from the aquatic environment for reproduction and development.
Ans : Land, Internal

6. Cross pollination brings about ..... recombination in new plants.
Ans : Genetic

7. A technique to produce generically alike individuals from a single cell is known as .....
Ans : Cloning

8. The process of asexual reproduction in Amoeba is .....
Ans : Binary fission

9. ..... help in survival of the species in changing environment.
Ans : Variations

10. ..... is common method of multiplication of Yeast and Hydra.
Ans : Budding

11. Budding is a common method of asexual reproduction in yeast and .....
Ans : Hydra

12. In ..... vegetative propagation occurs by leaves.
Ans : Bryophyllum

13. By the fusion of male and female gametes, is formed.
Ans : Zygote

14. Eggs are produced in .....
Ans : Ovary

15. ..... bearing ovary with ....., are the female reproductive parts of a flower.
Ans : Carpel, ovules

16. Release of egg from ovary is called as .....
Ans : Ovulation

17. Surgically when fallopian tube is removed or ligated, it is called .....
Ans : Tubectomy

18. Ovulation in female human beings stops after the age of .....
Ans : 45-50

19. ..... flowers are underground closed flowers.
Ans : Cleistogamous

20. Organisms such as ..... can regenerate if they are broken into pieces.
Ans : Hydra

21. ..... is the periodic discharge of blood, mucous, uterine mucosa pieces, etc. from uterus.
Ans : Mensturation

22. Fertilization occurs in the .....tube.
Ans : Fallopian

23. Pollen grains are produced by .....
Ans : Stamens

24. ..... contain half the amount of DNA compared to the parents.
Ans : Germ cells

25. Pollen grains are transferred from stamens to ..... of carpel.
Ans : Stigma

26. An egg cell of a plant is contained in an ..... present in an ovary.
Ans : Ovule

27. Transfer of pollen from one flower to stigma of another flower of same species is termed .....
Ans : Cross-pollination

28. Testes are located outside the abdominal cavity in .....
Ans : Scrotum

29. Ovaries are also responsible for the production of hormone called .....
Ans : Estrogen/Progesterone

30. Plants raised by vegetative propagation bear early ..... and ..... .
Ans : Flowers, Fruits

31. Future shoot hidden in a seed is called ..... .
Ans : Plumule

32. The gametes are formed in most of the multicellular organisms by a process of cell division called ..... .
Ans : Meiosis

33. The two parts tied together during grafting are called ..... and .....
Ans : Stock, Scion

34. If the ..... in the male is blocked, sperms can be prevented to ..... the egg.
Ans : Vas deferens, fertilize

35. A bud in Hydra develops an outgrowth to repeated division at a ....
Ans : Specific site

36. Simply break up into smaller pieces upon maturation is found in .....
Ans : Spirogyra

3. TRUE/FALSE

DIRECTION : Read the following statements and write your answer as true of false.

1. Transfer of pollen grains from one flower to the stigma of another flower is known as cross-pollination.
Ans : True

2. Vegetative propagation by leaves occurs in sweet potato.
Ans : False

3. Transfer of male gametes to the stigma of flower is called pollination.
Ans : True

4. Sexual reproduction involves two individuals for the creation of a new individual.
Ans : True

5. DNA copying mechanisms creates variations which are useful for ensuring the survival of the species.
Ans : True

6. Plants that produce asexually do not produce flower.
Ans : False

7. Placenta is the name of a vital connection between mother and embryo.
Ans : True

8. Rhizopus reproduces by fragmentation.
Ans : False

9. Before cell division copying of DNA is not essential.
Ans : False

10. Birds are oviparous.
Ans : True

11. The only function of the testes is to produce sperm.
Ans : False

12. Sertoli cells are involved in testosterone production.
Ans : True

13. Ovulation occurs in reproductively active females roughly in the middle of menstrual cycle.
Ans : True

14. Acrosome in the sperm carries the genetic material.
Ans : True

15. Embryo gets embedded in the uterine wall.
Ans : True

16. Animal development is limited to the period prior to bird hatching.
Ans : False

17. In fission, many bacteria and protozoa simply divide into two or more doughter cells.
Ans : False

18. Fertilization is the fusion of sperm and ovum.
Ans : True

19. Sperms mature at a temperature higher than that of human body.
Ans : False

20. Reproduction, unlike other life processes, is not essential to maintain the life of an individual organism.
Ans : True

21. One advantage of sexual reproduction is that it allows for genetic sameness.
Ans : False

22. Onset of menstruation is termed as menopause.
Ans : False

23. In Spirogyra, asexual reproduction takes place by fragmentation.
Ans : True

24. The maternal blood supply mixes frequently with the foetal blood supply during the exchange of waste materials and nutrients.
Ans : False

25. The DNA copying mechanisms create variations which are useful for ensuring the survival of the species.
Ans : True

26. At the time of birth, a baby girl has thousands of immature eggs.
Ans : True

27. Basic event in reproduction is creation of DNA copy.
Ans : True

28. Plasmodium multiplies by binary fission.
Ans : False

29. Bryophyllum propagates through spore formation.
Ans : False

30. Copper-T is a contraceptive device used by women.
Ans : True

31. Hibiscus has unisexual flowers.
Ans : False

32. In mammals including man, fertilization takes place externally.
Ans : False

33. Reproduction, unlike other life processes, is not essential to maintain the life of an individual organism.
Ans : True

34. In fission, many acteria and protozoa simply divide into two or more daughter cells.
Ans : True

35. Sexual reproduction does not lead to variation in a population.
Ans : False

36. The ovary of a flower grows into a fruit.
Ans : True

37. Reproduction is not essential for an Individual but to maintain the species.
Ans : False

38. Regeneration is the same as reproduction.
Ans : False

39. The ovulation takes place 10-12 days after the start of menstruation.
Ans : True

40. In male adults testes are located in scrotum to facilitate sperm formation.
Ans : True

41. Fertilisation of egg takes place in uterus.
Ans : False

42. The male germ-cell produced by pollen grain contains half the amount of DNA as compared to the other body cells of the plant.
Ans : True

43. Vegetative propagation produces plants that are genetically similar to the parent plant.
Ans : True

44. Sexually transmitted diseases can be prevented by using condoms.
Ans : True

45. Reproducing cells don not replicate DNA.
Ans : False

46. Pjants produced by vegetative propagation are genetically similar to the parent plant.
Ans : True

47. In human-beings, male can produce sperms upto the age of 45-50 years.
Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Animals which give birth to young one	(p)	Hydra
(B)	Animal which producess bud	(q)	Planaria
(C)	An animal which shows regeneration	(r)	Placenta
(D)	Provides nutrition to the developing embryo	(s)	Cross-pollina-tion
(E)	The pollen transferred from one flower to another	(t)	Germination
(F)	The process in which embryo develops into seedling	(u)	Viviparous
(G)	Fertilised egg in humans gets implanted in	(v)	Menstruation
(H)	When egg in humans is not fertilised, what happens?	(w)	Uterus

Ans : A-u, B-p, C-q, D-r, E-s, F-t, G-w, H-v

2.

Column I		Column II	
(A)	Seminal vesicle	(p)	Latex sheath
(B)	Urinogenital duct	(q)	Semen plasma
(C)	Condom	(r)	Protozoan
(D)	Trichomoniasis	(s)	Corpus spongio-sum

Ans : A-q, B-s, C-p, D-r

3.

	Column I		Column II
(A)	Amoeba	(p)	Budding
(B)	Hydra	(q)	Regeneration
(C)	Planaria	(r)	Fission
(D)	Rhizopus	(s)	Fragmentation
(E)	Spirogyra	(t)	Spore formation

Ans : A-r, B-p, C-t D-s, E-q

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** DNA copying is necessary during reproduction.
Reason : DNA copying leads to the transmission of characters from parents to offspring.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

DNA copying is necessary during reproduction because it leads to the transmission of characters from parents to offsprings and brings about variation.

2. **Assertion :** Holoblastic cleavage with almost equal sized blastomeres is a characteristic of placental animals.
Reason : Eggs of most mamals, including humans, are of centrolecithal type.
Ans : (c) Assertion (A) is true but reason (R) is false.

3. **Assertion :** Sexual reproduction increases genetic diversities and plays a role in origin of new species.
Reason : Sexual reproduction involves formation of gametes and fusion of gametes.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Sexual reproduction involves two parents that results in the offsprings that are not identical to the parents. If causes variations; which are essential for evolution as well as survival of species under unfavourable conditions.

4. **Assertion :** An embryo is formed from fertilized egg.
Reason : A monocot embryo comprises embryonal axis with two cotyledons.
Ans : (c) Assertion (A) is true but reason (R) is false.

Zygote, a fertilized egg give rise to an embryo, which has the ability to develop into a complete plant. A typical dicot embryo comprises an embryonal axis with two cotyledons.

5. **Assertion :** Scrotum is present outside the abdominal cavity.
Reason : It stores sperms which require a lower temperature than the normal body temperature.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Scrotum, a pouch containing testis is present outside the abdominal cavity because sperms require a lower temperature than the normal body temperature.

6. **Assertion :** Vagina is also called as birth canal.
Reason : During birth, the baby passes through the vagina.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Vagina is called as birth canal, because the baby passes through the vagina during birth.

7. **Assertion :** Individuals produced by asexual reproduction are known as clones.
Reason : They are known as clones because they are genetically identical.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The new individuals produced after cell divisions in asexual reproduction are always genetically identical or clone to each other and their parents.

8. **Assertion :** Vasectomy is a surgical method or birth control.
Reason : In vasectomy, small portion of oviduct is cut or tied properly.
Ans : (c) Assertion (A) is true but reason (R) is false.

Vasectomy is a surgical method or birth control. in which small portion of the sperm duct is cut or tied properly.

9. **Assertion :** HIV-AIDS is a bacterial disease.
Reason : It spreads through sharing of food and water.
Ans : (e) Both Assertion and Reason are false.

HIV-AIDS is viral disease that is transmitted sexually.

It is one of the STDs.

10. **Assertion :** In human male, there are perianal glands near the anus.
Reason : Perianal glands secrete sex-attractant pheromone which initiates sexual desire in human female.
Ans : (d) Assertion (A) is false but reason (R) is true.

11. **Assertion :** Amobea reproduces by Binary fission.
Reason : All unicellular organisms reproduce asexually.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Amoeba is a unicellular organism. It reproduces asexually through binary fission. It is the division of one cell into two similar or identical cells.

12. **Assertion :** In morula stage, cells divide without increases in size.
Reason : Zona pellucida remain undivided till cleavage is complete.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

13. **Assertion :** Double fertilisation is unique to angiosperms.
Reason : Triple fusion occurs in both fertilization.
Ans : (c) Assertion (A) is true but reason (R) is false.

Double fertilization is a characteristic feature of flowering plants. In this process, out of the two sperm nuclei, one sperm nucleus fuses with the egg nucleus to form an embryo (process is called syngamy) and another fuses with the secondary nucleus to form an endosperm (process is called triple fusion). Because two kinds of fusion-syngamy and triple fusion-take place, the process is known as double fertilisation.

14. **Assertion :** Unisexual flowers have separate male and female flowers whereas a typical monocot embryo comprises an embryonal axis with single cotyledon.
Reason : Cucumber, pumpkin and water melon are example of unisexual flowers.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Unisexual flowers have separate male and female flowers. The example includes cucumber, pumpkin and watermelon.

15. **Assertion :** Plants are vegetatively propagated even though they bear seeds.
Reason : Potatoes reproduces through tubers, apples by cutting etc.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Vegetative reproduction happens through the use of vegetative parts of the plants, such as leaves, stems, and roots to produce new plants or through gowth from specialized vegetative plant parts.

16. **Assertion :** Pollen grains from the carpel stick to the stigma of stamen.
Reason : The fertilised egg cells grow inside the ovules and become seeds.
Ans : (d) Assertion (A) is false but reason (R) is true.

17. **Assertion :** Characteristics of parental plants can be preserved through asexual reproduction.
Reason : Vegetative reproduction involves only mitosis.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Asexual reproduction involves a single individual, which give rise to new individual that are genetically identical to parents. It is because, when organisms reproduce asexually, only mitotic divisions are involved and the chromosome number remains the same.

18. **Assertion :** Urethra in human male acts as urinogenital canal.
Reason : Urethra carries only urine while sperms are carried by vasa deferentia only.
Ans : (c) Assertion (A) is true but reason (R) is false.

19. **Assertion :** During fertilization only head of spermatozoa enters egg.
Reason : If several spermatozoa hit the egg at same time, all can enter the egg.
Ans : (c) Assertion (A) is true but reason (R) is false.

20. **Assertion :** Asexual reproduction is also called blastogenesis.
Reason : In asexual reproduction, their is no formation and fusion of gametes.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

21. **Assertion :** amoeba shows multiple fission during unfavorable conditions.
Reason : Chances of survival are less during unfavourable conditions.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

22. **Assertion :** Plasmodium reproduces by multiple fission.
Reason : Multiple fission is a type of asexual reproduction.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Plasmodium prproduces asexually by multiple fission.

23. **Assertion :** In human male, testes are extra-abdominai which are present inside scrotum.
Reason : Scrotum has a relatively lower temperature needed for the production and storage of sperms.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion

(A).

Formation of sperms needs lower temperature than the normal body temperature. Hence, testes lie outside the body cavity in the scrotum.

24. **Assertion :** At puberty, in boys, voice begins to crack and thick hair grows on face.
Reason : At puberty, there is decreased secretion of testosterone in boys.
Ans : (c) Assertion (A) is true but reason (R) is false.

Puberty in boys is regulated by male sex hormone called testosterone, which are secreted by testes. In puberty, secondary sexual characters like growth of hair on face, chest, broadening of shoulders and deepening of voice occurs.

25. **Assertion :** Spores are unicellular bodies.
Reason : The parent body simply breaks up into smaller pieces on maturation.
Ans : (c) Assertion (A) is true but reason (R) is false.

26. **Assertion :** Surgical methods are most effective methods of contraception.
Reason : Surgical method blocks gametes transport and hence prevent fertilisation.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Surgical method like vasectomy in male and tubectomy in female prevent pregnancy. These methods block gamete transport and hence prevent fertilisation. They are very effective but reversibility is very poor.

27. **Assertion :** Asexual reproduction is a primitive type of reproduction.
Reason : Asexual reproduction involves only mitotic cell division.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

28. **Assertion :** Clones are offspring of an organism formed by asexual reproduction.
Reason : Clones have exact copies of DNA as their parent.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

29. **Assertion :** Colonies of yeast multiply in sugar solution.
Reason : Sugar is made of sucrose which provides energy for sustaining all life activities.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

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CHAPTER 9

Heredity and Evolution

1. OBJECTIVE QUESTIONS

1. There was no free oxygen in the early atmosphere because most of it was tied up in
(a) water (b) ammonia
(c) methane (d) rock

Ans : (d) rock

2. Which of the following provides evidence for evolution?
(a) Direct observations of genetic changes in populations
(b) Shared characteristics of organisms
(c) The fossil record
(d) All of the above

Ans : (d) All of the above

3. Which of the following is a Test Cross?
(a) TT × tt (b) Tt × tt
(c) Tt × TT (d) tt × tt

Ans : (b) Tt × tt

4. In natural selection,
(a) the genetic composition of the population changes at random over time.
(b) new mutations are generated over time.
(c) all individuals in a population are equally likely to contribute offspring to the next generation.
(d) individuals that possess particular inherited characters survive and reproduce at a higher rate than other individuals.

Ans : (d) individuals that possess particular inherited characters survive and reproduce at a higher rate than other individuals

5. A heterozygous red-eyed female Drosophila mated with a white-eyed male would produce
(a) red-eyed females and white-eyed males in the F_1
(b) white-eyed females and red-eyed males in the F_1
(c) half red and half white-eyed females and all white eyed males in the F_1
(d) half red and half white-eyed females as well as males in the F_1

Ans : (d) half red and half white-eyed females as well as males in the F_1

6. Sex-linked disorders such as color blindness and hemohilia are
(a) caused by genes on the X chromosome
(b) caused by genes on the autosome
(c) caused by genes on the Y chromosome
(d) expressed only in men

Ans : (a) caused by genes on the X chromosome

7. Which of the following would stop evolution by natural selection from occurring?
(a) If humans became extinct because of a disease epidemic
(b) If a thermonuclear war killed most living organisms and changed the environment drastically
(c) If ozone depletion led to increased ultraviolet radiation, which caused many new mutations
(d) If all individuals in a population were genetically identical and there was no genetic recombination, sexual reproduction, or mutation

Ans : (d) If all individuals in a population were genetically identical, and there was no genetic recombination, sexual reproduction, or mutation

8. The earliest living organisms were
(a) multicellular (b) eukaryotes
(c) prokaryotes (d) photosynthesizes

Ans : (c) prokaryotes

9. Which of the following is Heterozygous?
(a) TTRR (b) ttrr
(c) TT (d) Tt

Ans : (d) Tt

10. The phenomenon by which a new set of population is formed from the change in frequency of some genes is
(a) genetic drift (b) organic evolution
(c) variations (d) speciation

Ans : (a) genetic drift

The change in the frequency of some genes which leads to appearance of a new set of population without any survival disadvantage is called genetic drift.

11. Genetic s is the study of-
(a) Inheritance (b) Cell structure
(c) Only plants (d) Only animals

Ans : (a) Inheritance

12. If two parents have the genotypes $AA \times aa$, the probability of having an aa genotype in the F, generation is-
(a) 25 percent (b) 50 percent
(c) 75 percent (d) None of the above

Ans : (d) None of the above

13. Eye color in the fruit fly is said to be sex-linked. This simply means that the gene for eye colour is:
(a) on the Y chromosome
(b) on an auto some
(c) on the X and Y chromosomes
(d) on the X chromosome

Ans : (a) on the Y chromosome

14. The arrangement of organisms into a series of groups based on physiological, biochemical, anatomical and other relationships is
(a) hierarchy (b) categorisation
(c) taxonomy (d) classification

Ans : (d) classification

Classification involes hierarchical arrangement living organisms into different categories on the basis of common inter-relationships between them.

15. The presence of homologous organs in different animals indicates
(a) independent evolution (b) common ancestry
(c) different ancestry (d) hierarchy

Ans : (b) common ancestry

Hmologous organs represent common ancestry. It represents the evolution of closely related species from a common ancestor.

16. Gene is made of which chemical
(a) D.N.A. (b) R.N.A.
(c) protein (d) enzyme

Ans : (a) D.N.A.

17. Fossils are the remains of
(a) hard parts of life forms in rock
(b) soft parts of life forms in rock
(c) protein and bones of life forms
(d) None of the above

Ans : (a) hard parts of life forms in rock

Fossils are the remains of hard parts of life forms found in rocks, e.g. tree trunks or skull.

18. Which of the following rediscovered the Mendel's work?
(a) Correns (b) de Vries
(c) Tschermark (d) all of the above

Ans : (d) all of the above

19. What determines the sexs of a child?
(a) Chromosome content of the ovum
(b) Chromosome content of the sperm
(c) Number of days between ovulation and fertilisation
(d) Number of days between fertilisation and implantation

Ans : (b) Chromosome content of the sperm

If a sperm containing X-chromosome fertilises an ovum, female child is produced. If a sperm containing Y-chromosome fertilises an ovum, male child is produced. Ovum always provides X-chromosome and plays no role in determining the sex of a child.

20. The Genotype of offspring formed from Tt × tt will be-
(a) TT and tt (b) Tt and tt
(c) only tt (d) only TT

Ans : (b) Tt and tt

21. Which amongst the listed tools was used to study the law of inheritance in pea plant by Gregor J Mendel?
(a) Family tree (b) Pedigree chart
(c) Punnett square (d) Herbarium sheet

Ans : (c) Punnett square

Punnett square was used by GJ Mendel to determine the law of inheritance in his experiments with pea plants.

22. When a breed of cattle with red coats is crossed with the same breed with white coats, all the offspring have coats with a mixture of red and white hairs, a condition called roan.
If roan cows were crossed with a red-coated bull, the theoretical ratio of the offspring would be
(a) all red (b) all roan
(c) 1 red : 1 roan (d) 3 red : 1 roan

Ans : (c) 1 red : 1 roan

She following cross shows how this ratio 1 : 1 is obtained.

Parents	:	Roan	Red
Genotype	:	Rr	RR
Gametes	:	(R) (r)	(R)
Offsprings Genotype	:	RR	Rr
Phenotype	:	1 Red	1 Roan

23. Which of the following are fossils?
(a) pollen grains buried in the bottom of a peat bog

(b) the petrified cast of a clam's burrow
(c) the impression a clam shell made in mud, preserved in mudstone
(d) all of the above

Ans : (d) all of the above

24. Which statement is true for a dominant allele?
(a) It cannot undergo mutation
(b) It gives a greater chance of survival than a recessive allele
(c) It gives the same phenotype in heterozygotes and homozygotes
(d) It is only responsible for male characteristics

Ans : (c) It gives the same phenotype in heterozygotes and homozygotes

Dominant allele suppresses the recessive allele in terms of its expression. Hence, it also shows its phenotype in heterozygotes.

25. Which statement about the genotypes of organisms is correct?
(a) Dominant alleles are only found in homozygotes
(b) One recessive allele always causes a recessive phenotype
(c) Recessive phenotypes must be homozygous
(d) The dominant phenotype msut be heterozygous

Ans : (c) Recessive phenotypes must be homozygous

Recessive phenotype only expresses if both alleles are homozygous, while dominant phenotype may express in either homozygous or heteroygous conditions.

26. A farmer saves the seeds from his best maize crop plants to sow for next year's crop.
(a) artificial selection (b) genetic engineering
(c) natural selection (d) variation

Ans : (a) artificial selection

Its artificial selection because the farmer is giving the chance to grow best maize crop next year while the natural selection operates due to competition and survival for the fittest.

27. What is a result of natural selection?
(a) Dogs that are friendly to humans
(b) Grapes that contain no seeds
(c) Mosquitoes that are resistant to insecticides
(d) Onion crops that have a pleasant taste

Ans : (c) Mosquitoes that are resistant to insecticides

By natural selection, resistant mosquitoes are produced dut to continuous spray of insecticides.

28. Mendel's concept of segregation implies that the two members of an allelic pair of genes-
(a) are distributed to separate gametes
(b) may contaminate one another
(c) are segregated in pairs
(d) are linked

Ans : (a) are distributed to separate gametes

29. Your arm is homologous with-
(a) a seal flipper (b) an octopus tentacle
(c) a bird wing (d) both a and c

Ans : (d) both a and c

30. Which statement describes an example of artificial selection?
(a) It has been found that some strains of bacteria produce antibiotics
(b) It is common practice to mate bulls with cows that produce the most milk
(c) It is possible to control caterpillars on food crops by releasing small wasps which lay their eggs on caterpillars and kill them
(d) Mosquitoes have developed strains that are resistant to insecticides

Ans : (b) It is common practice to mate bulls with cows that produce the most milk

Artificial cross-breeding of animals and then selection of desirable traits is an example of artificial selection by human beings.

31. Which of the following evolutionary mechanisms acts to slow down or prevent the evolution of reproductive isolation?
(a) Natural selection (b) Gene flow
(c) Mutation (d) Genetic drift

Ans : (b) Gene flow

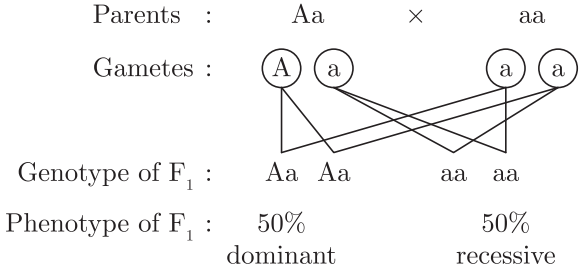
32. Which of the following features do humans lack that other primates have?
(a) Forward-facing eyes
(b) Short snouts
(c) Flexible shoulder and elbow joints
(d) Opposable big toes

Ans : (d) Opposable big toes

33. A recessive homozygote is crossed with a heterozygote of the same gene. What will be the phenotype of the F_1-generation?
(a) All dominant
(b) 75% dominant, 25% recessive
(c) 50% dominant, 50% recessive
(d) 25% dominant, 50% heterozygous, 25% recessive

Ans : (c) 50% dominant, 50% recessive

Suppose aa is recessive homozygote and Aa is heterozygote. Rusult of the cross are shown below.



34. The genotype of the height of an organism is written as Tt. What conculsion may be drawn?
(a) The allele for height has at least two different genes
(b) There are atleast two different alleles for the gene for height
(c) There are two different genes for height, each having a single allele
(d) There is one allele for height with two different forms

Ans : (b) There are atleast two different alleles for the gene for height

Alleles are different forms of the same gene. They occupy the same relative positions on a pair of homologous chromosomes. The allele for tallness is designed T (dominant allele) and the allele for dwarfness, t (recessive allele). The different alleles for height represented in the genotype Tt shows that the organisms is heterozygous for height and exhibit tallness.

2. FILL IN THE BLANK

1. The sex chromosomes in male are indicated by ..... .
Ans : XY

2. Tendril of a pea plant and phylloclade of Opuntia are ..... structures.
Ans : analogous

3. Chromosome consists of a DNA molecule and .....
Ans : Protein

4. The sex chromosomes in female are indicated by .....
Ans : XX

5. The phenotypic ratio between tall and dwarf is .....
Ans : 3 : 1

6. The phenotypic in dihybrid cross is .....
Ans : 9 : 3 : 3 : 1

7. There are ..... pairs of chromosomes in human.
Ans : 23

8. The differences from one generation to the other generation are called .....
Ans : Variations

9. The offspring can be of two types with XX and chromosomes.
Ans : XY

10. ..... reproduction causes greater diversity.
Ans : Sexual

11. Transmission of traits from one generation to the next generation is called .....
Ans : Heredity

12. The chromosome related to determination of sex is called ..... .
Ans : Sex Chromosome

13. A test cross can distinguish the pure dominant from the ..... dominant.
Ans : Impure

14. Mendel performed his experiments on .....
Ans : Garden pea

15. According to modern concept, Mendel's factor is called a .....
Ans : Gene

16. Characteristics that are developed during the lifetime of an individual are .....
Ans : acquired

17. Mendelian factors or genes as well as chromosomes are present in .....
Ans : Pairs

18. The traits which express themselves in F_1 generation are called .....
Ans : Dominant

19. The genetics is the science of ..... and .....
Ans : Heredity, Variations

20. DNA segment in a chromosome performing specific function is the .....
Ans : gene

21. The traits which are acquired by an organism during its lifetime are called ..... .
Ans : Acquired traits

22. The two types of reproduction are sexual and .....
Ans : Asexual

23. ..... traits are unable to express in a hybrid.
Ans : Recessive

24. Gene is the segment of .....
Ans : DNA

25. Two types of nucleic acids are DNA and ..... .
Ans : RNA

26. Out of tall and dwarf plants ..... trait is dominant.
Ans : Tall

27. If tall plant contains TT gene then dwarf plant contains ..... .
Ans : TT

28. ..... . called father of genetics.
Ans : Mendel

29. The term genetics was coined by .....
Ans : Bateson

30. Mendel chose ..... characters in Pea for his experiments.
Ans : Seven

31. Broccoli has been developed from ..... cabbage through artificial selection.
Ans : Wild

32. ..... speciation occurs in geographically separated populations.
Ans : Allopatric

33. Fossils are written documents of ..... .
Ans : Evolution

34. Earth cam into existence probably ..... million years ago.
Ans : 4600

35. ..... and ..... proved that life originated from inorganic molecules.
Ans : Stanley Miller and Harold Urey

36. There is no possibility of chemical evolution of life on earth today, because .....
Ans : The atmosphere is oxidising

37. Mendel is known as the father of .....
Ans : genetics

38. An atmosphere rich in hydrogen is an ..... atmosphere.
Ans : Reducing

39. The first organisms were ..... and not autotrophs.
Ans : Heterotrophs

40. The study of fossils, a branch of biology called ..... was founded by Goerges Cuiver.
Ans : Paleontology

41. The age of fossil is usually determined by analysing the ..... present in the rock from which fossil is recovered.
Ans : Radioactive materials

42. Theory of natural selection was proposed by .....
Ans : Darwin

43. The theory of natural selection was given by .....
Ans : Darwin

44. Wind of bat and wing of bird are the example of the ..... organs.
Ans : Analogous

45. The process by which new species develop from existing ones is called .....
Ans : speciation

46. Forelimbs of frog and lizard are the example of the ..... organs.
Ans : Homologous

47. ..... are the chromosomes found in somatic cells.
Ans : autosomes

48. The analogous organs have similar functions but have ..... structures.
Ans : Different

49. The homologous organs have different functions but have ..... structures.
Ans : Similar

3. TRUE/FALSE

1. Selection of variants by environmental factors forms the basis of evolutionary process.
Ans : True

2. The more characteristics two species will have in common, the more closely they are related.
Ans : True

3. Traits which are not inherited over generations do not cause evolution.
Ans : True

4. Both the parents contribute DNA equally to the offspring.
Ans : True

5. Sex of the child is determined by the type of ovum provided by the mother.
Ans : False

6. A recessive trait can also be common as blood group O.
Ans : True

7. There was plenty of oxygen present in atmosphere of primitive earth.
Ans : False

8. Variations arising during the process of reproduction cannot be inherited.
Ans : False

9. Sex is determined by different factors in various

species.
Ans : True

10. At present time evolution is not possible.
Ans : False

11. Mouth parts of insects show divergent evolution.
Ans : True

12. Life can originate on earth from pre-existing life only.
Ans : True

13. The atmosphere of the primitive earth was reducing.
Ans : True

14. Changes in the non-reproductive tissues caused by environmental factors are inheritable.
Ans : False

15. Evolution cannot be said to 'progress' from 'lower' forms to 'higher' forms.
Ans : True

16. Exchange of genetic material takes place in asexual reproduction.
Ans : False

17. A cross between a true tall and pure dwarf pea plant resulted in production of all tall plants because tallness is the dominant trait.
Ans : True

18. For every molecule of fat there is a gene.
Ans : False

19. Reduction in weight of an organism due to nutrition is genetically controlled.
Ans : False

20. Reduction in weight of the organism due to starvation is genetically controlled.
Ans : False

21. New species may be formed if DNA undergoes significant changes germ cells or chromosome number changes in the gametes.
Ans : True

22. Variation is minimum in asexual reproduction.
Ans : True

23. Tendril of a pea plant and phylloclade of Opuntia are homologous.
Ans : True

24. The artificial classification of organisms is based on homology.
Ans : True

25. A trait in an organism is influenced by both maternal and paternal DNA.
Ans : True

26. The similarities in homologous organs are because of convergent evolution.
Ans : True

27. A factor which shows its effect in the hybrid is called recessive.
Ans : False

28. Dromaesaurs were the first to fly.
Ans : False

29. Attached ear lobe is recessive trait.
Ans : True

30. Charles Darwin discovered the law of independent assortment.
Ans : False

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1. Match the genetic cross of the parents on the left with the genotypes of the offspring most likely to be produced from that cross on the right.

Column I		Column II	
(A)	BB × bb	(p)	100% Bb
(B)	Bb × Bb	(q)	25% BB, 50% Bb, 25% bb
(C)	BB × BB	(r)	100% BB
(D)	bb × bb	(s)	100% bb

Ans : A-p, B-q, C-r, D-s

2. Match the physical evidence of evolution with the best description of that particular type of evidence.

Column I		Column II	
(A)	Fossils	(p)	The remains of deceased organisms that are studied.
(B)	Embryology	(q)	Comparisons of the early development stages of an organism.

Column I		Column II	
(C)	Cytology	(r)	Comparing and constrasting cell structures found within an organism.
(D)	DNA evidence	(s)	Comparing similarities and differences between amino acid sequences in two organisms.

Ans : A-p, B-q, C-r, D-s

3.

Column I		Column II	
(A)	Erect ape man	(p)	Java man
(B)	Homo sapiens fossils	(q)	Cromagnon man
(C)	Base analogous	(r)	5-Bromouracil
(D)	Lamarck	(s)	Theory of inheritance of acquired character.

Ans : A-p, B-q, C-r, D-s

4.

Column I		Column II	
(A)	Allopatric speciation	(p)	Finches to darwin
(B)	Bar eye character in Drosophila	(q)	Duplication in X-chromosome
(C)	Louis pasteur	(r)	Swan neck experiment
(D)	Ladder of nature	(s)	Aristotle

Ans : A-p, B-q, C-r, D-s

5.

Column I		Column II	
(A)	Genetic changes	(p)	Homologous organ
(B)	Independent inheritance	(q)	Fossil
(C)	Natural selection	(r)	Analogous organ
(D)	Dihybrid ratio	(s)	XY
(E)	Male human beings	(t)	9 : 3 : 3 : 1
(F)	Wing of a bat and a wing of a bird	(u)	Darwin
(G)	Remanant of ancient animals	(v)	Mendel
(H)	Arm of a man and wing of a bird	(w)	DNA copying

Ans : A-w, B-v, C-u, D-t, E-s F-r, G-q, H-p

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

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

(c) Assertion (A) is true but reason (R) is false.

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

(e) Both Assertion and Reason are false.

1. **Assertion :** Evolution is called as organic evolution.
Reason : Evolution involves the living organisms.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Evolution is called as organic evolution, because it involves the living organisms.

2. **Assertion :** Dominant allele is an allele whose phenotype expresses even in the presence of another allele of that gene.
Reason : It is represented by a capital letter, e.g. T.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Dominant allele is an allele whose phenotype will be expressed even in the presence of another allele of that gene. It is represented by a capital letter, e.g. T. Both Assertion and Reason are true, but Reason is not the correct explanation of Assertion.

3. **Assertion :** Forelimbs of vertebrates are homologous organs.
Reason : Analogous organs have same origin but different functions.
Ans : (c) Assertion (A) is true but reason (R) is false.

Forelimbs of vertebrates are homologous organs. Analogous organs have different origin but show similar appearance.

4. **Assertion :** The sex of the children will be determined by chromosome received from the father.
Reason : A human male has one X and one Y -chromosome.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

If a child inherits X-chromosome from the father will be a girl and one who inherits a Y-chromosome will be a boy.

5. **Assertion :** Among the primates, chimpanzee is the closest relative of the present day humans.
Reason : The banding pattern in the autosome number 3 and 6 of man and chimpanzee is remarkably similar.
Ans : (a) Both assertion (A) and reason (R) are true

and reason (R) is the correct explanation of assertion (A).

The banding pattern seen on stained chromosomes from humans and chimpanzee show striking similarities which indicates that they have evolutionary relationships (cytogenetic evidence).

6. **Assertion :** Human ancestors never used their tails and so the tail expressing gene has disappeared in them.
Reason : Lamarck's theory of evolution is popularly called theory of continuity of germ plasm.
Ans : (c) Assertion (A) is true but reason (R) is false.

According to Lamark's theory, continuous disuse of organs make them weak. The theory of continuity of germplasm was given by Weismann.

7. **Assertion :** Speciation is the process of formation of a new species from a pre-existing one.
Reason : Mutation plays a role in speciation.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Speciation is an evolutionary process by which new species arise. One of the factors that lead to speciation is mutation.

8. **Assertion :** Mutation is sudden change in the genetic material.
Reason : Variation is useful for the survival of species over time.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

9. **Assertion :** Changes in non-reproductive tissues can be passed on the the DNA of the germ cells.
Reason : Inherited traits include the traits developed during the lifetime of an individual that cannot be passed on to its propeny.
Ans : (d) Assertion (A) is false but reason (R) is true.

Changes in non-reproductive tissues cannot be passed on the the DNA of the germ cells

The traits developed during the lifetime of an individual that cannot be passed on to its progenies are acquired traits.

10. **Assertion :** Chromosomes are known as hereditary vehicles.
Reason : The chromosomes are capable of self-reproduction and maintaining morphological and physiological properties through successive generations.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

11. **Assertion :** Mendel chose a number of varieties of garden pea as plant material for his experiments.
Reason : Garden pea has well defined characters and was bisexual.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Mendel chose garden pea as plant material for his experiment because garden pea plants were easily available/they grow in one season/fertilization was easy.

12. **Assertion :** Ear muscles of external ear in man are poorly developed.
Reason : These muscles are useful which move external ear freely to detect sound efficiently.
Ans : (c) Assertion (A) is true but reason (R) is false.

13. **Assertion :** The establishment of reproductive isoloations in an event of biological significance.
Reason : In the absence of reproductive isolation species can merge into single population.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** The sex of a child is determined by the mother.
Reason : Humans have two types of sex chromosomes: XX and XY.
Ans : (d) Assertion (A) is false but reason (R) is true.

15. **Assertion :** In humans, males play an important role in determining the sex of the child.
Reason : Males have two X chromosomes.
Ans : (c) Assertion (A) is true but reason (R) is false.

Sex of a child is dependent on the type of the male gamete that fuses with the female gamete. Human beings possess 23 pairs of chromosomes. Out of these, 22 pairs are known as autosomes, while the remaining one pair comprises sex chromosomes (XX in females and XY in males). At the time of fertilisation, tha egg cell fuses with the sperm cell, resulting in the formation of the zygote. If the egg cell carrying an X chromosome fuses with the sperm carrying an X chromosome, the resulting child would be a girl. If the egg cell carrying an X chromosome fuses with the sperm carrying a Y chromosome, the resulting child would be a boy.

16. **Assertion :** DNA finger printing is a method in which polymerase chain reaction followed by DNA probe is used.
Reason : A DNA finger print is inherited and therefore, resembles that of parents.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

17. **Assertion :** The birds have large, light spongy bones with air sacs.
Reason : These adaptations help them during flight.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

18. **Assertion :** We have lost all the direct evidence of

origin of life.
Reason : The persons responsible for protecting evidences were not skilled.
Ans : (c) Assertion (A) is true but reason (R) is false.

19. **Assertion :** Variations are seen in offspring produced by asexual reproduction.
Reason : DNA molecule generated by replication is not exactly identical to original DNA.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

20. **Assertion :** Although living organism always arise from other living organism,, life should certainly have had a beginning.
Reason : The study of the conditions and the mechanisms involved in the creation of most primitive living structures on earth is actually the problem of origin of life.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

21. **Assertion :** Wings of butterfly and wings of bat are analogous organs.
Reason : Analogous organs have different origin and structural plan but same function.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Wings of butterfly and wings of bat though they perform similar function, they have different origin/ basic structure. Hence, they are known as analogous organs.

22. **Assertion :** Mendel selected the pea plant for his experiments.
Reason : Pea plant is cross-pollinating and has unisexual flowers.
Ans : (a) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

23. **Assertion :** The genetic complement of an organism is called genotype.
Reason : Genotype is the type of hereditary properties of an organism.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Genotype of the organism include all dominant and recessive characters.

24. **Assertion :** Learning a skill such as dance and music is an acquired trati.
Reason : Acquired traits develops in the life time of an individual and do not pass to the progeny.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Trails which develop in the life time of an individual and do not pass to the progeny are called acquired traits. Learning a skill such as dance/music/loss of body parts/weight etc are example of acquired traits.

25. **Assertion :** Traits like eye colour or height are inherited traits.
Reason : Inherited traits are not transferred from parents to young ones.
Ans : (c) Assertion (A) is true but reason (R) is false.

Eye colour and height are genetically inherited traits, as these are expressed by genes. Inherited traits are the traits which are transferred from parents to young ones. Acquired traits are the characters that are acquired by the individual during its lifetime. These traits cannot be inherited. For example, if a wrestler develops large muscles due to his training program that does not mean it will be passed on to his offspring.

26. **Assertion :** Fossils are remains of dead organisms.
Reason : It is helpful in study of evolution.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Fossils are remains of hard parts of the past individuals in the strata of earth. It help in tracing evolutionary pathways.

27. **Assertion :** A geneticist crossed two pea plants and got 50% tall and 50% dwarf in the progeny.
Reason : One plant was heterozygous tall and the other was dwrf.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

CHAPTER 10

Light, Reflection and Refraction

1. OBJECTIVE QUESTIONS

1. Morning sun is not so hot as the mid day sun because
(a) Sun is cooler in the morning
(b) Heat rays travel slowly is the morning
(c) It is God gift
(d) The sun's rays travel a longer distance through atmosphere in the morning

Ans : (d) The sun's rays travel a longer distance through atmosphere in the morning

2. Where should an object be placed in front of a convex lens to get a real image of the size of the object?
(a) At the principal focus of the lens
(b) At twice the focal length
(c) At infinity
(d) Between the optical centre of the lens and its principal focus.

Ans : (b) At twice the focal length

3. An object is placed 60 cm in front of a concave mirror. The real image formed by the mirror is located 30 cm in front of the mirror. What is the object's magnification?
(a) $+2$ (b) -2
(c) $+0.5$ (d) -0.5

Ans : (d) -0.5

4. The image of an object placed in front of a convex mirror is formed at
(a) the object itself
(b) twice the distance of the object in front of the mirror
(c) half the distance of the object in front of the mirror
(d) behind the mirror

Ans : (d) behind the mirror

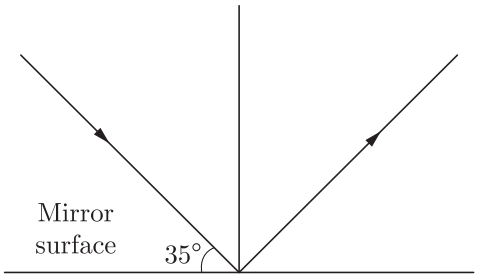
5. Light waves
(a) Require air or another gas to travel through
(b) Require an electric field to travel through
(c) Require a magnetic field to travel through
(d) Can travel through perfect vacuum

Ans : (d) Can travel through perfect vacuum

6. An object is placed 40.0 cm in front of a convex mirror. The image appears 15 cm behind the mirror. What is the focal length of the mirror?
(a) $+24$ cm (b) $+11$ cm
(c) -11 cm (d) -24 cm

Ans : (d) -24 cm

7. Find the angle of incidence and angle of reflection from the diagram.



(a) 45°, 40° (b) 55°, 55°
(c) 60°, 60° (d) 30°, 30°

Ans : (b) 55°, 55°

8. Velocity of light in air is 3×10^8 m/s. While its velocity in a medium is 1.5×10^8 m/s. Then, refractive index of this medium is
(a) 3 (b) 5
(c) 0.5 (d) 2

Ans : (d) 2

Refractive index of medium with respect to air,

$$ {}_a n_g = \frac{\text{Speed of light in air}}{\text{Speed of light in medium}} $$

$$ {}_a n_g = \frac{3 \times 10^8}{1.5 \times 10^8} = 2 $$

9. Focal length of a plane mirror is
(a) zero (b) infinite

(c) 25 cm (d) -25

Ans : (b) infinite

Focal length of a plane mirror is infinite.

10. An object is placed at a distance of 10 cm in front of a plane mirror, then the distance of image from mirror will be

(a) 5 cm (b) 10 cm

(c) 20 cm (d) 0

Ans : (b) 10 cm

The distance of image is equal to the distance of object from mirror. Therefore, the distance of image from mirror is 10 cm.

11. The radius of curvature of concave mirror is 12 cm. Then, the focal length will be

(a) 12 cm (b) 6 cm

(c) -24 cm (d) -6 cm

Ans : (d) -6 cm

Given, radius of curvature, $R = 12$ cm

We know that the focal length of concave mirror has negative value.

Hence, focal length, $f = \frac{-R}{2} = \frac{-12}{2} = -6$ cm

12. A man is 6.0 ft tall. What is the smallest size plane mirror he can use to see his entire image

(a) 3.0 ft (b) 6.0 ft

(c) 12 ft (d) 24 ft

Ans : (a) 30 ft

13. A spherical mirror and a thin spherical lens have each a focal length of -15 cm. The mirror and the lens are likely to be

(a) both concave

(b) both convex

(c) the mirror is concave and the lens is convex.

(d) the mirror is convex, but the lens is concave.

Ans : (a) both concave

14. Which of the following lenses would you prefer to use while reading small letters found in a dictionary?

(a) A convex lens of focal length 50 cm.

(b) A concave lens of focal length 50 cm.

(c) A convex lens of focal length 5 cm.

(d) A concave lens of focal length 5 cm.

Ans : (c) A convex lens of focal length 5 cm.

15. One light wave is incident upon a plate of refracting index μ. Incident angle i, for which refractive & reflective waves are mutually perpendicular will be

(a) $i = 45^\circ$ (b) $i = \sin^{-1}(\mu)$

(c) $i = \text{cosec}^{-1}(\mu)$ (d) $i = \tan^{-1}(\mu)$

Ans : (d) $i = \tan^{-1}(\mu)$

$$\frac{\sin i}{\sin r} = \mu$$

Angle between refractive & reflective waves

$$180^\circ - (i + r) = 90^\circ$$

$$i + r = 90^\circ$$

$$r = 90^\circ - i$$

$$\mu = \frac{\sin i}{\sin(90 - i)} = \frac{\sin i}{\cos i} = \tan i$$

$$i = \tan^{-1}(\mu)$$

16. An object is situated at a distance of $f/2$ from a convex lens of focal length f. Distance of image will be

(a) $+(f/2)$ (b) $+(f/3)$

(c) $+(f/4)$ (d) $-f$

Ans : (d) $-f$

For a spherical lens $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

For convex lens, $u = -f/2$ and f is Positive

$$\frac{1}{v} = \frac{1}{(-f)} + \frac{1}{u} + \frac{1}{(-f)} = +\frac{1}{f} - \frac{2}{f}$$

$$v = -f$$

17. Two plane mirrors are set at right angle and a flower is placed in between the mirrors. The number of images of the flower which will be seen is

(a) One (b) Two

(c) Three (d) Four

Ans : (c) Three

18. An object is placed 20 cm from the concave mirror of focal length 10 cm, then image is formed at

(a) behind the mirror

(b) between the mirror and focus

(c) at focus

(d) centre of curvature of mirror

Ans : (d) centre of curvature of mirror

Given, focal length of concave mirror,

$$f = -10 \text{ cm}$$

Distance of object from concave mirror,

$$u = -20 \text{ cm}$$

From the mirror formula,

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

$$\frac{1}{-20} + \frac{1}{v} = \frac{1}{-10}$$

$$\frac{1}{v} = \frac{1}{20} - \frac{1}{10} = \frac{1-2}{20} = \frac{-1}{20}$$

$$v = -20 \text{ cm}$$

Hence, the image is formed at the centre of curvature of mirror.

19. The refractive index of dens flint glass is 1.65 and for alcohol, it is 1.36 with respect to air, then the refractive index of the dens flint glass with respect to alcohol is

(a) 1.31 (b) 1.21

(c) 1.11 (d) 1.01

Ans : (b) 1.21

Given,

Refractive index of flint glass with respect to air

$n_a = 1.36$

$$_fn_a = \frac{n_f}{n_a} = \frac{1.65}{1.36} = 1.21$$

Thus, the refractive index of flint glass with respect to alcohol is 1.21.

20. A virtual image three times the size of the object is obtained with a concave mirror of radius of curvature 36 cm. The distance of the object from the mirror is

(a) 20 cm (b) 10 cm

(c) 12 cm (d) 5 cm

Ans : (c) 12 cm

We know that, $f = \frac{R}{2}$

$$f = \frac{36}{2} = 18$$

Magnification, $m = 3$

$$m = \frac{f}{u - f}$$

$$-3 = \frac{18}{u - 18}$$

$$u = 12\,\text{cm}$$

21. A convex mirror of focal length of produces an image $\frac{1}{n^{th}}$ of the size of the object. The distance of the object from the mirror is

(a) $\frac{n+1}{n}f$ (b) $(n+1)f$

(c) $(n-1)f$ (d) $\frac{n-1}{n}f$

Ans : (c) $(n-1)f$

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

Take real +ve, virtual = − ve

Sign convention, $n = \frac{I}{O} = \frac{v}{u} = \frac{1}{\mu}$

$$v = \frac{u}{\mu}$$

$$\frac{1}{u} - \frac{n}{u} = \frac{1}{f}$$

$$f = \frac{u}{0 - n}$$

$$u = f(1 - n)$$

Required distance $= -u = (n-1)f$

22. An object is placed at the centre of curvature of a concave mirror. The distance between its image and the pole is

(a) equal to f (b) between f and $2f$

(c) equal to $2f$ (d) greater than $2f$

Ans : (c) equal to $2f$

An object is at c,

$$u = -c = -2f$$

Mirror formula, $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

For concave mirror, f is negative

$$-\frac{1}{f} = -\frac{1}{2f} + \frac{1}{v}$$

$$\frac{1}{v} = -\frac{1}{f} + \frac{1}{2f} = \frac{-1}{2f}$$

$$v = -2f$$

Distance of image from pole is $2f$.

23. A perfectly reflecting mirror has an area of $1\,\text{cm}^2$. Light energy is allowed to fall on it for an hour at the rate of $10\,\text{Wcm}^{-2}$. The force that acts on the mirror is

(a) $3.35 \times 10^{-7}\,\text{N}$ (b) $6.7 \times 10^{-7}\,\text{N}$

(c) $3.35 \times 10^{-8}\,\text{N}$ (d) $6.7 \times 10^{-8}\,\text{N}$

Ans : (d) $6.7 \times 10^{-8}\,\text{N}$

Let n photons fall on mirror each having frequency v_1 energy of all photons is 1 sec is $= 10\,\text{J} = nv$

Rate of change of momentum $= \frac{2nbv}{c}$ (after reflection)

$$= \frac{2}{c} \times 10 = \frac{20}{3 \times 10^8} = 6.7 \times 10^{-8}\,\text{N}$$

24. Refractive index of diamond with respect to glass is 1.6. If the absolute refractive index of glass is 1.5, then the absolute refractive index of diamond is

(a) 1.4 (b) 2.4

(c) 3.4 (d) 4.4

Ans : (b) 2.4

Given, $_d\mu_g = 1.6$ and $\mu_g = 1.5$

Refractive index of diamond with respect to glass

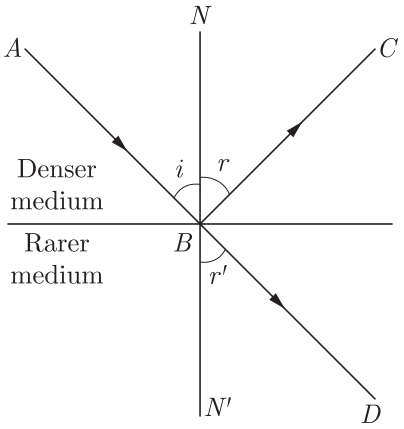
$$= \frac{\text{Absolute refractive index of diamond}}{\text{Absolute refractive index of glass } (\mu_g)}$$

So, absolute refractive index of diamond

= Refractive index of diamond glass $(_d\mu_g) \times$ Absolute refractive index of glass (μ_g)

$$\mu_d = 1.6 \times 1.5 = 2.4$$

25. A ray of light from a denser medium strikes a rarer medium at an angle of incidence as shown in figure. The reflected and refracted rays make an angle of 90° with each other. The angles of reflection and refraction are r and r'. The critical angle is



(a) $\sin^{-1}(\tan r)$ (b) $\sin^{-1}(\tan i)$

(c) $\sin^{-1}(\tan r')$ (d) $\tan^{-1}(\tan i)$

Ans : (a) $\sin^{-1}(\tan r)$

From figure, $i = r$ and $r' = 90° - r$

Now, $n = \frac{\sin i}{\sin r} = \frac{\sin r'}{\sin r} = \frac{\sin(90^\circ - r)}{\sin r}$

$n = \frac{\cos r}{\sin r} = \frac{1}{\tan r}$

We know that, $n = \frac{1}{\sin C}$

where, C = critical angle

$\frac{1}{\sin C} = \frac{1}{\tan r}$

$C = \sin^{-1}(\tan r)$

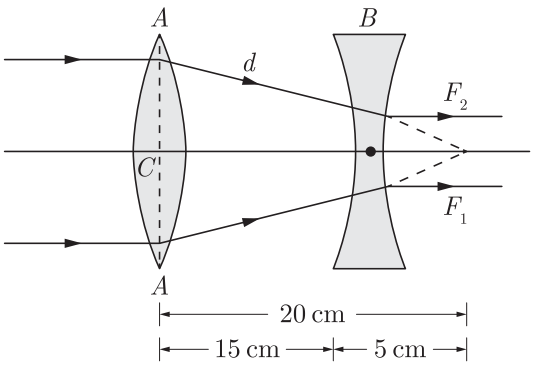
26. A convex lens A of focal length 20 cm and a concave lens B of focal length 5 cm are kept along the same axis with a distance d between them. If a parallel beam of light falling on A leaves B as a parallel beam, then the distance d in cm will be

(a) 25 (b) 15

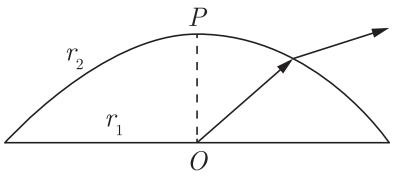
(c) 30 (d) 50

Ans : (b) 15

The situation is shown in figure. In the absence of concave lens, the parallel beam will be focussed at f_2 i.e. at a distance 20 cm from the lens A. The focal length of concave lens is 5 cm. i.e. if this lens is placed at 5 cm from f_2, then the beam will become parallel. So, $d = 15\,\text{cm}$.



27. A thick plane convex lens made of crown glass (refractive index 1.5) has thickness of 3 cm at its centre.



An ink mark made at the centre of its plane face, when viewed normal through the curved face, appears to be a distance x from the curved face. Then, x is equal to

(a) 2 cm (b) 2.1 cm

(c) 2.3 cm (d) 2.5 cm

Ans : (d) 2.5 cm

The ray of light from the object O gets refracted at the interface between lens and air and therefore appears to start from the point I in figure. So, I is the refracted image of the object O. The object distance u is PO and the image distance V is PI. [P is the pole of the spherical surface].

We have, $\frac{\mu_2}{v} - \frac{\mu_1}{u} = \frac{(\mu_2 - \mu_1)}{R}$

So that $\frac{1}{v} - \frac{1.5}{(-3)} = \frac{(1-1.5)}{(-5)}$

rearranging the above equation, we obtain.

$\frac{1}{v} = \frac{0.5}{5} - \frac{1.5}{3} = \frac{-6}{15}$

$v = -2.5\,\text{cm}$

28. If the refractive indices for water and diamond relative to air are 1.33 and 2.4 respectively, then the refractive index of diamond relative to water is-

(a) .55 (b) 1.80

(c) 3.19 (d) None of these

Ans : (b) 1.80

29. There is an equiconvex lens of focal length of 20cm. If the lens is cut into two equal parts perpendicular to the principle axis, the focal lengths of each part will be

(a) 20 cm (b) 10 cm

(c) 40 cm (d) 15 cm

Ans : (c) 40 cm

30. An object is placed in front of a screen and a convex lens is placed at a position such that the size of the image formed is 9 cm. When the lens is shifted through a distance of 20 cm. the size of the image becomes 1 cm. The focal length of the lens and the size of the object are respectively.

(a) 7.5 cm and 3.5 cm (b) 7.5 cm and 4.5 cm

(c) 6 cm and 3 cm (d) 7.5 cm and 3 cm

Ans : (d) 7.5 cm and 3 cm

If h_1 and h_2 are the size of the image in the two conjugate positions, the size of the object is given by

$h = \sqrt{(h_1 h_2)} = \sqrt{(9 \times 1)} = 3\,\text{cm}$

Considering the formations of the image in the first case, we have $\frac{v}{u} = \frac{9}{3}$. So that $v = 3u$.

Also, $v = 20 + u$ (since, v and u interchange in the conjugate position)

Therefore, $3u = 20 + u$ from which $u = 10\,\text{cm}$

$v = 20 + u = 30\,\text{cm}$

Focal length, $f = \frac{uv}{u+v}$

Since v is positive and u is negative in the equation,

$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

Therefore, $f = \frac{10 \times 30}{(10+30)} = 7.5\,\text{cm}$

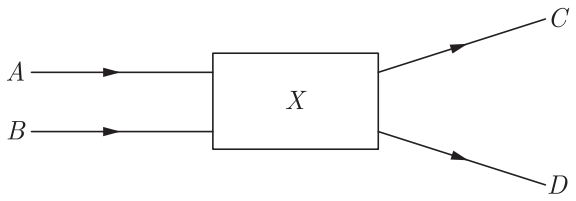
31. An object is placed 60 cm in front of a convex mirror. The virtual image formed by the mirror is located 30 cm behind the mirror. What is the object's magnification

(a) +2 (b) −2

(c) $+0.5$ (d) -0.5

Ans : (c) $+0.5$

32. Light rays A and B fall on optical component X and come out as C and D.



The optical component is a
(a) concave lens (b) convex lens
(c) convex mirror (d) prism

Ans : (a) concave lens

33. An object is placed 20.0 cm in front of a concave mirror whose focal length is 25.0 cm. What is the magnification of the object?
(a) $+5.0$ (b) -5.0
(c) $+0.20$ (d) -0.20

Ans : (a) $+5.0$

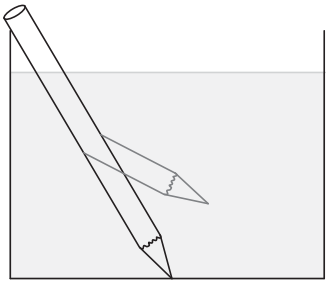
34. An object is placed at the radius of curvature of a concave spherical mirror. The image formed by the mirror is
(a) located at the focal point of the mirror.
(b) located between the focal point and the radius of curvature of the mirror.
(c) located at the center of curvature of the mirror.
(d) located out beyond the center of curvature of the mirror.

Ans : (c) located at the center of curvature of the mirror.

35. An object is placed 20.0 cm in front of a concave mirror whose focal length is 25.0 cm. Where is the image located?
(a) 1.0×10^2 cm in front of the mirror
(b) 1.0×10^2 cm behind the mirror
(c) 5.0×10^1 cm in front of the mirror
(d) 5.0×10^1 cm behind the mirror

Ans : (b) 1.0×10^2 cm behind the mirror

36. Which statement best describes the property of light waves illustrated in the diagram below?



(a) some materials absorb light waves.
(b) Some materials refracted by some materials.
(c) Light waves are refracted by some materials.
(d) Light waves are emitted by some materials.

Ans : (c) Light waves are refracted by some materials.

2. FILL IN THE BLANK

DIRECTION : Complete the following statements with an appropriate word/term to be filled in the blank space(s).

1. Two immiscible transparent liquids A and B have 1.2 and 1.4 as their refractive indices (with respect to air). The refractive index of B with respect to A is.....
Ans : 5/4

2. The power of a convex lens is ..... and that of a concave lens is .....
Ans : Positive, negative

3. Light seems to travel in .....
Ans : Straight lines

4. Power of a lens is the reciprocal of its .....
Ans : Focal length

5. The SI unit of power of a lens is .....
Ans : Dioptre

6. The centre of the reflecting surface of a spherical mirror is a point called the .....
Ans : Pole

7. The mirror used in the construction of shaving glass is ..... mirror.
Ans : Concave

8. An object is placed in front of a spherical mirror. The image is found to be virtual for all positions of the object. The spherical mirror is .....
Ans : Convex

9. The angle of incidence is ..... to the angle of reflection.
Ans : Equal

10. The reflecting surface of a spherical mirror may be curved ..... or .....
Ans : Inwards, outwards

11. The surface of the spoon can be approximated to a ..... mirror.
Ans : Concave

12. Line passing through the pole and the centre of curvature of a spherical mirror is called the .....
Ans : Principal axis

13. Parallel rays of light are reflected by a concave mirror to a point called the ..... . The focal length is the distance from the ..... to the pole of mirror.
Ans : Focus point, focus

14. Light is a form of ..... and it travels in a .....
Ans : energy, straight line

15. A ray of light passes ..... after refraction through the optical centre of a thin lens.
Ans : straight

16. A ray parallel to the principal axis, after reflection, will pass through the .....
Ans : Principal focus

17. $\frac{\sin i}{\sin r} = \mu$ is called ..... law.
Ans : Snell's

18. A light ray travelling obliquely from a denser medium to a rarer medium bends ..... the normal when it travels obliquely from a rarer to a denser medium.
Ans : Away from, towards

19. In case of a rectangular glass slab, the refraction takes place at both ..... interface and ..... interface. The emergent ray is ..... to the direction of incident ray.
Ans : Air-glass, glass-air, parallel

20. The centre of curvature of a concave mirror lies in ..... of it.
Ans : Front

21. According to the new cartesian sign convention, the focal length of a convex lens is ..... and focal length of a concave lens is .....
Ans : Positive, negative

22. A concave mirror ..... rays of light, whereas a convex mirror ..... rays of light.
Ans : converges, diverges

23. The dentists use ..... mirrors to see large images of the teeth of patients.
Ans : Concave

24. A transparent material bound by two surfaces, of which one or both surfaces are spherical, forms a .....
Ans : Lens

25. The degree of ..... of light rays achieved by a lens is expressed in terms of its power.
Ans : Convergence or divergence

3. TRUE/FALSE

DIRECTION : Read the following statements and write your answer as true of false.

1. A lens of power 1 dioptre must have a focal length of 1 cm.
Ans : False

2. Convex mirrors enable the driver to view much larger area than would be possible with a plane mirror.
Ans : True

3. A convex lens always forms a real image for a real object.
Ans : False

4. A concave lens will always give a virtual, erect and diminished image.
Ans : True

5. A glass slab can produce lateral displacement which occurs in the direction of the light.
Ans : True

6. A ray of light passing through the optical centre of a lens will emerge without any deviation.
Ans : True

7. All the distances measured in a direction opposite to that of incident rays are taken as negative.
Ans : True

8. A plane mirror can form virtual images.
Ans : True

9. An object is placed in front of a mirror and an image of it is formed at the object itself. The mirror mentioned in question is a convex mirror.
Ans : True

10. A concave mirror can produce both real and virtual images.
Ans : True

11. Light travels faster in glass than in air.
Ans : False

12. A lens that is thicker at the middle than at the edge is a diverging lens.
Ans : False

13. The refractive index of a transparent medium is the ratio of the speed of light in vacuum to that in the medium.
Ans : True

14. A concave mirror always produces inverted image.
Ans : False

15. The reflecting surfaces, of all types, obey the laws of reflection.
Ans : True

16. Light travels in vacuum with an enormous speed of $3 \times 10^8\ ms^{-1}$.
Ans : True

17. The speed of light is different in different media.
Ans : True

18. Light has transverse wave nature.
Ans : True

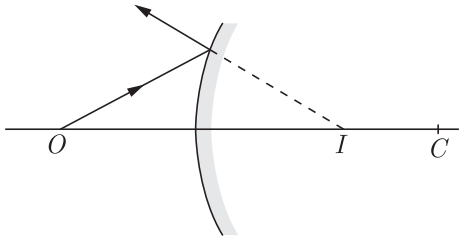
19. The laws of reflection are valid for plane mirrors and not for spherical mirrors.
Ans : False

20. The mirror formula is valid only if the aperture of the mirror is small.
Ans : True

21. When a ray of light travels from air to water, its speeds up.
Ans : False

22. The incident ray, the normal to the mirror at the point of incidence and the reflected ray, all lie in the same plane.
Ans : True

23. Image formed by a plane mirror is always virtual and erect.
Ans : False
Plane mirror can form real image as shown.



24. The principal focus of a spherical mirror lies midway between the pole and centre of curvature.
Ans : True

4. MATCHING QUESTIONS

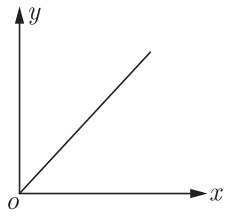
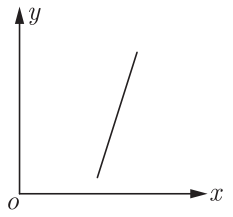
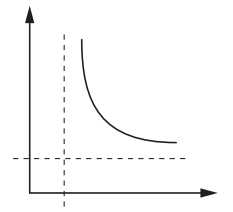
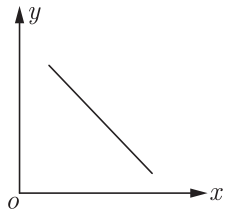
DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1. Match the Following

Column I		Column II	
(A)	Power of convex mirror	(p)	Positive power
(B)	Power of concave mirror	(q)	Negative power
(C)	Power of plane mirror	(r)	Zero power
(D)	Power of convex lens	(s)	Infinite power

Ans : A-q, B-p, C-r, D-p

2. The graphs given apply to convex lens of focal length f, producing a real at a distance v from the optical centre when self luminous object is at distance u from the optical centre. The magnitude of magnification is m. Identify the following graphs with the first named quantity being plotted along y-axis.

Column I		Column II	
(A)	ν against u	(p)	
(B)	$\frac{1}{\nu}$ against $\frac{1}{u}$	(q)	
(C)	m against ν	(r)	
(D)	$(m+1)$ against $\frac{\nu}{f}$	(s)	

Ans : A-r, B-s, C-q, D-p

3. A convex lens (f) forms an images on a screen Considering the object to be at the zero mark in a scale, match the following.

Column I		Column II	
(A)	Image	(p)	Moves the image of infinite object further away
(B)	Additional lens in contact	(q)	Not unique as lens is moved between object and source.
(C)	Reduction in refractive index	(r)	Virtual for screen position at a distance $< 4f$ from the object.

Column I		Column II	
(D)	Slicing the lens to have one plane and another	(s)	Object at d forms real image further convex surface nearer plano-convex lens.

	A	B	C	D
(a)	p, q	q	r	q,r
(b)	r	q	q, r, s	r, s
(c)	p, r	s	p	p, r
(d)	p	q, r	r	s

Ans : (c) A-p,r, B-s, C-p, D-p, r

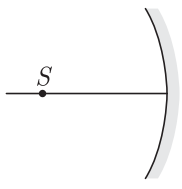
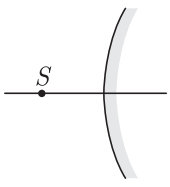
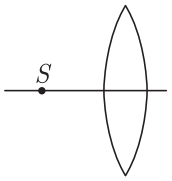
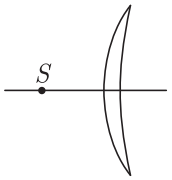
4. In the following columns, the position of an object is given is column I and the nature of image formed in a concave mirror is given in column II.

Column I (Position of object)		Column II (Nature of image)	
(A)	At infinity	(p)	Real
(B)	Between infinity and centre of curvature	(q)	Inverted
(C)	At centre of curvature	(r)	Diminished
(D)	At focus	(s)	Enlarged
		(t)	Same size

	A	B	C	D
(a)	p, q	q	r, s	q,r
(b)	r, s	q, r	s, t	p, q, r, s
(c)	p, s	q	r, s, t	r
(d)	p, q, r	p, q, r	p, q, t	p, q

Ans : (d) A-p, q, r, B-p, q, r, C-p, q, t, D-p, q

5. An optical component and an object S placed along its optic axis are given in **Column I.** The distance between the object and the component can be visaed. The properties of images are given in **Column II.** Match all the properties of images from **Column II** with the appropriate components given in **Column I.**

Column I		Column II	
(A)		(p)	Real image
(B)		(q)	Virtual image
(C)		(r)	Magnified image
(D)		(s)	Image at infinity

	A	B	C	D
(a)	p, q	q	r, s	q,r
(b)	p q, r, s	q	p, q, r, s	p, q, r, s
(c)	p, s	q	r, s, t	r
(d)	p	q, r	r	s

Ans : (b) A-p, q, r, s, B-q, C-p, q, r, s, D-p, q, r, s

6.

	Column I		Column II
1.	Reflection	(a)	The radius of that sphere of which the mirror is a part.
2.	Refraction	(b)	The bouncing back of light from a smooth surface.
3.	Incident ray	(c)	A mirror whose reflecting surface is the part of a hollow sphere.
4.	Spherical mirror	(d)	The bending of light, when it passes from one medium to another.
5.	Rarer medium	(e)	A ray of light that strikes the reflecting surface.
6.	Denser medium	(f)	It is the degree of convergence or divergence of light rays achieved by a lens.
7.	Radius of curvature	(g)	A medium in which the speed of light is less.
8.	Focal length	(h)	The centres of spheres which form the part of the surface of the lens.
9.	Optic centre	(i)	The distance of the principal focus from the pole of the mirror.
10.	Power of lens	(j)	A medium in which the speed of light is more.

Ans : 1-(b), 2-(d), 3-(e), 4-(c), 5-(j), 6-(g), 7-(a), 8-(i), 9-(h), 10-(f)

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

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

(c) Assertion (A) is true but reason (R) is false.

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

(e) Both Assertion and Reason are false.

1. **Assertion :** A point object is placed at a distance of 26 cm from a convex mirror of focal length 26 cm. The image will not form at infinity.
Reason : For above given system the equation $\frac{1}{u}+\frac{1}{\nu}=\frac{1}{f}$ gives $\nu=\infty$.
Ans : (c) Assertion (A) is true but reason (R) is false.

2. **Assertion :** Keeping a point object fixed, if a plane mirror is moved, the image will also move.
Reason : In case of a plane mirror, distance of object and Its image is equal from any point on the mirror.
Ans : (d) Assertion (A) is false but reason (R) is true.

3. **Assertion :** If both plane mirror and object are moved through a distance x, then the image moves through a distance $2x$.
Reason : When the object is fixed and plane mirror is moved through a distance x. Then the image is also moves through the distance $2x$.
Ans : (c) Assertion (A) is true but reason (R) is false.

4. **Assertion :** If a spherical mirror is dipped in water, its focal length remains unchanged.
Reason : A laser light is focused by a converging lens. There will be a significant chromatic aberration.
Ans : (c) Assertion (A) is true but reason (R) is false.

5. **Assertion :** Large concave mirrors are used to concentrate sunlight to produce heat in solar cookers.
Reason : Concave mirror converges the light rays falling on it to a point.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Concave mirror converges the light rays falling on it to a point. So large concave mirrors are used to concentrate sunlight to produce heat in solar cookers.

6. **Assertion :** Plane mirror may form real image.
Reason : Plane mirror forms virtual image, if objects is real.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Plane mirror forms virtual image of real object and real image of virtual object.

7. **Assertion :** The focal length of a convex mirror of radius R is equal to, $f=\left(\mu_g=\frac{3}{2}\right)$.
Reason : The focal length of convex lens in water becomes $4f$.
Ans : (d) Assertion (A) is false but reason (R) is true.

$$f_w = f\frac{{}_a\mu_g - 1}{\left(\frac{{}_a\mu_g}{{}_a\mu_g} - 1\right)} = f\frac{\left(\frac{3}{2}-1\right)}{\left(\frac{\frac{3}{2}}{\frac{4}{3}}-1\right)} = 4f$$

8. **Assertion :** The speed of light in glass depends on colour of light.
Reason : The speed of light in glass $v_g=\frac{c}{n_g}$ the refractive index (n_g) of glass is different for different colours.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

9. **Assertion :** If the rays are diverging after emerging from a lens; the lens must be concave.
Reason : The convex lens can give diverging rays.
Ans : (d) Assertion (A) is false but reason (R) is true

If the rays cross focal point of convex lens, they become diverging.

10. **Assertion :** Light travels faster in glass than in air.
Reason : Glass is denser than air.
Ans : (d) Assertion (A) is false but reason (R) is true.

11. **Assertion :** A ray of light incident along the normal to the plane mirror retraces its path after reflection from the mirror.
Reason : A ray of light along the normal has angle of incidence as $\pi/2$ and hence, it retraces its own path after reflection from mirror.
Ans : (c) Assertion (A) is true but reason (R) is false.

Angle of incidence = Angle between incident ray normal to the mirror $= 0^\circ$

12. **Assertion :** The height of an object is always considered positive.
Reason : An object is always placed above the principal axis in this upward direction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

13. **Assertion :** Refractive index has no units.
Reason : The refractive index is a ratio of two similar quantities.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** When a concave mirror is held under water, its focal length will increase.
Reason : The focal length of a concave mirror is independent of the medium in which it is placed.
Ans : (d) Assertion (A) is false but reason (R) is true.

15. **Assertion :** A ray incident along normal to the mirror retraces its path.
Reason : In reflection, angle of incidence is always equal to angle of reflection.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

When light ray incident along normal to the mirror, angle of incidence $\angle i = 0^\circ$. According to law of reflection $\angle i = \angle r$, therefore angle of reflection $\angle r = 0^\circ$, i.e. the incident ray retraces its path.

16. **Assertion :** A convex mirror is used as a driver's mirror.
Reason : Because convex mirror's field of view is large and images formed are virtual, erect and diminsed.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

17. **Assertion :** When a concave mirror is held under water, its focal length will increase.
Reason : The focal length of a concave mirror is independent of the medium in which it is placed.
Ans : (d) Assertion (A) is false but reason (R) is true.

Focal length is the property of mirror and is independent of the medium in which it is placed.

18. **Assertion :** A virtual image cannot be photographed.
Reason : Only real objects are photographed.
Ans : (c) Assertion (A) is true but reason (R) is false.

An image is a plane mirror is virtual and it can be photographed.

19. **Assertion :** If both object and plane mirror are moved through a distance x, then the image moves through a distance $2x$.
Reason : If object is fixed and plane mirror is moved through a distance x then the image also moves through a distance $2x$.
Ans : (c) Assertion (A) is true but reason (R) is false.

20. **Assertion :** Higher is the refractive index of a medium or denser the medium, lesser if the velocity of light in that medium.
Reason : Refractive index is inversely proportional to velocity.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

According to Snell's law,

$$\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = \frac{c/v_2}{c/v_1} = \frac{v_1}{v_2}$$

$$n_1 v_1 = n_2 v_2$$

This shows that higher is the refractive index of a medium or denser the medium, lesser is the velocity of light in that medium.

21. **Assertion :** Mirror formula can be applied to a plane mirror.
Reason : A plane mirror is a spherical mirror of infinite focal length.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

22. **Assertion :** Red light travels faster in glass than green light.
Reason : The refractive index of glass is less for red light than for green light.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

23. **Assertion :** For observing traffic at back, the driver mirror is convex mirror.
Reason : A convex mirror has much larger field of view than a plane mirror.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

24. **Assertion :** The image formed by a concave mirror is certainly real if the object is virtual.
Reason : The image formed by a concave mirror is certainly virtual if the object is real.
Ans : (c) Assertion (A) is true but reason (R) is false

The image of real object may be real in case of concave mirror.

25. **Assertion :** When the object moves with a velocity $\vec{v}$, its image in the plane mirror moves with a velocity of $-2\vec{v}$.
Reason : The minimum height of the mirror to be required to see the full image of man of height h is $\frac{h}{2}$.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

26. **Assertion :** When the object moves with a velocity 2 m/s, its image in the plane mirror moves with a velocity of 4 m/s.
Reason : The image formed by a plane mirror is as far behind the mirror as the object is in front of it.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

27. **Assertion :** A convex mirror is used as a driver's mirror.
Reason : Convex mirrors have a wider field of view as they are curved outwards. They also give an erect, though diminished image.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

28. **Assertion :** The small object, to be seen in a microscope, is kept within the two foci of its objective.
Reason : In this case, the image formed by the objective is nearer to the eyepiece.
Ans : (c) Assertion (A) is true but reason (R) is false.

Object is placed between F and $2F$ of objective lens.

29. **Assertion :** As light travels from one medium to another, the frequency of light does not change.
Reason : Because frequency is the characteristic of source.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

30. **Assertion :** Light rays retrace their path when their direction is reversed (Law of reversibility of light rays)
Reason : For the refraction light, water is denser than air, but for the refraction of sound, water is rarer than air.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

31. **Assertion :** Speed of light in glass of

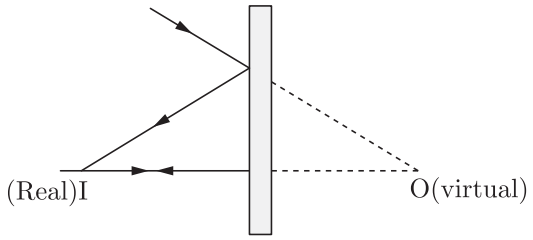
$$\mu = 1.5 \text{ is} 2 \times 10^8 \text{ m/sec}$$

Reason : According to dual theory, light has particle nature and wave nature simultaneously.
Ans : (c) Assertion (A) is true but reason (R) is false.

32. **Assertion :** It is not possible to see a virtual image by eye.
Reason : The rays that seem to emanate from a virtual image do not in fact emanates from the image.
Ans : (d) Assertion (A) is false but reason (R) is true.

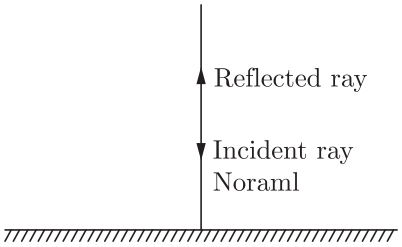
33. **Assertion :** Plane mirror may form real image.
Reason : Plane mirror forms virtual image, if objects is real.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Plane mirror may form real image, if object is virtual.



34. **Assertion :** An object is placed at a distance of f from a convex mirror of focal length f, its image will form at infinity.
Reason : The distance of image in convex mirror can never be infinity.
Ans : (d) Assertion (A) is false but reason (R) is true

The distance of image in convex mirror is always finite.



Angle of reflection $= 0^\circ$ (from laws of reflection) Hence, the reflected ray retraces its path along the normal at an angle 0° with normal.

35. **Assertion :** The mirror used in search lights are concave spherical.
Reason : In concave spherical mirror the image formed is always virtual.
Ans : (c) Assertion (A) is true but reason (R) is false.

36. **Assertion :** Refractive index of glass with respect to air is different for red light and violet light.
Reason : Refractive index of a pair of media depends on the wavelength of light used.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Refractive index of any pair of media is inversely proportional to wavelength of light.

Hence, $\gamma_v < \gamma_r$

$\mu_r < \mu_v$

where, γ_v and γ_r are the wavelengths of violet and red light. μ_v and μ_v are refractive index of violet and red light.

37. **Assertion :** The focal length of the convex mirror will increase, if the mirror is placed in water.
Reason : The focal length of a convex mirror of radius R is equal to, $f = \frac{R}{2}$
Ans : (d) Assertion (A) is false but reason (R) is true.

Focal length of the spherical mirror does not depend on the medium which it placed.

38. **Assertion :** As the temperature of a medium increases the refractive index decreases.
Reason : When a ray travels from vacuum to a medium, then μ is known as absolute refractive index of the medium. ($\mu_{\text{vacuum}} = 1$).
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

39. **Assertion :** Concave mirrors are used as make-up mirrors.
Reason : When the face is held within the focus of a concave mirror, then a diminished image of the face is seen in the concave mirror.
Ans : (c) Assertion (A) is true but reason (R) is false.

40. **Assertion :** Propagation of light through an optical fibre is due to total internal reflection taking palce at the core-clade interface.
Reason : Refractive index of the material of the core

of the optical fibre is greater than of air.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Optical fibre communication is based on the phenomenon of total internal reflection at core-clade interface. The refractive index of the material of the cladding, hence, light sinking at core-cladding interface gets totally internal reflected. The light undergoes and reaches the other end of the fibre.

41. **Assertion :** The refractive index of diamond is $\sqrt{6}$ and refractive index of liquid is $\sqrt{3}$. If the light travels from diamond to the liquid, it will initially reflected when the angle of incidence is 30°.

Reason : $\mu = \dfrac{1}{\sin C}$, where μ is the refractive index of diamond with respect to liquid.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Refractive index of diamond *w.r.t.* liquid

$$^{l}\mu_{b} = \frac{1}{\sin C} = \frac{\mu_d}{\mu_1}$$

$$\frac{\sqrt{6}}{\sqrt{3}} = \frac{1}{\sin C}$$

$$\sin C = \frac{1}{\sqrt{2}} = \sin 45^\circ$$

$$C = 45^\circ$$

CHAPTER 11

Human Eye and The Colorful World

1. OBJECTIVE QUESTIONS

1. The human eye forms the image of an object at its
(a) cornea (b) iris
(c) pupil (d) retina

Ans : (d) retina

2. The change in focal length of an eye lens is caused by the action of the
(a) pupil (b) retina
(c) ciliary muscles (d) iris

Ans : (c) ciliary muscles

3. In the visible spectrum the colour having the shortest wavelength is
(a) Green (b) Red
(c) Violet (d) Blue

Ans : (c) Violet

4. Even in absolutely clear water, a diver cannot see very clearly because
(a) rays of lights get diffused
(b) velocity of light is reduced in water
(c) ray of light passing through the water makes it turbid.
(d) the focal length of the eye lens in water gets changed and the image is no longer focussed sharply on the retina.

Ans : (d) the focal length of the eye lens in water gets changed and the image is no longer focussed sharply on the retina.

The refractive indices of water and the cornea are so similar that the bending of light when it enters eye is negligible. The lens does not focus the image on retina but somewhere behind it. Due to this one cannot see clearly in absolutely clear water.

5. When ciliary muscales are relaxed, focal length of eye lens is
(a) maximum
(b) minimum
(c) Neither maximum nor minimum
(d) Cannot say

Ans : (a) maximum

When we are looking at distant objects, the ciliary muscles are relaxed and the eye lens becomes thin. Consequently, the focal length of the eye lens becomes maximum.

6. A person with a myopic eye cannot see object beyond $-1.2\,\text{m}$ distinctly. The power of the corrective lens used to restore proper vision is
(a) $-0.83\,\text{D}$ (b) $-0.92\,\text{D}$
(c) $+0.21\,\text{D}$ (d) $+0.91\,\text{D}$

Ans : (a) $-0.83\,\text{D}$

The corrective lens should form the image of far off object at the far point of the myopic person. So, by using lens formula,

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{-1.2} - \frac{1}{\infty} = -\frac{1}{1.2}$$

$$f = -1.2\,\text{m}$$

$$\text{Power of a lens, } P = -\frac{1}{1.2} = -0.83\,\text{D}$$

7. The least distance of distinct vision for a young adult with normal vision is about
(a) 25 m (b) 2.5 cm
(c) 25 cm (d) 2.5 m

Ans : (c) 25 cm

8. A person uses a lens of power $+3\,\text{D}$ to normalise vision. Near point of hyper-me-tropic eye is
(a) 1.66 m (b) 0.66 m
(c) 0.33 m (d) 1 m

Ans : (d) 1 m

Focal length of lens,

$$f = \frac{1}{P}$$

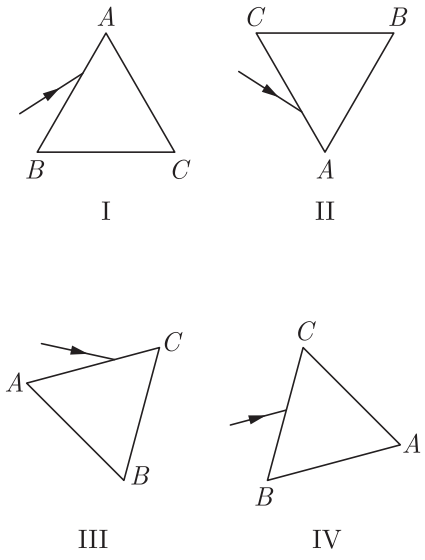
$$= \frac{1}{3} \times 100 = \frac{100}{3}\,\text{cm}$$

By lens formula, $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\frac{1}{\frac{100}{3}} = \frac{1}{v} - \frac{1}{(-25)}$$

$$v = -100\,\text{cm} = -1\,\text{m}$$

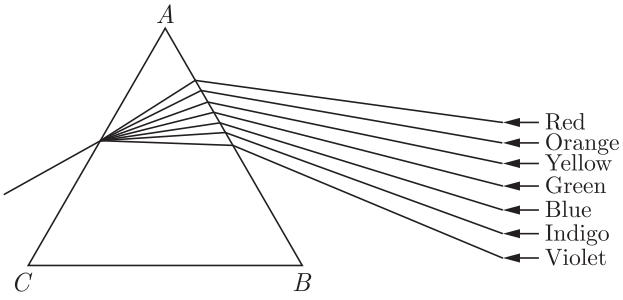
9. A prism ABC (with BC as base) is placed in different orientations. A narrow beam of white light is incident on the prism as shown in figure. In which of the following cases, after dispersion, the sixth colour from the top corresponds to the colour of the sun?



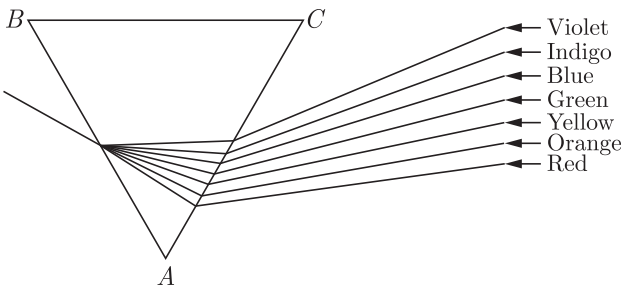
(a) (I) (b) (II)
(c) (III) (d) (IV)

Ans : (b) (II)

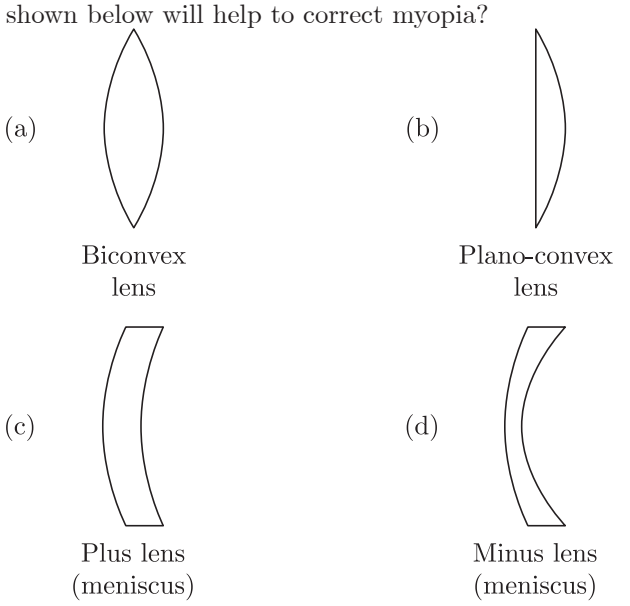
Generally, in case of a prism (II), the formation of spectrum is shown below



In the above figure, from top the sixth colour is Indigo. But we can see that from bottom the sixth colour is orange which is the colour of sun. So, we can obtain the correct situation by inverting the prism. Thus, the required orientations can be bound in case II.

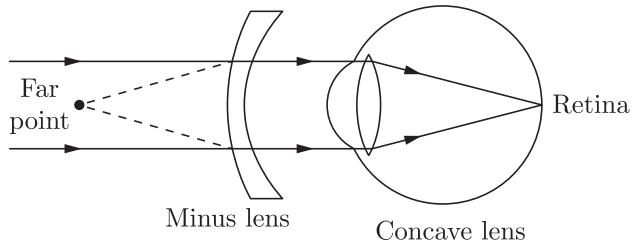


10. For a healthy eye, the rays of light entering the eye form a sharp image on retina. For a myopic eye, the rays from distant objects focus in front of the retina forming a blurred image. Which of the following lenses shown below will help to correct myopia?



Ans : (d)

Myopia can be corrected by using a concave lens or diverging lens of appropriate power. Here, lens 4 i.e. minus lens (meniscus) can be used to bring back the image on retina by diverging light rays intitally, thus, the defect is corrected.



11. A near sighted person wears eye glass of power 5.5 D for distant vision. His doctor prescribes a correction of +1D in near vision part of his bi-focals, which is measured relative to the main part of the lens. Then, the focal length of his near vision part of the lens is

(a) −18.18 cm (b) −20 cm
(c) −22.22 cm (d) +20.22 cm

Ans : (c) −22.22 cm

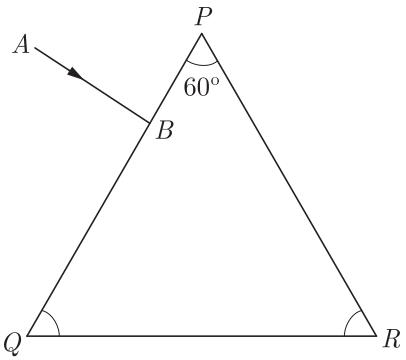
Power of lens after correction of +1D.

$$P_2 = P_1 + 1\text{D} = (-5.5 + 1)\text{D} = -4.5\,\text{D}$$

Focal length of near vision part of lens,

$$f_2 = \frac{1}{P_2} = \frac{100}{-4.5}\,\text{cm} = -22.22\,\text{cm}$$

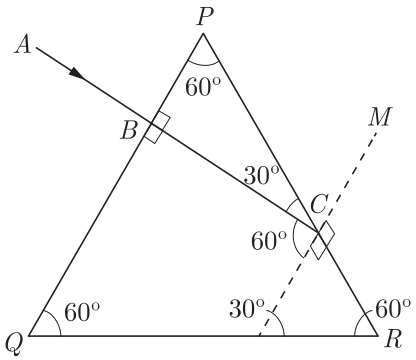
12. In given figure, a light ray AB is incident normally on one face PQ of an equilateral glass prism.
Find out the angles at faces PQ and PR.



(a) 60° (b) 30°
(c) 45° (d) 90°

Ans : (a) 60°

At face PQ, angle of incidence is 0° as ray AB falls normally on this face. This normally incident ray AB goes undeviated and strikes the face PR at point C. The angle of incidence, at point C with the normal MN is the angle NCB.
From the geometry of figure, it is clear that $\angle NCB$ is equal to 60°.



Therefore, angle of incidence at face PQ is 0° and angle of incidence at face PR is 60°

13. The following one is not a primary colour
(a) Yellow (b) Red
(c) Green (d) Blue

Ans : (a) Yellow

14. A thin prism P_1 with angle 4° and made from glass of refractive index 1.54 is combined with another prism P_2 made from glass of refractive index 1.92 to produce dispersion without deviation. Then, the angle of the prism P_2 is
(a) 2.3° (b) 4.3°
(c) 3.2° (d) 2.0°

Ans : (a) 2.3°

For a small-angled prism and for a small angle of incidence, deviation is given by

$$\delta = (n_g - 1)A$$

Where, n_g is refractive index of glass of prism

For prism $P_1 = \delta_1 = (n_{g_1} - 1)A_1$

For prism $P_2 = \delta_2 = (n_{g_2} - 1)A_2$

For no deviation, $\delta_1 = \delta_2$

$$(n_{g_1} - 1)A_1 = (n_{g_2} - 1)A_2$$

$$A_2 = \frac{(n_{g_1} - 1)}{(n_{g_2} - 1)}A_1$$

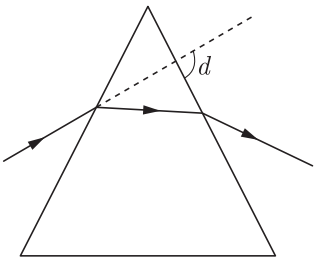
$$= \frac{(1.54 - 1)}{(1.92 - 1)} \times 4^\circ \qquad \begin{bmatrix} n_{g_1} = 1.54, \\ n_{g_2} = 1.92 \\ A_1 = 4^\circ \end{bmatrix}$$

$$A_2 = 2.3^\circ$$

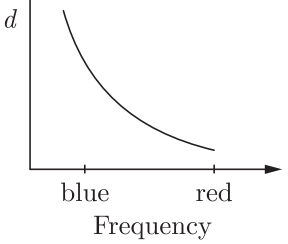
15. At the moment dew formation starts on a cool night, the air
(a) Must loose all water vapour
(b) Must remain unsaturated
(c) Must get mixed up with some ot
(d) Must become saturated

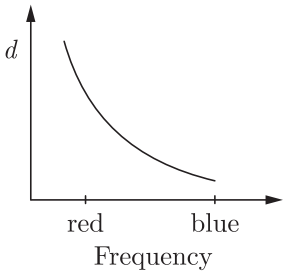
Ans : (d) Must become saturated

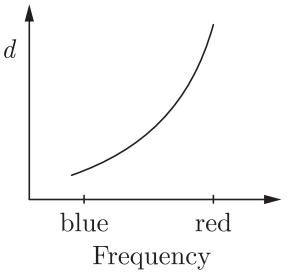
16. Light rays are deviated by a prism



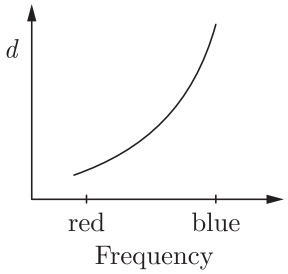
The deviation angle d is measured for light rays of different frequency, including blue light and red light. Which graph is correct?

(a)


(b)


(c)


(d)



Ans : (d)

When a white light passes through a prism, it disperses into its component colours i.e. VIBGYOR. Since, blue colour refracts the most, its angle of deviation would be greater than for red colour. Also, the frequency of blue colour is greater than that of the red colour.

17. A glass slab is placed over a page on which the word VIBGYOR is printed with each letter in corresponding colour. Then, which of the following is correct?

(a) The images of all the letters will be in the same place as that on paper

(b) Letter V is raised more

(c) Letter R is raised more

(d) None of the above

Ans : (b) Letter V is raised more

The image of all the letters are not in the same place as each colour have different wavelength. The letter V for violet is raised more because its wavelength is least.

18. Rainbow is caused due to

(a) Reflection of sun light air

(b) Dispersion of sun light from water drops

(c) Refraction of sun light from water drops

(d) Diffraction of sun rays from water drops

Ans : (b) Dispersion of sun light from water drops

19. Which amongst the given radiation is preferred for taking photographs in fog?

(a) Ordinary visible light (b) Infrared

(c) Microwave (d) X-rays

Ans : (b) Infrared

Infrared radiations are used for photography in fog, because they are not much scattered by mist or fog and can penetrate through fog, so photography can be done easily.

20. A near sighted person cannot see distinctly beyond 50 cm from his eye. The power in diopter of spectacle lenses which will enable him to see distant objects clearly is

(a) $+50$ (b) -50

(c) $+2$ (d) -2

Ans : (d) -2

21. Sometimes blurred and less sharply defined images are formed. This defect is called

(a) Chromatic aberration (b) Spherical aberration

(c) Blurred lens (d) None of the above

Ans : (b) Spherical aberration

22. A person cannot see objects clearly which are nearer than 75 cms from his eyes, the disease he suffering from is

(a) Astigmatism (b) Myopia

(c) Hypermetropia (d) Presbyopia

Ans : (c) Hypermetropia

23. Fraunhofer lines in the sun's spectrum are present because

(a) Vapours of certain elements present in the atmosphere absorb certain colours

(b) The temperature of the sun is very high

(c) The sun does emit certain light

(d) Certain elements present in the sun interfere

Ans : (d) Certain elements present in the sun interfere

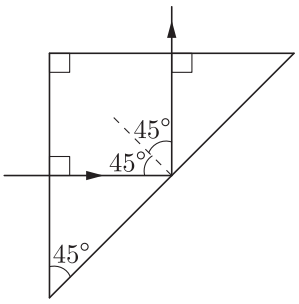
24. When a mirror is rotated an angle the reflected ray moves through double that angle, the instrument based on the above principle is

(a) Periscope (b) Odometer

(c) Refractometer (d) Sextant

Ans : (d) Sextant

25. A light ray is incident perpendicularly to one face of a 90° prism and is totally internally reflected at the glass-air interface. If the angle of reflection is 45°, we conclude that the refractive index



(a) $n > \frac{1}{\sqrt{2}}$ (b) $n > \sqrt{2}$

(c) $n < \frac{1}{\sqrt{2}}$ (d) $n < \sqrt{2}$

Ans : (b) $n > \sqrt{2}$

The incident angle is 45° incident angle>critical angle, $i > i_c$

$\sin i > \sin i_c$ or $\sin 45 > \sin i_c$

$$\sin i_c = \frac{1}{n}$$

$$\sin 45^\circ > \frac{1}{n}$$

or $$\frac{1}{\sqrt{2}} > \frac{1}{n}$$

$$n > \sqrt{2}$$

26. The splitting of white light into several colours on passing through a glass prism is due to

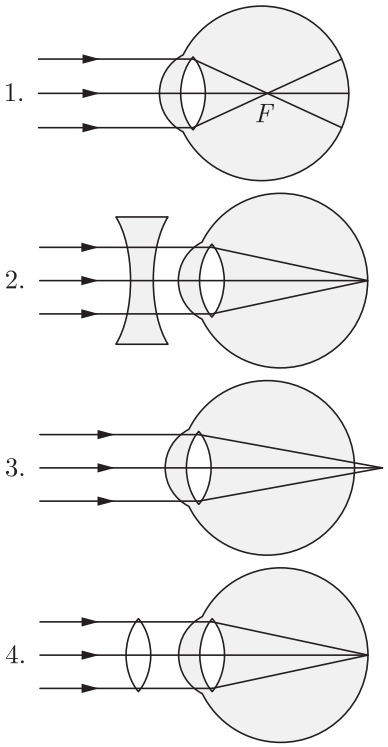
(a) refraction (b) reflection

(c) interference (d) diffraction

Ans : (a) refraction

Dispersion arises because of basic phenomenon refraction.

27.



Identify the wrong description of the above figures
(a) 1 represents far-sightedness
(b) 2 correction for short sightedness
(c) 3 represents far sightedness
(d) 4 correction for far-sightedness

Ans : (a) 1 represents far-sightedness

28. At sun rise or at sun set the sun appears to be reddish while at mid-day it looks white. This is because
(a) Scattering due to dust particles and air molecules causes this phenomenon
(b) The sun is cooler at sun rise or at sunset
(c) Refraction causes this phenomenon
(d) Diffraction sends red rays to the earth at these times.

Ans : (a) Scattering due to dust particles and air molecules causes this phenomenon

29. The size of the pupil of the eye is adjusted by
(a) cornea (b) retina
(c) iris (d) blind spot

Ans : (c) iris

Iris is a dark muscular diaphragam that controls the size of the pupil.

30. On entering a glass prism, sun rays are
(a) Deviated but not dispersed
(b) Deviated and dispersed
(c) Dispersed but not deviated
(d) Neither deviated nor dispersed.

Ans : (b) Deviated and dispersed

31. A piece of cloth looks red in sun light. It is held in the blue portion of a solar spectrum it will appear
(a) red (b) black
(c) blue (d) white

Ans : (b) black

32. To get line spectrum, the substances are excited in their
(a) solid state (b) molecular state
(c) gaseous state (d) atomic state

Ans : (d) atomic state

33. The frequency of light whose wavelength is 5000 Å is
(a) 15×10^{13} cycles per second
(b) 5000 cycles per second
(c) 6×10^{14} cycles per second
(d) 15×10^{16} cycles per second

Ans : (c) 6×10^{14} cycles per second

2. FILL IN THE BLANK

1. The closest distance at which the eye can focus clearly is called the .....

Ans : Near point

2. For a normal eye, the range of vision is from .....

Ans : 25 cm to infinity

3. ..... regulates and controls the amount of light entering the eye.

Ans : Pupil

4. For young adult with normal vision, least distance of distinct vision = ...

Ans : 25 cm.

5. ..... is a dark muscular diaphragm that controls the size of the pupil

Ans : Iris

6. The splitting of white light into its component colours is called .....

Ans : Dispersion

7. The eye which suffers from myopia as well as from hypermetropia is said to suffer from .....

Ans : Presbyopia

8. The eye which cannot simultaneously see with the same distinctness all objects or lines making different inclinations is said to suffer from .....

Ans : Astigmatism.

9. The defect of the eye due to which a person is unable to distinguish between certain colours, known as .....

Ans : Colour blindness

10. The coloured diaphragm between the cornea and the lens is .....
Ans : Iris

11. The ability of the eye to focus both near and distant objects, by adjusting its focal length, is called the .....
Ans : Accommodation of the eye.

12. The smallest distance, at which the eye can see objects clearly without strain, is called the ..... of the eye.
Ans : Near point

13. Phenomenon of splitting of white light into its constituent colours is .....
Ans : dispersion

14. Light enters the eye through a thin membrane called as .....
Ans : cornea

15. The middle point of the iris has a hole, which is called .....
Ans : Pupil

16. The screen on which the image is formed by the lens system of the human eye is called .....
Ans : Retina

17. ..... is the ability of the eye to adjust its focal length.
Ans : Accommodation of eye

18. ..... is the inside surface of the rear part of the eyeball where the light entering the eye is focused.
Ans : Retina

19. .....causes the blue colour of sky and the reddening of the Sun at sunrise and sunset.
Ans : Scattering of light

20. Sunlight comprises ..... colours.
Ans : 7

3. TRUE/FALSE

1. Lens which is used for correcting the presbyopia defect of the eye is concave.
Ans : False

2. The sun is visible two minutes before the actual sunrise due to atmospheric refraction.
Ans : True

3. To see an object comfortably and distinctly, you must hold it at about 25 cm from the eyes.
Ans : True

4. The colour of the scattered light does not depend on the size of the scattering particles.
Ans : False

5. Hypermetropia is corrected by using a convex lens of suitable power.
Ans : True

6. The part of human eye that determines the colour of a person's eye is known as cornea.
Ans : False

7. The colour that deviates maximum while passing through a glass prism is violet.
Ans : True

8. Danger signal lights are red in colour.
Ans : True

9. Water droplets act as tiny prism in the formation of rainbow.
Ans : True

10. Te transparent spherical membrane covering the front of the eye is known as cornea.
Ans : True

11. The eye which can see near object clearly is said to suffer from hypermetropia.
Ans : False

12. The eye which cannot see distant objects clearly is said to suffer from myopia.
Ans : True

13. Colour blindness is a genetic disorder which occurs by inheritance.
Ans : True

14. The sun looks red at sunset because most of the blue light in sunrays is scattered leaving behind red yellow lights.
Ans : True

15. Clouds look white because water droplets of clouds scatter all colours of light equally.
Ans : True

16. A person suffering from myopia cannot see distant objects clearly.
Ans : True

17. The focal length of a given lens depends on the surrounding medium.
Ans : True

18. The angle between incident ray and emergent ray is called angle of deviation.
Ans : True

19. In Myopia the image of distant objects is focussed before the retina.

Ans : True

20. A dentist uses a convex mirror to view the inner parts of a patient's mouth.

Ans : False

21. the solar spectrum in general is an absorption spectrum.

Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Inverted crown-flint Glass prism	(p)	Deviation $\propto \frac{1}{\text{dispersive power}}$
(B)	Achromatism	(q)	Deviation without dispersion
(C)	Hollow prism	(r)	Absence of chromatic aberration
(D)	Glass slab	(s)	Dispersion without deviation

Ans : A-s, B-r, p, C-q, D-q

2. Column II gives lens that can be use to correct the defect of vision given in column I, match them correctly.

Column I		Column II	
(A)	Myopia	(p)	Convex lens
(B)	Hyper-metropia	(q)	Concave lens
(C)	Astigmatism	(r)	Cylindrical lens
(D)	Presbyopia	(s)	Bi-focal lens

Ans : A-q, B-p, C-r, D-s

3.

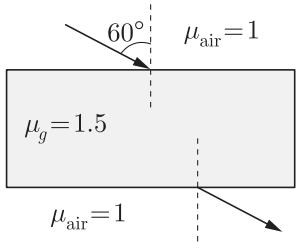
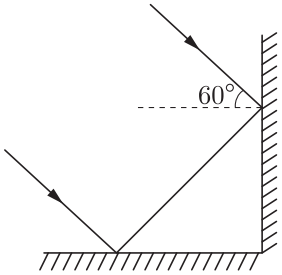
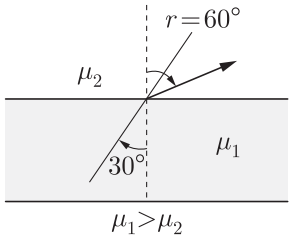
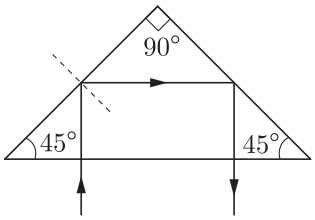
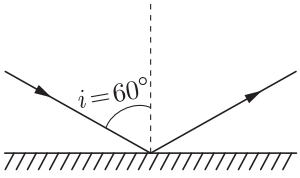
Column I		Column II	
(A)	Spectrometer	(p)	Refraction
(B)	Mirage	(q)	Deviation without dispersion
(C)	Hollow prism	(r)	To measure angle of prism
(D)	glass slab	(s)	To measure the dispersion

Column I		Column II	
		(t)	Dispersion without deviation

	A	B	C	D
(a)	s, r	r, p	q	q
(b)	s	p	q	r, t
(c)	p, q	s	r, s, t	q
(d)	q, s	q, r	s	s, t

Ans : (a) A-s, r, B-r, p, C-q, D-q

4. Angle of deviation is given in **Column-I** and ray diagram for angle of deviation in **Column -II**

Column I		Column II	
(A)	60°	(p)	
(B)	0°	(q)	
(C)	180°	(r)	
(D)	30°	(s)	
		(t)	

	A	B	C	D
(a)	t	p	q, s	r
(b)	r	t	q	r, t

	A	B	C	D
(c)	p, s	q	r, s, t	r
(d)	p	q, r	s	s, t

Ans : (a) A-t, B-p, C- q, s, D-r

A-t: The angle of deviation,

$$\delta = 180^\circ - 2i$$
$$= 180^\circ - 2 \times 60^\circ = 60^\circ$$

B-p: Glass slab produces no deviation and so $\delta = 0$.
C-q, s: Deviation in both the cases are 180°

D-r: $\delta = 60^\circ - 30^\circ = 30^\circ$

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Blue colour of sky appears due to scattering of blue colour.
Reason : Blue colour has shortest wave length in visible spectrum.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

During the day time, sky appears blue. This is because the size of the particles in the atmosphere is smaller than the wavelength of visible light, so they scatter the light of shorter wavelengths. The scatter blue light enters our eye.

2. **Assertion :** Hypermetropia is the defect of the eye in which only farther objects are seen.
Reason : Hypermetropia is corrected by using converging lens.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

3. **Assertion :** The focal length of the objective lens of the telescope is larger than that of eyepiece.
Reason : The resolving power of telescope increase when the aperture of objective lens is small.
Ans : (c) Assertion (A) is true but reason (R) is false.

The magnifying power of telescope is $m = \frac{f_0}{f_e}$. So, for high magnification, the focal length of objective lens should be larger than eyepiece.

Resolving power of a telescope $= \frac{d}{1.22\lambda}$. For high resolving power, diameter (d) of objective should be higher.

4. **Assertion :** The focal length of the mirror is f and distance of the object from the focus is u. The magnification of the mirror is $\frac{f}{u}$.
Reason : Magnification $= +\frac{\text{Size of image}}{\text{Size of object}}$
Ans : (d) Assertion (A) is false but reason (R) is true.

Magnification produced by mirror,

$$m = \frac{I}{O} = \frac{f}{f-u} = \frac{f}{x}.$$

Where, x is distance from focus.

and $$m = \frac{\text{Size of image (I)}}{\text{Size of object(O)}}$$

5. **Assertion :** Light from a distant object arriving at the eye lens may get converged at a point in front of the retina.
Reason : The eye is producing too much divergence in the incident beam.
Ans : (c) Assertion (A) is true but reason (R) is false.

The light from a distant object arriving at the eye lens may get converged at a point in front of the retina. This type of defect is called near-sightedness or myopia. This means that the eye is producing too much convergence in the incident beam.

6. **Assertion :** Thin prisms do not deviate light much.
Reason : Thin prism have small angle A and hence, $D_m = [(\mu - 1)A]$, where μ is the refractive index of prism w.r.t. medium 1.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

For thin prism, angle of prisms A is small.
For small A, D_{min} (minimum deviation) is also small.

So, $$\mu = \frac{\sin\left(\frac{A + D_{min}}{2}\right)}{\sin\left(\frac{A}{2}\right)} \quad ...(i)$$

$$\sin\left(\frac{A + D_{min}}{2}\right) \approx \frac{A + D_{min}}{2}$$
$(\sin\theta \approx \theta$ for small $\theta)$

and $$\sin\frac{A}{2} \approx \frac{A}{2}$$

Using above approximation, in equation (i)

$$\mu = \frac{A + D_{min}}{\frac{2}{A/2}}$$
$$D_{min} = (\mu - 1)A$$

Hence, it can be seen that if A is small, D_{min} is also small.

7. **Assertion :** Myopia is due to the increased converging power of the eye lens.
Reason : Myopia can be corrected by using spectacles made from concave lenses.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

In Myopia eye due to the increased converging power

of eye lens, the image of a far off object is formed in front of the retina.
Myopia can be corrected by using spectacles made from concave lens.

8. **Assertion :** The light of violet colour deviates the most and the light of red colour the least, while passing through a prism.
Reason : For a prism material, refractive index is highest for red light and lowest for the violet light.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

The light of violet colour deviates most and the light of red colour the least, while passing through a prism. For a prism material refractive index is highest for violet light and lowest for the red light.

9. **Assertion :** Myopia is the defect of the eye in which only nearer objects are seen by the eye.
Reason : The eye ball is elongated.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

10. **Assertion :** Secondary rainbow is fainter than primary rainbow.
Reason : Secondary rainbow formation is three step process and hence, the intensity of light is reduced at the second reflection inside the rain drop.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Primary rainbow is a result of three-step process.
1. Refraction at the first surface of raindrop.
2. Total internal reflection from the second surface of raindrop.
3. Again refraction from the first surface of raindrop from where the light finally emerges out. The intensity of light is reduced at the second reflection and hence, the secondary rainbow is fainter than the primary rainbow.

11. **Assertion :** The stars twinkle while the planet do not.
Reason : The stars are much bigger in size than the planets.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

As planets are of larger size than stars and much closer to the earth, planets can be considered as a collection of large number of point sized sources of light. The total variation in the amount of light entering our eye from all these individual point sized sources will average out to zero which nullify the twinkling effect of each other. Therefore, planets do not twinkle.

12. **Assertion :** There exists two angles of incidence for the same magnitude of deviation (except minimum deviation) by a prism kept in air.
Reason : In a prism kept in air, a ray is incident on first surface and emerges out of second surface. Now if another ray is incident on second surface (of prism) along the previous emergent ray, then this ray emerges out of first surface along the previous incident ray. This particle is called principle of reversibility of light.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

13. **Assertion :** A normal human eye can clearly see all the objects beyond certain minimum distance.
Reason : The human eye has capacity of adjusting the focal length of eye lens.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** A white light on passing through prism splits into its component colours as such that the red light emerges nearest to the base of the prism.
Reason : Wavelength of red light is more than other component colours and hence, red light deviates least.
Ans : (d) Assertion (A) is false but reason (R) is true.

Dispersion takes place because the refractive index of medium for different wavelengths (colours) is different. The refractive index is inversely proportion to λ by Cauchy's expression as

$$\mu(\lambda) = r + \frac{d}{\lambda^2} + \frac{c}{\lambda^4}$$

Hence, deviation$(D) = (\mu - 1)A$
Since λ_{red} is more than other colours wavelength. So, deviation is least for red and it appears farthest from the base of the prism.

15. **Assertion :** A rainbow is sometimes seen in the sky in rainy season only when observer's back is towards the sun.
Reason : Internal reflection in the water droplets cause dispersion and the final rays are in backward direction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

16. **Assertion :** Rainbow is an example of the dispersion of sunlight by the water droplets.
Reason : Light of shorter wavelength is scattered much more than light of larger wavelength.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

17. **Assertion :** When we see an object, the image formed On the retina is real and inverted.
Reason : If the magnification of a system is less than one, then the image formed is inverted.
Ans : (c) Assertion (A) is true but reason (R) is false.

The image formed on retina is real and inverted. If magnification is less than 1, then diminished images is formed not inverted.

18. **Assertion :** A normal human eye can clearly see all the objects beyond a certain minimum distance.
Reason : The human eye has the capacity to adjust

suitable the focal length of its lens to a certain extent.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

19. **Assertion :** The twinkling of stars is due to the fact that refractive index of the earth's atmosphere fluctuates.
Reason : In cold countries, the phenomenon of looming (i.e., ship appears in the sky) takes place, because refractive index of air decreases with height.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

20. **Assertion :** The optical instruments are used to increase the size of the image of the object.
Reason : The optical instruments are used increase the visual angle.

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

21. **Assertion :** The resolving power of a telescope is more if the diameter of the objective lens is more.
Reason : Objective lens of large diameter coileds more light.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

$RP \propto$ diameter of objective.

22. **Assertion :** The optical instruments are used to increase the size of the image of the object.
Reason : The optical instruments are used to increase the visual angle.

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

Optical instruments do not increase the size of the image of the object. It depends upon the distance between the object and objective lens.

23. **Assertion :** Danger signals are made of red colour.
Reason : Velocity of red light in air is maximum, so signals are visible even in dark.

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

24. **Assertion :** Sunlight reaches us without dispersion in the form of white light and not as its components.
Reason : Dispersion takes place due to variation of refractive index for different wavelength but in vacuum the speed of light is independent of wavelength and hence vacuum is a non-dispersive medium.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

In vacuum speed of light is independent of wavelength, Hence, no dispersion takes places in vacuum. Thus, vacuum is a non-dispersive medium in which all colours travel with the same speed.

25. **Assertion :** In case of rainbow, light at the inner surface of the water drop gets internally reflected.
Reason : The angle between the refracted ray and normal to the drop surface is greater than the critircal angle.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The rainbow is formed when light at the inner surface of the water drop gets internally reflected if the angle between the refracted ray and normal to the drop surface is greater than the critical angle.

26. **Assertion :** The sky looks dark and black instead of blue in outer space.
Reason : No atmosphere containing air in the outer space to scatter sunlight.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

CHAPTER 12

Electricity

1. OBJECTIVE QUESTIONS

1. Two unequal resistances are connected in parallel. Which of the following statement is true
(a) current in same in both
(b) current is larger in higher resistance
(c) voltage-drop is same across both
(d) voltage-drop is lower in lower resistance

Ans : (c) voltage-drop is same across both

2. You are given n identical wires, each of resistance R. When these are connected in parallel, the equivalent resistance is X. When these will be connected in series, then the equivalent resistance will be
(a) X/n^2 (b) n^2X
(c) X/n (d) nX

Ans : (b) n^2X

3. A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', then the ratio R/R' is
(a) 1/25 (b) 1/5
(c) 5 (d) 25

Ans : (d) 25

4. A letter A is constructed of a uniform wire of resistance 1 ohm per cm. The sides of the letter are 20 cm and the cross piece in the middle is 10 cm long. The resistance between the ends of the legs will be
(a) 32.4 ohm (b) 28.7 ohm
(c) 26.7 ohm (d) 24.7 ohm

Ans : (c) 26.7 ohm

5. Three resistances of 2, 3 and 5 Ω are connected in parallel to a 10 V battery of negligible internal resistance. The potential difference across the 3 Ω resistance will be
(a) 2 V (b) 3 V
(c) 5 V (d) 10 V

Ans : (d) 10 V

6. 2 ampere current is flowing through a conductor from a 10 volt emf source then resistance of conductor is
(a) 20 Ω (b) 5 Ω
(c) 12 Ω (d) 8 Ω

Ans : (b) 5 Ω

7. 20 coulomb charge is flowing in 0.5 second from a point in an electric circuit then value of electric current in amperes will be
(a) 10 (b) 40
(c) 0.005 (d) 0.05

Ans : (b) 40

8. A cylindrical rod is reformed to twice its length with no change in its volume. If the resistance of the rod was R, the new resistance will be
(a) R (b) $2R$
(c) $4R$ (d) $8R$

Ans : (c) $4R$

9. Three resistors of 4.0 Ω, 6.0 Ω and 10.0 Ω are connected in series. What is their equivalent resistance
(a) 20 Ω (b) 7.3 Ω
(c) 6.0 Ω (d) 4.0 Ω

Ans : (c) 6.0 Ω

10. A wire of resistance R is cut into ten equal parts which are then joined in parallel. The new resistance is
(a) 0.01 R (b) 0.1 R
(c) 10 R (d) 100 R

Ans : (a) 0.01 R

11. A current of 4.8 A is flowing in a conductor. The number of electrons passing per second through the conductor will be
(a) 3×10^{20} (b) 76.8×10^{20}
(c) 7.68×10^{-19} (d) 3×10^{19}

Ans : (d) 3×10^{19}

Given, current, I 4.8 A
$e = 1.6 \times 10^{-19}$ C

We know that, $I = \frac{q}{t} = \frac{ne}{t}$

$$\frac{n}{t} = \frac{I}{e} = \frac{4.8}{1.6 \times 10^{-19}}$$
$$= 3 \times 10^{19}$$

12. How much work is done in moving a charge of 2 C from a point of 118 V to a point of 128 V?

(a) 20 J (b) 30 J

(c) 40 J (d) 10 J

Ans : (a) 20 J

Given, charge, $q = 2\,\text{C}$

Potential at point A, $V_A = 118\,\text{V}$

Potential at point B, $V_B = 128\,\text{V}$

Potential difference, $\Delta V = V_B - V_A$
$= 128 - 118 = 10\,\text{V}$

Work done, $W = \Delta V \times q = 10 \times 2$
$= 20\,\text{J}$

13. If a wire of resistance R is melted and recast to half of its length, the new resistance of the wire will be

(a) $\frac{R}{4}$ (b) $\frac{R}{2}$

(c) R (d) $2R$

Ans : (a) $\frac{R}{4}$

Volume of the wire does not change when the wire si melted and recast. If l and A are the original length and area of cross-section and l' and A' are their corresponding values on reacastion

$$Al = A'l'$$
$$\frac{l'}{l} = \frac{A}{A'}$$
$$\frac{l'}{l} = \frac{1}{2}$$

We have $\frac{A}{A'} = \frac{1}{2}$

New resistance, $R' = \frac{\rho l'}{A'}$

$$R = \frac{\rho l}{A}$$
$$\frac{R'}{R} = \frac{\rho l'/A'}{\rho l/A} = \left(\frac{l'}{l}\right)\left(\frac{A}{A'}\right)$$
$$= \left(\frac{1}{2}\right)\left(\frac{1}{2}\right) = \frac{1}{4}$$
$$R' = R/4$$

14. 100 J of heat is produced each second in a $4\,\Omega$ resistance. The potential difference across the resistor is

(a) 20 V (b) 10 V

(c) 5 V (d) 15 V

Ans : (a) 20 V

Given, Heat, $H = 100\,\text{J}$

Resistance, $R = 4\,\Omega$

Time, $t = 1\,\text{s}$

We know that, $H = I^2Rt$

$$I = \sqrt{\frac{H}{Rt}} = \sqrt{\frac{100}{4 \times 1}} = 5\,\text{A}$$

Potential difference across the resistor is

$$V = IR = 5 \times 4 = 20\,\text{V}$$

15. Two bulbs have the following ratings:

1. 40 W, 220 V
2. 20 W, 100 V

The ratio of their resistance is

(a) 1 : 2 (b) 2 : 1

(c) 1 : 1 (d) 1 : 3

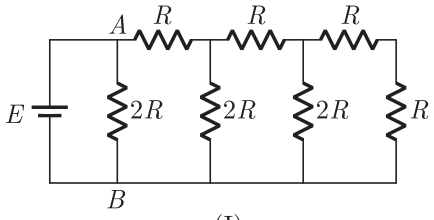
Ans : (b) 2 : 1

We have $P_1 = 40\,\text{W}$, $P_2 = 20\,\text{W}$, $V_1 = 220\,\text{V}$ and $V_2 = 110\,\text{V}$

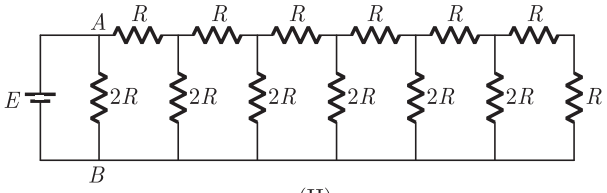
Now $P = VI = \frac{V^2}{R}$ and $R = \frac{V^2}{P}$

$$\frac{R_1}{R_2} = \frac{V_1^2}{V_2^2} \times \frac{P_2}{P_1} = \frac{(200)^2}{(110)^2} \times \frac{20}{40} = \frac{2}{1}$$
$$R_1 : R_2 = 2 : 1$$

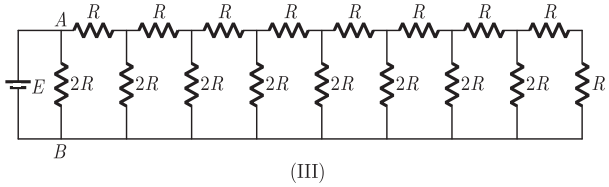
16. Three different circuits (I, II and III) are constructed using identical batteries and resistors of R and $2R$ ohm. What can be said about current I in arm AB of each circuit?



(I)



(II)



(III)

(a) $l_I > l_{II} > l_{III}$ (b) $l_I < l_{II} < l_{III}$

(c) $l_{II} < l_I < l_{III}$ (d) $l_I = l_{II} = l_{III}$

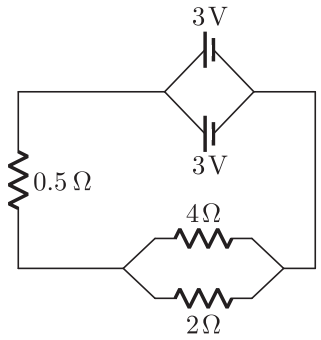
Ans : (d) $l_I = l_{II} = l_{III}$

In all the three circuits (I, II and III), the current in the arm AB is given by

$$I = \frac{E}{2R}$$ [By Ohm's law]

Since in mixed network of resistors, current in each arm of parallel connection of resistors is different.

17. Two cells of 3V each are connected in parallel. An external resistance of $0.5\,\Omega$ is connected in series to the junction of two parallel resistors of $4\,\Omega$ and $2\,\Omega$ and then to common terminal of battery through each resistor as shown in figure. What is the current flowing through $4\,\Omega$ resistor?



(a) 0.25 A (b) 0.55 A
(c) 0.35 A (d) 1.50 A

Ans : (b) 0.55 A

Resistors $4\,\Omega$ and $2\,\Omega$ are connected in parallel. So, their equivalent resistance is given by

$$R_p = \frac{4\times 2}{4+2} = \frac{8}{6} = \frac{4}{3}\,\Omega = 1.33\,\Omega$$

Total resistance of circuit,

$$R = R_p + 0.5\,\Omega = (1.33+0.5)\,\Omega = 1.83\,\Omega$$

Current in the circuit,

$$I = \frac{3\,V}{1.83\,\Omega} = 1.64\,\text{A}$$

Potential difference across $0.5\,\Omega$ resistor is

$$V' = 1.64\times 0.5 = 0.82\,\text{V}$$

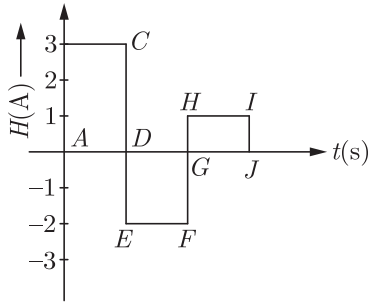
The potential difference across $4\,\Omega$ resistor is

$$V'' = V - V' = 3 - 0.82 = 2.18\,\text{V}$$

Thus, current flowing through $4\,\Omega$ resistor is

$$I_1 = \frac{2.18\,\text{V}}{4\,\Omega} = 0.55\,\text{A}$$

18. The current flowing through a wire of resistance $2\,\Omega$ varies with time as shown in figure alongside. The amount of heat produced (in J) in 3 s would be



(a) 2 J (b) 18 J
(c) 28 J (d) 10 J

Ans : (c) 28 J

Given,

Resistance of wire, $R = 2\,\Omega$

Amount of heat produced in first interval $(t = 0 \text{ to } t = 1\,\text{s})$ in region $ABCD$ is

$$H_1 = I_1^2 R t_1 = (3)^2 \times 2 \times 1 = 18\,\text{J}$$

Amount of heat produced in second interval $(t = 0 \text{ to } t = 2\,\text{s})$ in region $DEFG$ is

$$H_2 = I_2^2 R t_2 = (2)^2 \times 2 \times 1 = 8\,\text{J}$$

Amount of heat produced in third interval $(t = 2\,\text{s} \text{ to } t = 3\,\text{s})$ in region $GHIJ$ is

$$H_3 = I_3^2 R t_3 = (1)^2 \times 2 \times 1 = 2\,\text{J}$$

Total heat produced,

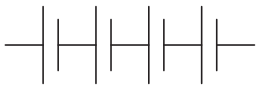
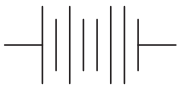
$$H = H_1 + H_2 + H_3$$
$$= 18 + 8 + 2 = 28\,\text{J}$$

19. A current of 1 A is drawn by a filament of an electric bulb. Number or electrons passing through a cross section of the filament in 16 seconds would be roughly

(a) 10^{20} (b) 10^{16}
(c) 10^{18} (d) 10^{23}

Ans : (a) 10^{20}

The proper representation of series combination of cells (Figure) obtaining maximum potential is

1. 
2. 
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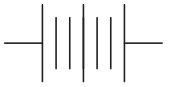
4. 

(a) 1 (b) 2
(c) 3 (d) 4

Ans : (a) 1

20. A cylindrical conductor of length l and uniform area of cross-section A has resistance R. Another conductor of length $2l$ and resistance R of the same material has area of cross section

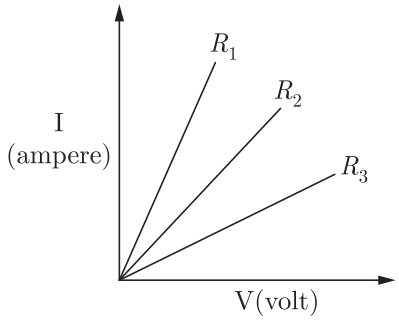
(a) $A/2$ (b) $3A/2$
(c) $2A$ (d) $3A$

Ans : (c) $2A$

21. A student carries out an experiment and plots the V-I graph of three samples of nichrome wire with resistances R_1, R_2 and R_3 respectively (Figure). Which of the following is true?

(a) $R_1 > R_2 = R_3$ (b) $R_1 > R_2 > R_3$
(c) $R_3 > R_2 = R_1$ (d) $R_2 > R_3 > R_1$

Ans : (c) $R_3 > R_2 = R_1$



22. An electric kettle consumes 1 kW of electric power when operated at 220 V. A fuse wire of what rating must be used for it?
(a) 1 A (b) 2 A
(c) 4 A (d) 5 A
Ans : (d) 5 A

23. What is the current through a 5.0 ohm resistor if the voltage across it is 10 V
(a) zero (b) 0.5 A
(c) 2.0 A (d) 5.0 A
Ans : (c) 2.0 A

24. The length of a wire is doubled. By what factor does the resistance change
(a) 4 time as large (b) twice as large
(c) unchanged (d) half as large
Ans : (d) half as large

25. A circular conductor is made of a uniform wire of resistance 2×10^{-3} ohm/metre and the diameter of this circular conductor is 2 metres. Then the resistance measured between the ends of the diameter is (in ohms)
(a) $\pi \times 10^{-3}$ (b) $2\pi \times 10^{-3}$
(c) $4\pi \times 10^{-3}$ (d) 4×10^{-3}
Ans : (c) $4\pi \times 10^{-3}$

26. A 24 V potential difference is applied is applied across a parallel combination of four 6 ohm resistor. The current in each resistor is
(a) 1 A (b) 4 A
(c) 16 A (d) 36 A
Ans : (b) 4 A

2. FILL IN THE BLANK

1. The S.I. unit of electric current is .....
Ans : Ampere

2. The S.I. unit of resistance is .....
Ans : Ohm (Ω)

3. The resistance of a conductor depends directly on its ....., inversely on its ....., and also on the ..... of the conductor.
Ans : Length, area of cross-section, material

4. 1 volt $\times$1 conductor.
Ans : Joule

5. The resistance of a semiconductor ..... with increase in temp.
Ans : Decreases

6. 1 kWh = ...
Ans : 3,600, 000 J

7. Electrical power $= \frac{(\text{Potential difference})^2}{\text{.....}}$
Ans : resistance

8. The alloy which is used for making the filament of bulbs is .....
Ans : Tungsten

9. Power transmission is carried out at high ..... and low ..... .
Ans : Voltage, current

10. Rate at which electric work is done is called .....
Ans : Electric power

11. Copper is a preferred material for making wire because of its low .....
Ans : Resistivity

12. The S.I. unit of resistivity is ..... .
Ans : Ohm-meter

13. Physical quantity represented by coulomb per second is ..... .
Ans : Electric current

14. ..... is a property that resists the flow of electrons in a conductor.
Ans : Resistance

15. The rate of flow of electric charge is called .....
Ans : Current

16. If there is no current, a voltmeter connected across a resistor will register ..... voltage.
Ans : Zero

17. The potential difference across the ends of a resistor is ..... to the current through it, provided its ..... remains the same.
Ans : Directly proportional, temperature

18. Combined resistance is the sum of separate resistances provided that the various conductors are connected in .....
Ans : Series

19. In a parallel circuit, each circuit, each circuit element has the same .....
Ans : Potential difference

20. Potential difference is a ..... quantity.
Ans : Scalar

21. Materials whose resistivity suddenly becomes ..... at a particular critical temperature is called as .....
Ans : zero, superconductor

22. Two resistances of $2\,\Omega$ each are connected in parallel. The equivalent resistance is ..... .
Ans : $1\,\Omega$

23. Current is considered as ..... along the direction of flow of ..... charge and opposite for ..... charge.
Ans : positive, positive, negative

24. The resistance of a wire is ..... proportional to the square of its radius.
Ans : Inversely

25. Kilowatt is the unit of electrical ..... but kilowatt-hour is the unit of electrical .....
Ans : Power, energy

26. Energy spent in kilowatt-hour

$$= \frac{\text{volt} \times \ldots\ldots\ldots \times \ldots\ldots\ldots}{1000}$$

Ans : Ampere, hour

27. A fuse is a short piece of wire of high ..... and low .....
Ans : Resistance, melting point

28. Fuse wire has a ..... melting point and is made of an alloy of ..... and ..... If the current in a circuit rises too high, the fuse wire .....
Ans : Low, lead, tin, melts

29. The fuse is placed in ..... with the device.
Ans : series

30. A fuse is connected in ..... to the ..... wire.
Ans : Series, live

31. The ..... reaction within the cell generates the potential difference between its two terminals that sets the ..... in motion to flow the current through a resistor.
Ans : chemical

32. Electric energy is produced by the ..... of charges.
Ans : Separation

33. In the series combination of resistors, the current is the ..... in very part of the circuit.
Ans : same

34. Energy converted per unit charge is measured with an instrument called a (n) .....
Ans : Voltmeter

35. The ..... is always connected in parallel across the points between which the potential difference is to be measured.
Ans : voltmeter

36. The electrical energy dissipated in a resistor is given by W = ...
Ans : $V \times I \times t$

37. In an electric circuit, the direction of electric current is taken as ..... to the direction of the flow of electrons, which are of ..... charges.
Ans : opposite, negative

38. The unit of power is .....
Ans : watt (W)

39. One watt of power is consumed when 1 A of current flows at a potential difference of .....
Ans : 1 V

40. Current = Charge $\times$
Ans : time

41. Tungsten wire is used in the electrical bulb due to .....
Ans : high

3. TRUE/FALSE

1. When a metallic conductor is heated the atoms in the metal vibrate with greater amplitude and frequency.
Ans : True

2. Two wires of resistances $2\,\Omega$ and $4\,\Omega$ are connected in parallel. The combination is connected to a 220 V supply. The power dissipated in $2\,\Omega$ resistor is more.
Ans : True

3. The reciprocal of resistance is called specific
Ans : False

4. Two wires of resistances $2\,\Omega$ and $4\,\Omega$ are connected in series. The combination is connected to a 220 V supply. The power dissipated in $2\,\Omega$ resistor is more.
Ans : False

5. The focal length of a given lens depends on the surrounding medium.
Ans : True

6. In the circuit to verify Ohm's law, ammeter and voltmeters both are connected in series with resistance

and cell in the circuit.

Ans : False

7. One kilowatt is equal to 10 horse power.

Ans : False

8. Fuse is a thin wire which melts and breaks the electric circuit due to only high voltage.

Ans : False

9. A copper wire of length L and cross-sectional area A carries a current I. If the specific resistance of copper is S, then electric field in the wire is Is/A.

Ans : True

10. The equivalent resistance of several resistors in series is equal to the sum of their individual resistances.

Ans : True

11. In parallel combination, the reciprocal of equivalent resistance is the sum of the reciprocal of individual resistance.

Ans : True

12. The series arrangement is used for domestic circuits.

Ans : False

13. A dentist uses a convex mirror to view the inner parts of a patient's mouth.

Ans : True

14. The resistivity of a wire is directly proportional to cross-sectional area.

Ans : True

15. The temperature coefficient of resistance of a wire is $0.00125/^\circ C$. The resistance of the wire is 1 ohm at 300 K. The resistance will be 2 ohm at 1100 K.

Ans : False

16. The quantity of charge flowing past a point multiplied by time is a current.

Ans : False

17. The resistivity of all pure metals increases with the rise in temperature.

Ans : True

18. Ohm's law is a relation between the power used in a circuit to the current and the potential difference.

Ans : False

19. Direction of current is taken opposite to the direction of flow of electrons.

Ans : True

20. The solar spectrum in general is an absorption spectrum.

Ans : False

21. When two resistances $1\,\Omega$ and $3\,\Omega$ are connected in parallel, their equivalent resistance is less than $1\,\Omega$.

Ans : True

22. The sun looks red at sunset because most of the blue light in sun rays is scattered leaving behind red yellow lights.

Ans : False

23. Clouds look white because water droplets of clouds scatter all colours of light equally.

Ans : False

24. The sun is visible two minutes before the actual sunrise due to atmospheric refraction.

Ans : True

25. The commercial unit of electrical energy is kilowatt-hour (kWh).

Ans : True

26. Pure tungsten has high resistivity and a high melting point (nearly $3000^\circ C$).

Ans : True

4. MATCHING QUESTIONS

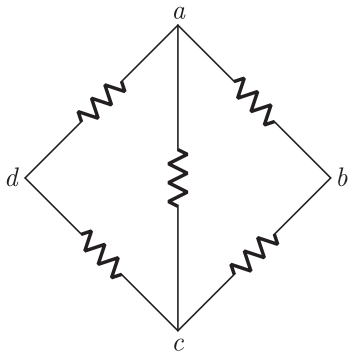
DIRECTION : (Q.No. 1-3) : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1. Match the Following

Column I		Column II	
(A)	Ohm	(p)	$\frac{\rho L}{A}$
(B)	Resistance	(q)	$\frac{1\text{ volt}}{1\text{ ampere}}$
(C)	Resistivity	(r)	zero resistance
(D)	Super conductor	(s)	ohm-meter

Ans : A-q, B-p, C-s, D-r

2. In the figure shown, the value of each resistance is R. match the entries of column I with the entries of column II.



Column I		Column II	
(A)	Resistance between a and b	(p)	$R/2$
(B)	Resistance between a and c	(q)	$\frac{5}{8}R$
(C)	Resistance between b and d r	(r)	R

Ans : A-q, B-p, C-

Ans : r

3. Column II gives name of material use for device given i column I

Column I		Column II	
(A)	Resistance of resistance box	(p)	$R/2+6$
(B)	Resistance between a and c	(q)	$\frac{5}{8}R$
(C)	Resistance between b and d r	(r)	R

Ans : A-q, B-r, C-p, D-s

DIRECTION : Following question has four statements (A, B, C and D...) given in Column I and 5 statements (p, q, r and s) in Column II. Any given statement in Column I can have correct matching with one or more statement (s) given in Column II. Match the entries in column I with entries in column II.

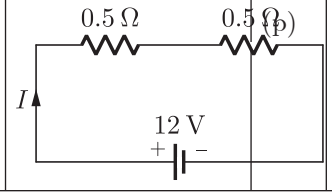
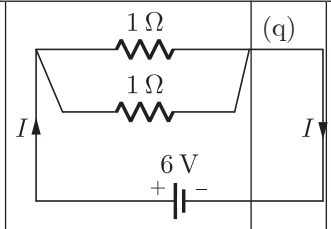
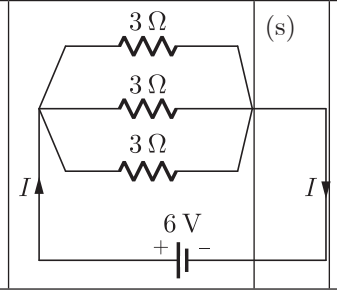
4.

Column I		Column II	
(A)	Ohm's Law	(p)	Direct proportional to area
(B)	Resistivity	(q)	Voltage α current
(C)	For Ohmic-conductor	(r)	$\frac{\text{charge}}{\text{time}}$
(D)	Electric current	(s)	$V = IR$

	A	B	C	D
(a)	q, s	p	q, s	D
(b)	p, q	q, s	r	q, r
(c)	p, s	q	r, s, t	r
(d)	p	q, r	r	r, s

Ans : (a) A-q, s, B-p, C-q, s D-r

5.

Column I		Column II	
(A)		(p)	$R_{eq} = 1\,\Omega$, $I = 12$ A
(B)		(q)	$\propto$ Length
(C)	Resistance	(r)	$R_{eq} = 1\,\Omega$, $I = 6$ A
(D)		(s)	$\propto \frac{1}{\text{Area}}$

	A	B	C	D
(a)	p	p	s, q	r
(b)	p, q	q, s	r	q, r
(c)	p	p	s, q	r
(d)	s, r	r	p, q	r, s

Ans : (a) A-p, B-p, C-s, q, D-r

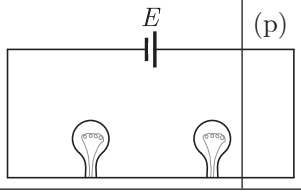
6.

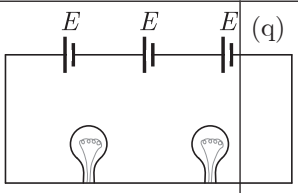
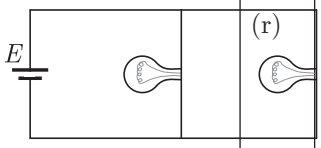
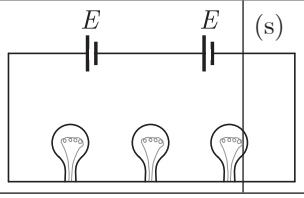
Column I		Column II	
(A)	Ohm	(p)	1 Volt/1 Amp
(B)	Current	(q)	Depends on matter of conductor
(C)	Resistivity	(r)	$\frac{\text{charge}}{\text{time}}$
(D)	Super conductor	(s)	$\frac{\text{Resistance}}{\text{Zero}}$

	A	B	C	D
(a)	p, r	p	r, s,	r
(b)	p	q, r	q	s
(c)	s, q	p, s	r	q
(d)	s, r	r	p, q	r, s

Ans : (b) A-p, B-q, r, C-q, D-s

7. For the circuit shown in the adjoining figure, match the entries of column I with the entries of column II.

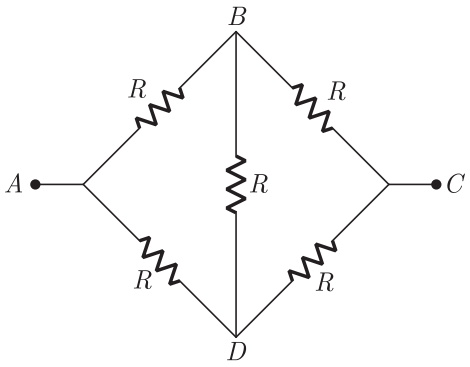
Column I		Column II	
(A)		(p)	Current drawn from the battery is maximum

Column I		Column II	
(B)		(q)	Current drawn from the battery is the least
(C)		(r)	Bulbs will lit the brightest
(D)		(s)	Bulbs will lit with brightness lying between maximum and minimum value

	A	B	C	D
(a)	q	r	p, s	s
(b)	p, q	q, s	r	q, r
(c)	s, r	r	p, q	r, s
(d)	p	p	s, q	r

Ans : (a) A-q, B-r, C-p, s, D-s

8. Consider a network of resistances each of value of R as shown in figure.



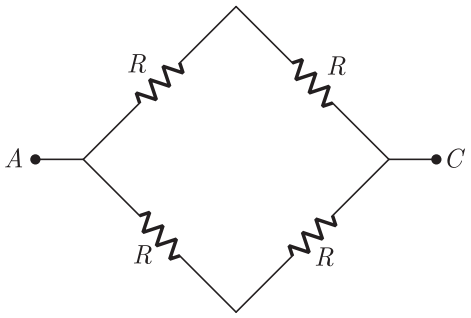
Column I		Column II	
(A)	Equivalent of net work between A and C is	(p)	same
(B)	Equivalent resistance between A and B	(q)	5/8 R
(C)	Potential of B and D when voltage source is applied across A and C is	(r)	R
(D)	Potential of B and D when voltage source is applied across A and B is	(s)	$2R$

Column I		Column II	
		(t)	different

	A	B	C	D
(a)	r	q	p	t
(b)	s	p	q	r, t
(c)	p	s	r, s	q
(d)	s	q, r	r	s, t

Ans : (a) A-r, B-q, C-p, D-t

A-r : $R_{AC} = R$



B-q : $R_{AB} = \frac{5R}{8}$

DIRECTION : Column A contains some electrical devices and Column B contains the material used for making these devices. Match Columns A and B.

9.

	Column I		Column II
1.	Filament of electrical bulb	(a)	Copper
2.	Heating elements	(b)	Lead-tin alloy
3.	Connection wire	(c)	Tungsten
4.	Fuse wire	(d)	Nichrome

Ans : 1-(c), 2-(d), 3-(a), 4-(b)

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

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

(c) Assertion (A) is true but reason (R) is false.

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

(e) Both Assertion and Reason are false.

1. **Assertion :** The connecting wires are made of copper.
Reason : The electrical conductivity of copper is high.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Copper conducts the current without offering much resistance due to high electrical conductivity.

2. **Assertion :** When the length of a wire is doubled, then its resistance also gets doubled.
Reason : The resistance of a wire is directly proportional to its length.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The resistance of wire,

$$R = \rho\frac{1}{A}$$

i.e. $R \propto l$

Since, the resistance of a wire is directly proportional to its length, i.e. when the length of a wire is doubled/ halved then its resistance also gets doubled/halved.

3. **Assertion :** A conductor has $+3.2 \times 10^{-19}$C charge.
Reason : Conductor has gained 2 electrons.
Ans : (c) Assertion (A) is true but reason (R) is false.

Conductor has positive charge, so it has lost two electrons.

4. **Assertion :** The 200 W bulbs glow with more brightness than 100 W bulbs.
Reason : A 100 W bulb has more resistance than 200 W bulb.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Resistance, $R = \frac{V^2}{P}$

$$R \propto \frac{1}{P}$$

i.e. Higher the wattage of a bulb, lesser is the resistance and so it will glow bright.

5. **Assertion :** If ρ_1 and ρ_2 be the resistivity of the materials of two resistors of resistances R_1 and R_2 respectively and $R_1 > R_2$.
Reason : The resistance $R = \rho\frac{l}{A} \Rightarrow \rho_1 > \rho_2$ if $R_1 > R_2$
Ans : (c)Assertion (A) is true but reason (R) is false.

ρ is the characteristic of. the material of resistors. It does not depend on the length and cross-sectional area of resistors. But R depends on the length and the cross-sectional are of the resistor.
So, R_1 may be greater than R_2 even when $\rho_1 \leq \rho_2$.

6. **Assertion :** Positive charge inside the cell always goes from positive terminal to the negative terminal.
Reason : Positive charge inside the cell may go from negative terminal to the positive terminal.
Ans : (d) Assertion (A) is false but reason (R) is true.

S.I. is true only when current is drawn from cell.

7. **Assertion :** Wire A is thin in comparison to wire B of same material same length then resistance of wire A is greater than resistance of wire B.
Reason : Resistivity of wire A is greater than resistance of wire B.
Ans : (c) Assertion (A) is true but reason (R) is false.

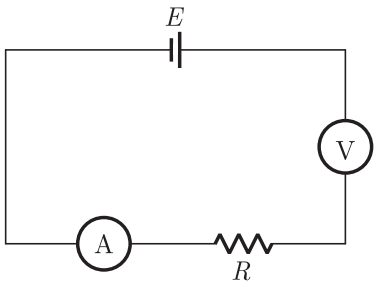
Resistivity is a material property.

8. **Assertion :** A voltmeter and ammeter can be used together to measure resistance but not power.
Reason : Power is proportional to voltage and current.
Ans : (e) Both Assertion and Reason are false.

$$\text{Resistance}, R = \frac{V}{I}$$

Power, $P = VI$
We can measure both resistance and power by measuring the V and I simultaneously in circuit. So option (e) is correct.

9. **Assertion :** All electric devices shown in the circuit are ideal. The reading of each of ammeter (a) and voltmeter (V) is zero.



Reason : An ideal voltmeter draws almost no current due to very large resistance, and hence (V) and (a) will read zero.
Ans : (c) Assertion (A) is true but reason (R) is false.

(a) will read zero but (V) will read E

10. **Assertion :** Electric appliances with metallic body have three connections, whereas an electric bulb has a two pin connection.
Reason : Three pin connections reduce heating of connecting wires.
Ans : (c) Assertion (A) is true but reason (R) is false.

The metallic body of the electrical appliances is connected to the third pin which is connected to the earth. This is a safety precaution and avoids eventual electric shock. By doing this the extra charge flowing through the metallic body is passed to earth and avoid shocks. There is nothing such as reducing of the heating of connecting wires by three pin connections.

11. **Assertion :** The resistivity of conductor increases with the increasing of temperature.
Reason : The resistivity is the reciprocal of the conductivity.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

The resistivity of the conductors in directly

proportional to temperature.

12. **Assertion :** If a graph is plotted between the potential difference and the current flowing, the graph is a straight line passing through the origin.
Reason : The current is directly proportional to the potential difference.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

13. **Assertion :** Resistance of 50 W bulb is greater than that of 100 W.
Reason : Resistance of bulb is inversely proportional to rated power.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

$$P = \frac{V^2}{R}$$

$$R \propto \frac{1}{P} \text{ (Same rated voltage)}$$

14. **Assertion :** Bending a wire does not affect electrical resistance.
Reason : Resistance of wire is proportional to resistivity of material.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Resistance of wire $\mathrm{R} = \rho\left(\frac{1}{A}\right)$
Where ρ is resistivity of material which does not depend on the geometry of wire. Since when wire is bended, resistivity, length and area of cross-section do not change, therefore resistance of wire also remains same.

15. **Assertion :** Two resistance having value R each. Their equivalent resistance is $\frac{R}{2}$.
Reason : Given Resistance is connected in parallel.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

When two resistance R_1 and R_2 connected in parallel than their equivalent resistance will be $r = \frac{R_1 R_2}{R_1 + R2}$.

16. **Assertion :** A tube light emits white light.
Reason : Emission of light in a tube takes place at a very high temperature
Ans : (c) Assertion (A) is true but reason (R) is false.

17. **Assertion :** Kirchoff's rule follows from conservation of charge.
Reason : Kirchoff's loop rule follows from conservation of momentum.
Ans : (c) Assertion (A) is true but reason (R) is false.
Kirchoff's loop rule follows from conservation of energy.

18. **Assertion :** Heater wire must have high resistance will be melting point.
Reason : If resistance is high, the electric conductivity will be less.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Heater wire must have high resistance and high melting point, because in series current remains same, therefore according to Joule's law, $H = I^2 Rt$, heat produced is high if R is high melting point must be high, so that wire may not melt with increase in temperature.

19. **Assertion :** Longer wires have greater resistance and the smaller wires have lesser resistance.
Reason : Resistance is inversely proportional to the length of the wire.
Ans : (c) Assertion (A) is true but reason (R) is false

20. **Assertion :** The equation $V = Ri$ does not apply to those conducting. devices which do not obey Ohm's law.
Reason : $V =$ RI is a statement of Ohm's law.
Ans : (c) Assertion (A) is true but reason (R) is false.

It is 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 resistance of all conducting devices, whether they obey Ohm's law or not.

21. **Assertion :** The product of resistivity and conductivity of a conductor depends on the material of the conductor.
Reason : Because each of resistivity and conductivity depends on the material of the conductor.
Ans : (c) Assertion (A) is true but reason (R) is false.

$$\text{Conductivity} = \frac{1}{\text{Resistivity}}$$

$$\text{Conductivity} \times \text{resistivity} = 1$$

22. **Assertion :** Insulators do not allow flow of current through themselves.
Reason : They have no free-charge carriers.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

23. **Assertion :** When current through a bulb decreases by 0.5% the glow of bulb decreases by 1%.
Reason : Glow (Power) which is directly proportional to square of current.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

$$\text{Glow} = \text{Power}$$

$$(P) = I^2 R$$

$$\frac{dP}{P} = 2\left(\frac{dI}{I}\right) = 2 \times 0.5 = 1\%$$

24. **Assertion :** Long distance power transmission is done

at high voltage.
Reason : At high voltage supply power losses are less.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

$$\text{Power loss} = i^2R = \left(\frac{P}{V}\right)^2 R$$

$[P = \text{Transmitted power}]$

25. **Assertion :** 40 W tube light give more light in comparison to 40 w bulb.
Reason : Light produced is same from same power.
Ans : (d) Assertion (A) is false but reason (R) is true.

In tube light majority portion of radiation comes under visible region while bulb radiation consists of visible, ultraviolet, infrared radiation giving less visible part.

26. **Assertion :** The electric bulbs glows immediately when switch is on.
Reason : The drift velocity of electrons in a metallic wire is very high.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

In a conductor there are large numbers of free electrons. When we close the circuit, the electric field is established instantly with the speed of electromagnetic wave which causes electron drift at every portion of the circuit. Due to which the current is set up in the entire circuit instantly. The current which is set up does not wait for the electrons flow from one end of the conductor to another end. It is due to this, the bulb glows immediately when switch is on.

27. **Assertion :** In a simple battery circuit the point of lowest potential is positive terminal of the battery.
Reason : The current flows towards the point of the lower potential as it flows in such a circuit from the negative to the positive terminal.
Ans : (d) Assertion (A) is false but reason (R) is true.

It is quite clear that in a battery circuit, the point of lowest potential is the negative terminal of the battery and the current flows from higher potential to lower potential.

28. **Assertion :** A resistor of resistance R is connected to an ideal battery. If the value of R is decreased, the power dissipated in the circuit will increase.
Reason : The power dissipated in the circuit will increase.
Ans : (c) Assertion (A) is true but reason (R) is false.

Here, $P = \frac{E^2}{R}$, so $P \propto R$ only when I is constant.
Here I increases as R is decreased. Hence the reason is wrong.

29. **Assertion :** The value of the current in the ammeter is the same, independent of its position in the electric circuit.
Reason : In a series combination of resistors the current is the same in every part of the circuit or the same current through each resistor.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

30. **Assertion :** When the resistances are connected between the same two points, they are said to be connected in parallel.
Reason : In case the resistance is to be decreased, then the individual resistances are connected in parallel.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

31. **Assertion :** A torch bulb give light if operated on AC of same voltage and current as DC.
Reason : Heating effect is common to both AC and DC.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

32. **Assertion :** When a battery is short-circuited, the terminal voltage is zero.
Reason : In the situation of a short-circuit, the current is zero
Ans : (c) Assertion (A) is true but reason (R) is false.

In the case of a short-circuited battery, the current

$$I = \frac{E(\text{e.m.f. of the battery})}{r(\text{internal resistance})} \neq 0$$

Terminal voltage, $V = IR = I(i) = I(0) = 0$
Where, $R = \text{external resistance} = 0$

33. **Assertion :** 40 W tube light give more light in comparison to 40 w bulb.
Reason : Light produced is same from same power.
Ans : (d) Assertion (A) is false but reason (R) is true.

In tube light majority portion of radiation comes under visible region while bulb radiation consists of visible, ultraviolet, infrared radiation giving less visible part.

34. **Assertion :** Alloys are commonly used in electrical heating devices, like electrical iron, toasters etc.
Reason : Alloys do not oxidise (burn) readily at high temperatures.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

35. **Assertion :** A resistor of resistance R is connected to an ideal battery. If the value of R is decreased, the power dissipated in the circuit will increase.
Reason : The power dissipated in the circuit is directly proportional to the resistance of the circuit.
Ans : (c) Assertion (A) is true but reason (R) is false.

Here, $P = \frac{E^2}{R}$, so $P \propto R$ only when I is constant.
Here I increases as R is decreased. Hence the reason is wrong.

36. **Assertion:** Tungsten metal is used for making filaments of incandescent lamps.
Reason : The melting point of tungsten is very low.
Ans : (c) Assertion (A) is true but reason (R) is false

37. **Assertion :** Resistivity of material may-change with temperature.
Reason : Resistivity is a material property & independent on temperature.
Ans : (c) Assertion (A) is true but reason (R) is false.

$$\rho = \rho_0(1 + \alpha \Delta T)$$

38. **Assertion :** When the resistances are connected end-to-end consecutively, they are said to be in series.
Reason : In case the total resistance is to be increased, then the individual resistances are connected in series.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

39. **Assertion :** Copper is used to make electric wires.
Reason : Copper has very low electrical resistance.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

A low electrical resistance of copper makes it a good electric conductor. So, it is used to make electric wires.

40. **Assertion :** Silver is not used to make electric wires.
Reason : Silver is a bad conductor.
Ans : (c) Assertion (A) is true but reason (R) is false

Silver is a good conductor of electricity but it is not used to make electric wires because it is expensive.

CHAPTER 13

Magnetice Effect of Electric Current

1. OBJECTIVE QUESTIONS

1. Instrument can be shielded from outside magnetic effects by surrounding them with
(a) Rubber shield (b) Glass shield
(c) Iron shield (d) Brass shield

Ans : (c) Iron shield

2. By removing the inducing magnet, the induced magnetism is
(a) Finished after some time
(b) Finished just after
(c) Not finished for a long time
(d) Not changed

Ans : (b) Finished just after

3. Choose the correct option (s).
The magnetic field inside a long straight solenoid-carrying current
(a) is zero
(b) decreases as we move towards its end.
(c) increases as we move towards its end.
(d) is the same at all points.

Ans : (d) is the same at all points.

4. Which of the following is not true
(a) Induction precedes attraction
(b) We cannot isolate a single pole
(c) We can magnetise an iron ring
(d) A permanent magnet retains its magnetism even when heated on a flame.

Ans : (d) A permanent magnet retains its magnetism even when heated on a flame.

5. Which of the following correctly describes the magnetic field near a long straight wire?
(a) The field consists of straight lines perpendicular to the wire.
(b) The field consists of straight lines parallel to the wire.
(c) The field consists of radial lines originating from the wire.
(d) The field consists of concentric circles centred on the wire.

Ans : (d) The field consists of concentric circles centred on the wire.

6. Magnetic field due to a current through a straight conductor depends on
(a) current
(b) distance from the wire
(c) Both (a) and (b)
(d) cross-sectional area of wire

Ans : (c) Both (a) and (b)

Magnetic field due to a current through a straight conductor depends on the current and distance from the wire (r) i.e.

$$B \propto I$$

$$B \propto \frac{1}{r}$$

$$B \propto \frac{I}{r}$$

7. The magnetic field at a distance r from a long wire carrying current I is 0.4. Tesla. The value of magnetic field at a distance $2r$ is
(a) 0.2 T (b) 0.1 T
(c) 0.15 T (d) 1 T

Ans : (a) 0.2 T

As, $$B \propto \frac{1}{r}$$

$$\frac{B_1}{B_2} = \frac{2r}{r}$$

$$B_2 = \frac{B_1}{2} = \frac{0.4}{2} = 0.2\ \text{T}$$

8. A positively-charged particle (alpha-particle) projected towards west is deflected towards north by a magnetic field. The direction of magnetic field is
(a) towards south (b) towards east
(c) downward (d) upward

Ans : (d) upward

9. The magnetic lines of force, inside a current carrying

solenoid, are
(a) along the axis and are parallel to each other
(b) perpendicular to the axis and equidistance from each other
(c) circular and they do not intersect each other
(d) circular at the ends but they are parallel to the axis inside the solenoid.

Ans : (a) along the axis and are parallel to each other

10. Which of the following statement is not correct about two parallel conductors carrying equal currents in the same direction?
(a) Each of the conductors will repel each other.
(b) The two conductors will repel each other.
(c) The are concentric lines of force around each conductor
(d) Each of the conductors will move if not prevented from doing so

Ans : (b) The two conductors will repel each other.

11. Force on a current carrying conductor in a magnetic field depends on
(a) direction of the current
(b) direction of magnetic field
(c) Both (a) and (b)
(d) length of the wire

Ans : (c) Both (a) and (b)

The direction of force on the conductor depends on
1. direction of current
2. direction of magnetic field

Force on the conductor is maximum when the direction of current is at right angle to the direction of magnetic field.

12. Which of the following processes will not produce new magnetic poles?
(a) cutting a bar magnet in half
(b) turning on a current in a solenoid
(c) running a current through a straight wire
(d) placing an iron rod in contact with a magnet

Ans : (c) running a current through a straight wire

13. A tesla is equivalent to a
(a) newton per coulomb
(b) newton per ampere-meter
(c) ampere per newton
(d) newton per ampere-second

Ans : (b) newton per ampere-meter

14. To avoid risk of electrical shock, which phenomena is used?
(a) Over loading (b) Short circuiting
(c) Earthing (d) None of these

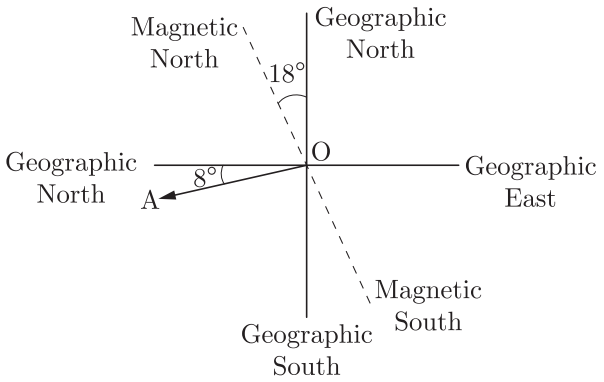
Ans : (c) Earthing

To avoid risk of electrical shock, the metal body of appliance is earthed. Earthing means to connect the metal case of the appliance to earth by means of a metal wire called earth wire. One end of the metal wire is buried in the earth.

15. A ship is to reach a place 8° south of west. In what direction should the ship be steered if declination at the place is 18° west?
(a) West of magnetic south at angle 64°
(b) East of magnetic north at angle 64°
(c) West of magnetic south at angle 50°
(d) East of magnetic north at angle 18°

Ans : (a) West of magnetic south at angle 64°

As the ship is to reach a place 8° South of West, i.e. along OA, as shown in figure, so, the ship should be steered West of magnetic North at an angle of $(90° - 18° - 8°) = 64°$



16. The effective length of the magnet is
(a) the complete length of the magnet
(b) the distance between the two poles of the magnet
(c) the half of the length of the magnet
(d) the square of the length of the magnet

Ans : (b) the distance between the two poles of the magnet

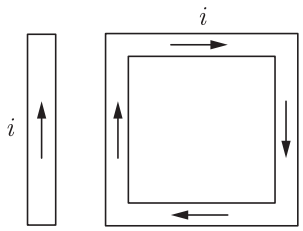
17. A small magnet is placed perpendicular to a uniform magnet field. The forces acting on the magnet will result in
(a) Rotational motion
(b) Translatory motion
(c) No motion at all
(d) Translational and rotational motion both

Ans : (a) Rotational motion

18. The magnetic field at a point due to a current carrying conductor is directly proportional to the
(a) current flowing through to the
(b) Distance from the conductor
(c) Voltage across the conductor
(d) Resistance of the conductor

Ans : (a) current flowing through to the

19. A rectangular loop carrying a current i is situated near a long straight wire such that the wire is parallel to one of the sides of the loop and is in the plane of the loop. If a steady current i is created in wire as shown in figure below, then the loop will



(a) rotate about an axis parallel to the wire
(b) move towards the wire
(c) move away from the wire or towards right
(d) remain stationary

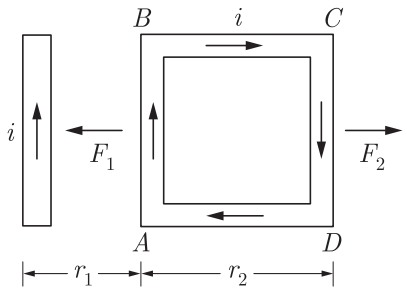
Ans : (b) move towards the wire

As, $r_1 < r_2$

So, $F_1 > F_2$

$F_{net} = F_1 - F_2$

directed towards the wire



20. Which of the following determines the direction of magnetic field due to a current carrying conductor?
(a) Faraday's laws of electromagnetic induction
(b) Fleming's left-hand rule
(c) Lenz's rule
(d) Maxwell's cork screw-rule

Ans : (d) Maxwell's cork screw-rule

21. Magnetic lines do not intersect on one-another because
(a) they are at a distance
(b) they are in the same direction
(c) they are parallel to another
(d) at the point intersection there will be two direction of the magnetic force which is impossible

Ans : (d) at the point intersection there will be two direction of the magnetic force which is impossible

22. A vertical wire carries a current upward. The magnetic field north of the wire will be directed
(a) upward (b) eastward
(c) westward (d) northward

Ans : (c) westward

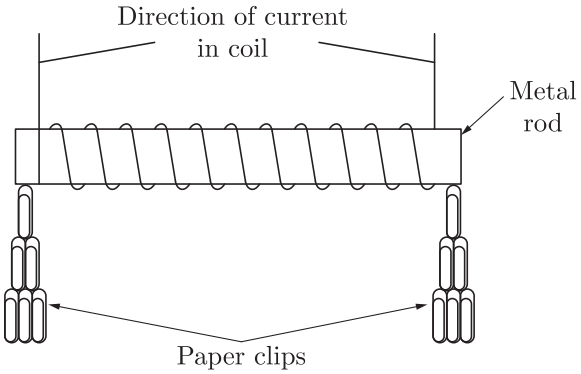
23. When the bars of bismuth are placed between the magnetic poles they set their length
(a) perpendicular to the lines of force
(b) along the lines of force
(c) neither perpendicular nor along the lines of force
(d) In any direction

Ans : (a) perpendicular to the lines of force

24. Which one of the following substances is the magnetic substances?
(a) Mercury (b) Iron
(c) Gold (d) Silver

Ans : (b) Iron

25. Four metal rods are placed, in turn, inside a coil of copper wire.



The table below gives the results of the experiment. Which rod would be the most suitable to use for the case of a coil in a circuit breaker?

Metal rod	Number of paper clips picket up when there is a current in the coil	Number of paper clips still attracted when the current is switched off
(a)	1	0
(b)	20	2
(c)	35	0
(d)	35	30

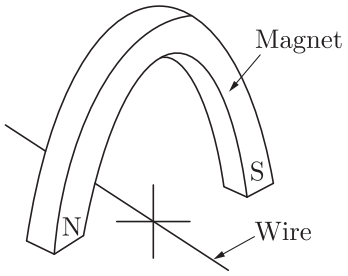
Ans : (c)

The core of the circuit breaker should be made up of soft iron type magnetic material which can be strongly magnetised. But it retains the magnetism till the current is flowing.

Only in the option (c), it is correctly listed. As, it attracts the greatest member of clips when current is

in the coil and as soon as current is removed, it does not attract any clips.

26. A copper wire is held between the poles of a magnet.



The current in the wire can be reversed. The pole of the magnet can also be changed over. In how many of the four directions shown can the force act on the wire?

(a) 1 (b) 2

(c) 3 (d) 4

Ans : (b) 2

From Fleming's left hand rule, we know that the force acting on the wire must be perpendicular to the current in the wire and the magnetic field.

This means, these are only two possibilities for the direction of the force i.e., upward or downward.

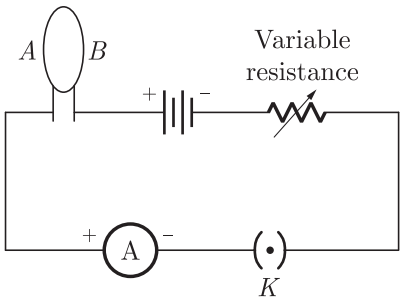
27. A circular loop placed in a plane perpendicular to the plane of paper carries a current when the key is ON. The current as seen from points A and B (in the plane of paper and on the axis of the coil) is anti clockwise and clockwise respectively. The magnetic field lines point from B to A. The N-pole of the resultant magnet is on the face close to

(a) A

(b) B

(c) A if the current is small, and B if the current is large

(d) B if the current is small and A if the current is large



Ans : (a) A

28. Three plotting compasses are placed close to a solenoid carrying a current. How many of the compass needles will change direction, if the current through the solenoid is increased? (Ignore the effect of the earth's magnetic field).

(a) Only 1 compass needle (b) 2 compass needle

(c) 3 compass needle (d) None of the above

Ans : (d) None of the above

The plotting compass gives the direction of the magnetic field. The magnitude of the current affects the strength of field and not the direction of the magnetic field. So, the compass needles will not change the direction.

29. The magnetic lines of force, inside a current carrying solenoid, are

(a) along the axis and are parallel to each other

(b) perpendicular to the axis and equidistance from each other

(c) circular and they do not intersect each other

(d) circular at the ends but they are parallel to the axis inside the solenoid.

Ans : (a) along the axis and are parallel to each other

2. FILL IN THE BLANK

1. A compass needle is a ..... magnet.

Ans : Small

2. Field lines are used to represent a .....

Ans : Magnetic field

3. Field lines are shown closer together where the magnetic field is .....

Ans : Greater

4. A metallic wire carrying an electric current has associated with it a ..... field.

Ans : Magnetic

5. The force that a magnetic field exerts on a current is always perpendicular to the ..... and to the .....

Ans : Field, Current

6. In a magnetic field pointing away from you, an electron traveling to the right will experience a force in the ..... direction.

Ans : Downward

7. Magnetic fields are produced by .....
Ans : Currents

8. Closeness of field lines indicate ..... magnetic field strength.
Ans : high

9. Magnetic field lines emerge from the ..... pole of a solenoid or a permanent magnet.
Ans : North

10. Field lines come out of ..... pole while enters from ..... pole.
Ans : North, South

11. The N-pole of a compass points to the ..... pole of a permanent magnet.
Ans : S

12. In right hand thumb rule the thumb points in the direction of .....
Ans : current

13. You are looking into a solenoid, at its S-pole, along its axis. From your view point, the direction of the current in the solenoid is .....
Ans : Clockwise

14. Crowding the wires of a solenoid more closely together will ..... the strength of the field inside it.
Ans : Increase

15. A Permanent behaves like a solenoid because both contain currents in the form of .....
Ans : Circles

16. The field lines about the wire consist of a series of concentric circles whose direction is given by the ..... rule.
Ans : Right-hand

17. An electric current can be used for making temporary magnets known as .....
Ans : Electromagnets

18. The unit of magnetic field is .....
Ans : Tesla

19. The S.I. unit of magnetic flux .....
Ans : Weber

20. The force between currents is called the ..... force.
Ans : Magnetic

21. The unit of self-inductance in SI system is ..... .
Ans : Henry

22. No force acts on a current carrying conductor when it is ..... to the magnetic field.
Ans : parallel

23. The magnetic lines of force are the lines drawn in a magnetic field along which a ..... pole would move.
Ans : North magnetic

24. An e.m.f. is induced in a coil when ..... linked with it changes.
Ans : The magnetic flux

25. In an AC generator, maximum number of lines of force pass through the coil when the angle between the plane of coil and lines of force is .....
Ans : 90

26. You are looking down the axis of a solenoid, and the current from your position is clockwise. The end of the solenoid facing you is a ..... pole.
Ans : South

27. Red colour insulation is used for ..... wire.
Ans : live

28. A generator converts mechanical energy into ..... energy. It works on the basis of .....
Ans : Electrical, Electromagnetic induction.

29. Larger the number of turns in the solenoid, greater will be the ..... produced.
Ans : magnetic field

30. In our houses we receive AC electric power of ..... with a frequency of .....
Ans : 220V, 50 Hz.

31. An electromagnet is a ..... magnet.
Ans : temporary

32. The frequency for A.C. (alternating current) in USA is .....
Ans : 60 Hz

33. The armature in a motor rotates within a ..... field.
Ans : Magnetic

34. To produce DC, the output of a generator must be fed through a .....
Ans : Commutator

35. In any generator, the current in the armature is of the .....type.
Ans : A.C

36. The phenomenon of production of back e.m.f. in a coil due to flow of varying current through it is called .....
Ans : Self-induction

37. SI unit of magnetic field strength is .....
Ans : tesla

3. TRUE/FALSE

1. The induced e.m.f. depends only the turns of the coil.
Ans : False

2. The magnitude of induced current can be increased by decreasing the speed of rotation of coil.
Ans : False

3. It is standard practice to connect fuse wire in the neutral wire of the household wiring.
Ans : False

4. The magnitude of induced current can be decreased by increasing the area of cross. section of coil.
Ans : False

5. A positive charge projected along the axis of a current carrying solenoid moves undeviated from its original path.
Ans : True

6. Energy associated with an electric field is analogous to potential energy whereas the energy associated with the magnetic field is analogous to kinetic energy.
Ans : True

7. No net force acts on a rectangular coil carrying a steady current when suspended freely in a uniform magnetic field.
Ans : True

8. An electron and a proton move in a uniform magnetic field with same speed perpendicular to the magnetic field. They experience forces in opposite directions differing by a factor of 1840.
Ans : False

9. There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it.
Ans : False

10. An electron does not suffer any deflections while passing through a region. This makes sure that there is no magnetic field in that region.
Ans : True

11. We can use either a two pin (plug and socked) or a three pin (plug and socket) while working with an electric iron.
Ans : False

12. The field at the centre of a long circular coil carrying current will be parallel straight lines.
Ans : True

13. A magnetic field exists in the region surrounding a magnet, in which the force of the magnet can be detected.
Ans : True

14. Fleming's left hand rule helps us to find the direction of the induced current.
Ans : False

15. The pattern of the magnetic field around a conductor due to an electric current flowing through it depends on the shape of the conductor.
Ans : True

16. We use the 'right hand thumb rule' for finding the direction of the magnetic field due to both a (current carrying) straight wire as well as a circular coil.
Ans : True

17. A current-carrying conductor when placed in a magnetic field always experiences a force.
Ans : False

18. The electrician must always follow the correct colour code while wiring the household circuits.
Ans : True

19. The direction of force on a current carrying conductor placed in a magnetic field can be reversed by reversing the direction of current flowing in the conductor.
Ans : True

20. While replacing a 'fuse wire'. the electrician must use a fuse wire of correct rating.
Ans : True

21. The direction of force on a current carrying conductor placed in a magnetic field cannot be reversing the direction of magnetic field.
Ans : False

22. Every household circuit must have proper earth wire installed in it.
Ans : True

23. Two magnetic lines of force never intersect each other.
Ans : True

24. It is always good habit not to touch an electric switch with wet hands.
Ans : True

25. The field lines inside the infinite solenoid are in the form of parallel straight lines.
Ans : True

26. An electric generator works on the principle of

electromagnetic induction.

Ans : True

27. In a DC electric motor a pair of split rings is used as commutator.

Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	An electric motor works on	(p)	to a battery
(B)	An electric motor is also	(q)	direct current
(C)	A commutator is used to	(r)	reverse the direction of flow of current.
(D)	Commutator rings are connected	(s)	known as DC MOTOR

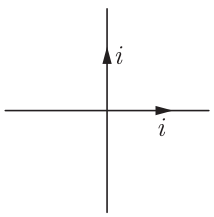
Ans : A-q, B-s, C-r, D-p

2. Column II gives approximate values of magnetic fields due to source given in column I

Column I		Column II	
(A)	At surface of neutron star	(p)	10^{-10} T
(B)	Near big electromagnet	(q)	1.5 T
(C)	At earth surface	(r)	10^{8} T
(D)	In interstellar space	(s)	10^{-4} T

Ans : A-r, B-q, C-s, D-p

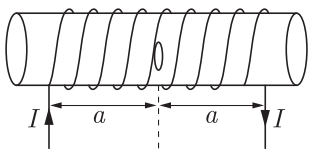
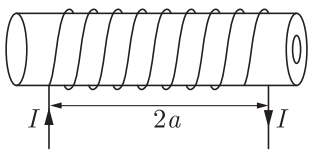
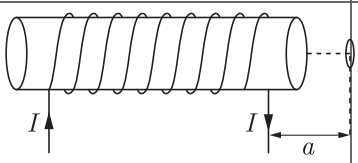
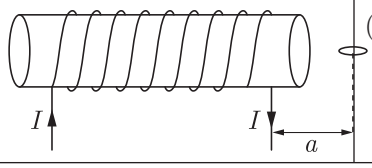
3. Equal currents i flow in two wires along x and y axis as shown. Match the following :



Column I		Column II	
(A)	Magnetic field in first quadrant	(p)	inwards
(B)	Magnetic field in second quadrant	(q)	outwards
(C)	Magnetic field in third quadrant	(r)	may be inwards or outwards
(D)	Magnetic field in fourth quadrant		

Ans : A-r, B-q, C-r, D-p

4. In column I, the position of small current carrying loops have been shown and in column II information related to force experienced by coil is given. Match the entries of column I with the entries of column II.(Assume solenoid radius to be small as compared to its length)

Column I		Column II	
(A)		(p)	Attractive
(B)		(q)	Repulsive
(C)		(r)	Zero
(D)		(s)	Initially zero, then starts increasing

	A	B	C	D
(a)	p	q	r	s
(b)	p, q	t	s	r
(c)	r	p	p	s
(d)	t	q, r	p, s	q

Ans : (c) A-r, B-p, C-p, D-s

The force experienced by a coil in a magnetic field is given by

$$F = P_m \frac{\delta B}{\delta r}$$

Where, $\frac{\delta B}{\delta r}$ is the increment of B along magnetic dipole moment of contour. You can write the expression for magnetic field due to solenoid at a general point and then differentiate it. From this information, you can have the results. Whether the force is attractive or repulsive can also be found by using the concept of nature of poles induced on the solenoid and coil.

The force comes out to be zero at centre and as we approach it from some outside point, its value increase.

For D: The coil first rotates to align itself in such a manner so as to link maximum flux and then the case would be same as that of C.

5. In magnetic field, for a charged particle, match the entries of column I with the entries of column II.

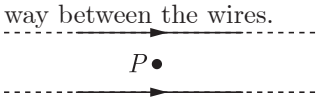
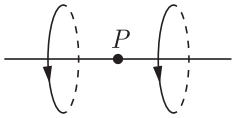
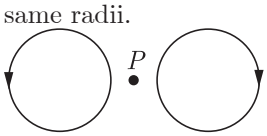
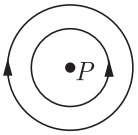
Column I		**Column II**	
(A)	Acceleration	(p)	may be zero
(B)	Velocity	(q)	is zero
(C)	Speed	(r)	may be constant
(D)	Kinetic energy	(s)	is constant

	A	**B**	**C**	**D**
(a)	p	r	s	s
(b)	s	p	q	r
(c)	p, q	s	r, s	q
(d)	q, s	q, r	s	s

Ans : (a) A-p, B-r, C-s, -D-s

Work done by magnetic force is zero. From work-energy theorem, its speed or kinetic energy is constant.

6. Two wires each carrying a steady current I are shown in four configurations in Column I. Some of the resulting effects are described in Column II. Match the statements in Column I with the statements in column II.

Column I		**Column II**	
(A)	Point P is situated mid-way between the wires. 	(p)	The magnetic fields (B) at P due to the currents in the wires are in the same direction.
(B)	Point P is situated at the mid-point of the line joining the centers of the circular wires, which have same radii. 	(q)	The magnetic fields (B) at P due to the currents in the wires are in opposite directions.
(C)	Point P is situated at the mid-point of the line joining the centers of the circular wires, which have same radii. 	(r)	There is no magnetic field at P.
(D)	Point P is situated at the common center of the wires. 	(s)	The wires repel each other.

	A	**B**	**C**	**D**
(a)	p, r	r, s	q, s,	s
(b)	s	p	q	r
(c)	q, r	p	q, r	q, s
(d)	q , s	q, r	s	s

Ans : (c) A-q, r B-p, C-q, r, D-q, s

The magnetic field at P due to current flowing in AB is perpendicular to the plane of paper acting vertically downward. And the magnetic field at P due to current flowing in CD is perpendicular to the plane of paper acting vertically upwards.
Therefore, q is correct.
As P is the mid point, the two magnetic fields, cancel out each other. Therefore, r is correct.
B:p
The magnetic field at P due to current in loop A is along the axial line towards right. Similarly, the magnetic field at P due to current in loop B is also along the axial line towards right.
C:q, r
The magnetic field due to current in loop A at P is equal and opposite to the magnetic field due to current in loop B at P.
D:q, s
The direction of magnetic field at P due to current in lop A is perpendicular to the plane of paper directed vertically upwards.

The direction of magnetic field at P due to current in loop B is perpendicular to the plane of paper directed vertically downward.

Since the current are in opposite direction the wires repel each other.

7. Column I contains some features of AC supply in India and Column II contains their relevant values/ details. Match Columns I and II.

	Column I		**Column II**
(A)	(Average rms) potential differences (in volts) between the live wire and the neutral wire in a household in India.	(p)	100
(B)	Value of the frequency of AC supply in India.	(q)	220
(C)	Number of times the household supply voltage attain its peak value in one second.	(r)	Green (yellow)

(D)	Colour of the earth wire in household wiring.	(s)	00
(E)	(Average rms) potential difference (in volts) between the neutral wire and the ground wire in a domestic electric circuits.	(t)	50

Ans : A-q, B-t, C-p, D-r, E-s

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Safety fuses are made up of materials having a low melting point.
Reason : Safety fuses should be resistant to electric current.
Ans : (c) Assertion (A) is true but reason (R) is false.

2. **Assertion :** On freely suspending a current - carrying solenoid, it comes to rest in N-S direction just like a bar magnet.
Reason : One end of current carrying straight solenoid behaves as a North pole and the other end as a South pole.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

3. **Assertion :** Copper is used to make electric wires.
Reason : Copper has very low electrical resistance.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
The low electrical resistance of copper makes it a good conductor for electricity.

4. **Assertion :** A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the magnitude of an electric current in the wire is increased.
Reason : Strength of a magnetic field at a point near the conductor increases on increasing the current.
Ans : (d) Assertion (A) is false but reason (R) is true.

5. **Assertion :** AC load line is used for long distance transmission.
Reason : It has very less loss of energy in long distance transmission.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
It can be easily transmitted over long distance without much loss in energy.

6. **Assertion :** When two bulbs are operated on same voltage supply, having power 60 W and 100 W then 100 W bulb has less resistance than 60 W.
Reason : The power of the bulb is directly proportional to the square of the voltage.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Since, $\text{power } (P) = \frac{V^2}{R}$

or $R \propto \frac{1}{P}$

Hence, 100 W bulb has less resistance.

7. **Assertion :** The magnitude of the magnetic field at a point on the axis of a current carrying solenoid is inversely proportional to the current flowing through the solenoid.
Reason : The magnitude of the magnetic field at a point on the axis of a current carrying solenoid is directly proportional to the number of turns per unit length of a solenoid.
Ans : (d) Assertion (A) is false but reason (R) is true.

8. **Assertion :** An induced e.m.f. appears in any coil in which the current is changing.
Reason : Self induction phenomenon obeys Faraday's law of induction.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

9. **Assertion :** The magnetic field produced by a current carrying solenoid is independent of its length and cross-section area.
Reason : The magnetic field inside the solenoid is uniform.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
The magnetic field is independent of length and area. It is uniform inside the solenoid.

10. **Assertion :** The magnetic field is stronger at a point which is nearer to the conductor and goes on decreasing on moving away from the conductor.
Reason : The magnetic field B produced by a straight current carrying wire is inversely proportional to the distance from the wire.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The magnitude of magnetic field is
1. directly proportional to the current I passing through the wire.
2. Inversely proportional to the distance r from the wire.

The magnetic field is stronger at a point which is nearer to the conductor and goes on decreasing on moving away from the conductor.

11. **Assertion :** A solenoid tends to expand, when a current passes through it.
Reason : Two straight parallel metallic wires carrying current in same direction attract each other.

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

When current flows through a solenoid, the currents in the various turns of the solenoid are parallel and in the same direction. Since the current flowing through parallel wires in the same direction lead to force of attraction between them, the turns of the solenoid will also attract each other and as a result the solenoid tends to contract.

12. **Assertion :** A direction current flows through a metallic rod, produced magnetic field only outside the rod.
Reason : There is no flow of charge carriers inside the rod.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

In the case of metallic rod, the charge carries flow through whole of the cross-section. Therefore, the magnetic field exists both inside as well as outside. However, magnetic field inside the rod will go no decreasing as we go towards the axis.

13. **Assertion :** Force experienced by moving charge will be maximum if direction of velocity of charge is perpendicular to applied magnetic field.
Reason : Force on moving charge is independent of direction of applied magnetic field.

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

From equation $F = qvB\sin\theta$. Force on moving charge will be maximum if direction of velocity of charge is perpendicular to direction of magnetic field (when $\theta = 90^\circ$)

14. **Assertion :** Electric appliances with metallic body have three connections, whereas an electric bulb has two pin connections.
Reason : Three pin connections reduce heating of connecting wires.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

The metallic body of the electrical appliance is connected to the third pin which is connected to the earth. This is a safety precaution and avoids eventual electric shock. By doing this the extra charge flowing through the metallic body is passed to earth and avoid shocks. There is nothing such as reducing the heating of connecting wires by three pin connections.

15. **Assertion :** There is no change in the energy of a charged particle moving in a magnetic field although a magnetic force is acting on it.
Reason : Work done by centripetal force is always zero.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Magnetic force is always perpendicular to the direction of motion of charged particle, i.e., work done on the charge particle moving on a circular path in magnetic field zero.

16. **Assertion :** When two long parallel wires, hanging freely are connected in series to a battery, they come closer to each other.
Reason : Wires carrying current in opposite direction repel each other

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

The wires are parallel to each other but the direction of current in it is in same direction so they attract each other. If the current in the wire is in opposite direction then wires repel each other.

17. **Assertion :** In a conductor, free electrons keep on moving but no magnetic force acts on a conductor in a magnetic field.
Reason : Force on free electrons due to magnetic field always acts perpendicular to its direction of motion.

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

In a conductor, the average velocity of electrons is zero. Hence no current flows through the conductor. Hence, no force acts on this conductor.

18. **Assertion :** A small coil carrying current, in equilibrium, is perpendicular to the direction of the uniform magnetic field.
Reason : Torque is maximum when plane of coil and direction of the magnetic field are parallel to each other.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

The torque acting on a coil is given by,

$$\tau = \text{NIA}\, B\sin\theta$$

where θ is the angle between the plane of the coil and the direction of magnetic field. When $\theta = 90^\circ$, then $\tau = 0$. The coil tries to orient itself in this position. Thus in equilibrium, the coil acquires a position, such that its plane makes an angle 90° with the direction of magnetic field.

19. **Assertion :** A current carrying conductor experiences a force in a magnetic field.
Reason : The force acting on a current carrying conductor in a magnetic field is due to interaction between magnetic field produced by the current carrying conductor and external magnetic field in which the conductor is placed.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of

assertion (A).

When a current carrying conductor is placed in a magnetic field, it experiences a force except when it is placed parallel to the magnetic field. The force acting on a current carrying conductor in a magnetic field is due to interaction between magnetic field produced by the current carrying conductor and external magnetic field in which the conductor is placed.

20. **Assertion :** Basic difference between an electric line and magnetic line of force is that former is discontinuous and the later is continuous or endless.
Reason : No electric lines of force exist inside a charged body but magnetic lines do exist inside a magnet.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

In case of the electric field of an electric dipole, the electric lines of force originate from positive charge and, end at negative charge. Since, isolated magnetic lines are closed continuous loops extending throughout the body of magnet, hence they from endless curves.

21. **Assertion :** On changing the direction of flow of current through a straight conductor, the direction of a magnetic field around the conductor is reversed.
Reason : The direction of magnetic field around a conductor can be given in accordance with left hand thumb rule.
Ans : (c) Assertion (A) is true but reason (R) is false.

22. **Assertion :** Two bar magnets attract when they are brought near to each other with the same pole.
Reason : Unlike poles will attract each other.
Ans : (d) Assertion (A) is false but reason (R) is true.

23. **Assertion :** Magnetic field lines never intersect.
Reason : At a particular point magnetic field has only one direction.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

24. **Assertion :** In Fleming's Left Hand Rule, the direction of magnetic field, force and current are mutually perpendicular.
Reason : Fleming's Left hand Rule is applied to measure the induced current.
Ans : (c) Assertion (A) is true but reason (R) is false.

It is used to find the direction of force in a current carrying conductor in the presence of magnetic field.

25. **Assertion :** A compass needle is placed near a current carrying wire. The deflection of the compass needle decreases when the compass needle is displaced away from the wire.
Reason : Strength of a magnetic field decreases as one moves away from a current carrying conductor.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

26. **Assertion :** No net force acts on a rectangular coil carrying a steady current when suspended freely in a uniform magnetic field.
Reason : Force on coil in magnetic field is always non-zero.
Ans : (c) Assertion (A) is true but reason (R) is false.

Force acting on each pair of the opposite sides of the coil are equal.

27. **Assertion :** an induced current has a direction such that the magnetic flux that induces the current.
Reason : Above statement is in accordance with conservation of energy.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

28. **Assertion :** A proton moves horizontally towards a vertical long conductor having an upward electric current. It will deflect vertically downward.
Reason : Seeing the proton and the conductor from the side of the proton, the magnetic field at the site of the proton will be towards right. Hence the force $\vec{F} = q\vec{\nu} \times \vec{B}$ will deflect the proton vertically downward.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

29. **Assertion :** Lenz's law violates the principle of conservation of energy.
Reason : Induced e.m.f. always opposes the change in magnetic flux responsible for its production.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Lenz's law (that the direction of induced e.m.f. is always such as to oppose the change that cause it) is direct consequence of the law of conservation of energy.

30. **Assertion :** A neutral body may experience a net non-zero magnetic force.
Reason : The net charge on a current carrying wire is zero, but it can experience a force in a magnetic field.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

31. **Assertion :** When number of turns in a coil is doubled coefficient of self-inductance of the coil becomes 4 times.
Reason : This is because $L \propto N^2$.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

32. **Assertion :** Alternating Current is used in household supply.
Reason : AC electric power can be transmitted over long distance without much loss of energy.
Ans : (a) Both assertion (A) and reason (R) are true

and reason (R) is the correct explanation of assertion (A).

33. **Assertion :** The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the current flowing through the coil.
Reason : Magnetic field strength is inversely proportional to the current flowing in the coil.
Ans : (c) Assertion (A) is true but reason (R) is false.

34. **Assertion :** The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the radius of the circular coil.
Reason : Magnetic field strength is inversely proportional to the radius of the circular coil.
Ans : (d) Assertion (A) is false but reason (R) is true.

35. **Assertion :** The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the number of turns of the circular coil.
Reason : Magnetic field strength is directly proportional to the number of turns of the circular coil.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

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CHAPTER 14

Source of Energy

1. OBJECTIVE QUESTIONS

1. Which of the following is a non-renewable source of energy?
(a) Wood (b) Sun
(c) Fossil fuels (d) Wind

Ans : (c) Fossil fuels

2. Which environmental hazard is not contributed by the combustion of fossil fuels?
(a) Acid rain
(b) Greenhouse effect
(c) Destruction of wildlife habitat
(d) Air pollution

Ans : (c) Destruction of wildlife habitat

Combustion of fossil fuels does not lead to the destruction of wildlife habitat. However, hydroelectric power projects lead to devastation of wildlife habitat, soil erosion, man-made floods, etc.

3. Choose the incorrect statement regarding wind power
(a) its temperature increases
(b) larger amount of potential energy is converted into kinetic energy
(c) the electricity content of water increases with height
(d) more water molecules dissociate into ions.

Ans : (b) larger amount of potential energy is converted into kinetic energy

4. Which of the following is employed for harnessing the potential energy of surface water stored in a reservoir?
(a) Thermal power plant
(b) Nuclear power plant
(c) Tidal power plant
(d) Hydroelectric power plant

Ans : (d) Hydroelectric power plant

In a hydroelectric power plant, the kinetic energy of following river water is first converted into potential energy, when it is stored in a reservoir (dam) and finally when the stored dam water flows downhill, the stored potential energy of water harnessed in the form of electrical energy with the help of turbine.

5. Solar energy is the universal source of energy. It is converted into chemical energy by
(a) photovoltaic cells (b) solar cooker
(c) solar concentrators (d) green plants

Ans : (d) green plants

Solar energy is the universal source of energy that is used by all living organisms for their survival on Earth. The green plants convert solar energy into chemical energy - food or biomass of plant, by the process of photosynthesis.

6. $100\ \mathrm{W/m^2}$ of solar energy is received by the Earth. If all the energy was to be absorbed by a bucket of water (mass 30 kg) in 30 minutes, then the rise in temperature of water will be
(a) $18^\circ\mathrm{C}$ (b) $15^\circ\mathrm{C}$
(c) $14.3^\circ\mathrm{C}$ (d) $12.3^\circ\mathrm{C}$

Ans : (c) $14.3^\circ\mathrm{C}$

Given, mass of water, $m = 30\ \mathrm{kg} = 30000\ \mathrm{g}$
Specific heat of water, $s = 4.2\ \mathrm{J\,g^{-1^\circ}C^{-1}}$
and time, $t = 30$ minutes
$= 30 \times 60\ \mathrm{s}$
As heat absorbed by water is given by
$$Q_A = ms\Delta\theta$$
$$= (30000 \times 4.2 \times \Delta\theta)$$
where, $\Delta\theta$ is the rise in temperature of water.
Now, heat given out by the sun $= 100\ \mathrm{J\,W}$
$= 100\ \mathrm{Js^{-1}}$
Heat given out by the sun in $(30 \times 60)\mathrm{s}$ is
$$Q_L = 100 \times 30 \times 60$$
$$= 1.8 \times 10^5\ \mathrm{J}$$
Let the heat gained by water = the heat lost by the sun
i.e. $Q_A = Q_L$
or $3000 \times 4.2 \times \Delta\theta = 1.8 \times 10^5$
$\Delta\theta = 14.3^\circ\mathrm{C}$

7. While filling LPG in cylinders, a substance X is

added to make the detection of leakage of LPG from the cylinder easy. The substance X is

(a) ethanol (b) ethanethiol

(c) methanethiol (d) methanol

Ans : (b) ethanethiol

Ethanethiol or ethyl mercaptan is added while filling LPG in cylinders because it has a foul smell which can be detected easily during any leakage of LPG.

8. For a nuclear reactor, 48 kJ of energy is produced per minute. If the energy released per fission is 3.2×10^{-11} J, then the number of fission which would be taking place in a reactor per second is

(a) 5×10^{14} (b) 2×10^{14}

(c) 52×10^{13} (d) 2.5×10^{13}

Ans : (d) 2.5×10^{13}

Energy produced in 60 seconds $= 48$ kJ

Then, energy produced in 1 second $= \frac{48}{60} = 0.8$ kJ

$= 800$ J

If 3.2×10^{-11} J of energy is released by 1 fission, then 800 J of energy is released by $\frac{1 \times 800}{3.2 \times 10^{-11}}$ fission $= 2.5 \times 10^{13}$ fission.

9. What sector of the Indian economy consumes most of the nation's petroleum?

(a) residential (b) commercial

(c) industrial (d) transportation

Ans : (d) transportation

10. Global warming focuses on an increase in the level of which gas in the atmosphere?

(a) ozone (b) sulfur dioxide

(c) carbon dioxide (d) nitrous oxide

Ans : (c) carbon dioxide

11. Choose the incorrect statement regarding wind power

(a) It is expected to harness wind power to minimum in open space

(b) The potential energy content of wind blowing at high altitudes is the source of wind power

(c) Wind hitting at the blades of a windmill causes them to rotate The rotation thus achieved can be utilised further

(d) One possible method of utilising the energy of rotational motion of the blades of a windmill is to run the turbine of an electric generator

Ans : (b) The potential energy content of wind blowing at high altitudes is the source of wind power

12. Ocean thermal energy is due to

(a) energy stored by waves in the ocean

(b) temperature difference at different levels in the ocean

(c) pressure difference at different levels in the ocean

(d) tides arising out in the ocean

13. (b) temperatSolar, biomass, geothermal, wind, and hydro-power energy are all renewable sources of energy. They are called renewable because they

(a) are clean and free to use

(b) can be converted directly into heat and electricity

(c) can be replenished by nature in a short period of time

(d) do not produce air pollution

Ans : (c) can be replenished by nature in a short period of time

14. Most of the energy we use originally came from

(a) the sun (b) the air

(c) the soil (d) the oceans

Ans : (a) the sun

15. Propane is used instead of natural gas on many farms and in rural areas. Why is propane often used instead of natural gas?

(a) it's safer (b) it's portable

(c) it's cleaner (d) it's cheaper

Ans : (b) it's portable

16. Which part of the solar cooker is responsible for green house effect?

(a) Coating with black colour inside the box

(b) Mirror

(c) Glass sheet

(d) Outer cover of the solar cooker

Ans : (c) Glass sheet

17. Which is the ultimate source of energy?

(a) Water (b) Sun

(c) Uranium (d) Fossil fuels

Ans : (b) Sun

Ans : ure difference at different levels in the ocean

18. The main constituent of bio-gas is

(a) methane (b) carbon dioxide

(c) hydrogen (d) hydrogen sulphide

Ans : (a) methane

19. When the material P mined from the earth is heated strongly in an insufficient supply of air, it produces a solid fuel Q which mainly consist of carbon. When another material R obtained from trees is heated in an insufficient supply of air, it produces another solid fuel S which also consists mainly of carbon. Then, which of the following is true?

(a) P-coke (b) Q-coal

(c) R-charcoal (d) None of these

Ans : (d) None of these

As per the question, P is coal, Q is coke, R is wood and S is charcoal.

20. The mass number of four different elements A, B, C and D are 2, 35, 135 and 239, respectively. Which of them would provide the most suitable for nuclear fission?

(a) A (b) C

(c) C (d) D

Ans : (a) A

In the process of nuclear fusion, a very small atom is used as a fuel. Here, out of the four elements A, B, C and D the atom of element A is the smallest, having a mass number of 2. So, element A would provide the most suitable fuel for nuclear fusion.

21. Acid rain happens because
(a) sun leads to heating of upper layer of atmosphere
(b) burning of fossil fuels release oxides of carbon, nitrogen and sulphur in the atmosphere
(c) electrical charges are produced due to friction amongst clouds
(d) earth atmosphere contains acids

Ans : (b) burning of fossil fuels release oxides of carbon, nitrogen and sulphur in the atmosphere

22. Electrical energy can be produced from
(a) mechanical energy (b) chemical energy
(c) radiant energy (d) All of the above

Ans : (d) All of the above

23. Coal, petroleum, natural gas, and propane are fossil fuels. They are called fossil fuels because:
(a) they are burned to release energy and they cause air pollution
(b) they were formed from the buried remains of plants and tiny animals that lived hundred of millions of years ago
(c) they are non-renewable and will run out
(d) they are mixed with fossils to provide energy

Ans : (b) they were formed from the buried remains of plants and tiny animals that lived hundred of millions of years ago

24. In a hydro-power plant
(a) Potential energy possessed by stored water is converted into electricity
(b) Kinetic energy possessed by stored water is converted into potential energy
(c) Electricity is extracted from water
(d) Water is converted into steam to produce electricity.

Ans : (a) Potential energy possessed by stored water is converted into electricity

25. The power generated in a windmill
(a) is more in rainy season since damp air would mean more air mass hitting the blades
(b) depends on the height of the tower
(c) depends on wind velocity
(d) can be increased by planting tall trees close to the tower Choose the correct statement

Ans : (c) depends on wind velocity

26. Choose the correct statement
(a) Sun can be taken as an inexhaustible source of energy
(b) There is infinite storage of fossil fuel inside the earth
(c) Hydro and wind energy plants are non polluting sources of energy
(d) Waste from a nuclear power plant can be easily disposed off

Ans : (a) Sun can be taken as an inexhaustible source of energy

27. Natural gas is transported mainly by
(a) pipelines (b) trucks
(c) barges (d) al three equally

Ans : (a) pipelines

28. Gasoline is produced by refining which fossil fuel?
(a) natural gas (b) coal
(c) petroleum (d) propane

Ans : (c) petroleum

2. FILL IN THE BLANK

DIRECTION : Complete the following statements with an appropriate word/term to be filled in the blank space(s).

1. A device that utilises solar energy for cooking purposes is called a .....
Ans : Solar cooker

2. Hydro power plants convert ..... energy of falling water into electricity.
Ans : Potential

3. A solar cell is a device which converts solar energy directly into .....
Ans : Electricity

4. When wood is burnt in a limited supply of oxygen ..... is left behind as residue.
Ans : Charcoal

5. The energy possesses by wind is called .....
Ans : Wind energy

6. The flowing water possesses ..... energy.
Ans : Kinetic

7. Bio-gas contains ..... % methane.
Ans : 75

8. Electricity generated from sea waves is .....
Ans : Tidal energy

9. The internal heat of an earth is known as ..... energy.
Ans : Geothermal

10. Many of the sources ultimately derive their energy

from the .....
Ans : Sun

11. ..... and ..... countries have number of power plants based on geothermal energy.
Ans : New Zealand, United States of America

12. The material obtained from the bodies of plants and animals is called .....
Ans : Biomass

13. To establish 1 MW generator, the wind energy farm needs about ..... hectares of land.
Ans : 2

14. Coal gas is mixture of ....., ... and .....
Ans : H_2, CH_4 and CO

15. Coal, petroleum and ..... are the three important source of modern fuels.
Ans : Natural gas

16. Ocean Thermal Energy plants can operate if the temperature difference between the water at the surface and water at depths up to ..... km is ..... or more.
Ans : 2, 293 k (or 20° C)

17. Bio-gas is a mixture of ..... , carbon dioxide, ... and .....
Ans : Methane, hydrogen, hydrogen sulphide

18. To maintain the required speed of the turbine, wind speed should be higher than .....
Ans : 15 km/h

19. When a complex material is heated strongly in the absence of air, then id decomposes to the simplest substance. This process is called .....
Ans : Destructive distillation.

3. TRUE/FALSE

DIRECTION : Read the following statements and write your answer as true of false.

1. The low kinetic energy (slow moving) neutrons which can produce nuclear fission are called thermal neutrons.
Ans : True

2. Sun is the source of heat contained in geothermal energy.
Ans : False

3. Gobar gas is a non-renewable source of energy.
Ans : False

4. The main constituent of bio-gas is not methane.
Ans : False

5. Black colour is a very good absorber of heat and good reflector.
Ans : False

6. The use of geothermal energy cause pollution.
Ans : False

7. Deep drilling in the earth to obtain geothermal energy is very difficult.
Ans : True

8. Natural gas is renewable source of energy.
Ans : False

9. Wood is better fuel than charcoal.
Ans : False

10. Nuclear fission reactions have been used to generate electricity.
Ans : True

11. On an average, the 5.5 neutrons per fission is released.
Ans : True

12. Solar cookers make use of solar energy.
Ans : True

13. The sun is the ultimate source of energy.
Ans : True

14. Sun is the ultimate source of energy.
Ans : True

15. Charcoal is a better fuel than wood and coal.
Ans : True

16. Bio-gas is a better fuel than animal dung-cakes.
Ans : True

17. Our energy requirements increase with our standard of living.
Ans : True

18. Biogas is produced by the aerobic degradation of animal wastes like cow-dung in the presence of water.
Ans : True

19. In order to fulfil our energy requirements, we try to improve the efficiency of energy requirements, we try to improve the efficiency of energy usage and also try and exploit new sources of energy.
Ans : True

20. The calorific value of methane is less than that or butane.
Ans : False

21. Producer gas is obtained as one of the products of dry distillation of coal.
Ans : False

22. The sun is an ultimate source of fossil fuel.
Ans : True

23. Coal gas is an is an example of primary fuel.
Ans : False

24. Biomass is the oldest source of heat energy for domestic purposes.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Peat	(p)	liquid fuel
(B)	Alcohol	(q)	27% of carbon
(C)	Decay of biomass	(r)	Difference in temperature between warm surface waters and colder waters.
(D)	Rise and fall of water levels in oceans	(s)	biogas
(E)	OTEC	(t)	tidal energy
(F)	Ultimate source of energy	(u)	sun
(G)	Stored in food grains	(v)	wind
(H)	Moving air	(w)	bio-energy

Ans : A-q, B-p, C-s, D-t, E-r, F-u, G-w, H-v

2.

Column I		Column II	
(A)	Ramagudam thermal plant is in	(p)	Andhra Pradesh
(B)	Raichur thermal plant is in	(q)	Karanatak
(C)	Korba thermal plant is in	(r)	Madya Pradesh
(D)	Farraka thermal plant is in	(s)	West Bengal

	A	B	C	D
(a)	r	s	p	q
(b)	p	r	s	q
(c)	q	p	r	s
(d)	p	q	r	s

Ans : (d) A-p, B-q, C-r, D-s

3. Match the following

Column I		Column II	
(A)	Hydrogen bomb	(p)	Fission
(B)	Atom bomb	(q)	Fusion
(C)	Stellar energy	(r)	Critical mass
(D)	Nuclear reactor	(s)	Controlled chain reaction

	A	B	C	D
(a)	r	p	s	q
(b)	s	q	r	p
(c)	q	p	r	s
(d)	p	q	s	r

Ans : (c) A-q, B-p, C-r, -D-s

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Dam is a barrier that is built across a river or a stream.
Reason : Large dam can ensure the storage of adequate water for irrigation and also for generating electricity.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Dam is a barrier that stops or restricts the flow of water or underground streams. A dam is built to control water through placement of a blockage of earth, rock across a stream or river. They usually store water in a reservoir, which is then used for a variety of applications such as irrigation and municipal water supplies.

2. **Assertion :** Bio-gas is a boon to the farmers.
Reason : Spent slurry is used as manure and can be

used to generate electricity.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Bio-gas is considered to be a boon to the farmers as the slurry left in bio-gas plant is a good manure for fields.

3. **Assertion :** Certain gases like carbon-dioxide, water vapour, methane are called greenhouse gases.
Reason : These gases are responsible for heating up of the atmosphere.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Sun is very hot, so it emits infrared radiations of very short wavelength. The Earth absorbs the radiation and then re-emits. But the Earth being cooler emits radiations of longer wavelength. These are absorbed by certain gases like carbon-dioxide, water vapour, methane etc. This effect is called greenhouse effect and the gases are called greenhouse gases. This is responsible for heating up of the atmosphere.

4. **Assertion :** Solar heating devices are painted black.
Reason : Black bodies are good absorbers of heat, so temperature rises quickly.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Solar heating devices are painted black as black bodies are good absorbers of heat.

5. **Assertion :** Charcoal is a better fuel than wood.
Reason : It has a lower heat generation efficiency.

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

Charcoal is a better fuel than wood because it burns without flames and is comparatively smokeless. It also has higher heat generation efficiency.

6. **Assertion :** Burning of coal or petroleum products lead to air pollution.
Reason : Coal and petroleum are non renewable source of energy.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Coal and petroleum are non-renewable source of energy as they take millions of years to form and are available in very limited amount. Burning of fuels releases gases like CO_2, SO_2, NO_2. These gases air pollution. With rain, these pollutants fall as acid rain and cause soil pollution.

7. **Assertion :** Nuclear fusion is used to generate electricity.
Reason : Nuclear power is used because it cannot be controlled.

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

8. **Assertion :** Bio-gas is also known as Gobar gas.
Reason : The animal dung is the common material used in the bio-gas plant.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

9. **Assertion :** Solar cooker is painted white from inside.
Reason : The black surface to the solar cooker is a better heat absorber than a white surface.

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

10. **Assertion :** Charcoal is a better fuel then wood for domestic purposes.
Reason : Charcoal burns without flames and does not produce smoke during burning.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

11. **Assertion :** U^{235} nucleus, by absorbing a slow neutron undergoes unclear fission with the evolution of a significant quantity of heat
Reason : During nuclear fission a part of the original mass of U^{235} is lost gets converted into heat.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

12. **Assertion :** The slurry left behind in a bio-gas plant is used as a manure.
Reason : Slurry contains methane and phosphorus as two main nutrients in it.

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

13. **Assertion :** Thermal power plants are set up near coal or gas fields.
Reason : Transmission of electric power is more efficient, convenient and economical then transportation of fossil fuels like coal or natural gas.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** Solar cell is a device which converts solar energy i.e., light energy directly into electricity.
Reason : They are made up of semi-conductors like-silicon, germanium and selenium.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Solar cell panel absorb sunlight as a source of energy to generate electricity. It comprises of a large number of photo voltaic solar cells and can provide much higher power for many uses.

15. **Assertion :** Solar cooker covered with a plane glass plate is more effective then the one which is left open
Reason : Covered glass plate allows solar radiations of smaller wavelength to pass through it but does not allow heat radiation of longer wavelengths emitted by heated container to pass through it. thus, heat remains inside the cooker itself and food item is cooked easily.

Ans : (a) Both assertion (A) and reason (R) are true

and reason (R) is the correct explanation of assertion (A).

16. **Assertion :** In street light circuits, photo-cells are used to switch on and off the lights automatically at dusk and dawn.
Reason : A photocell can convert a change in intensity of illumination into a change in photo-current that can be used to control lighting system.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

17. **Assertion :** Construction of big dams has lots of problems associated with them.
Reason : Large ecosystems are destroyed when submerged under the water in dams.
Ans : (a) Both A and R are true and R is the correct explanation of A.

18. **Assertion :** Charcoal is better fuel than wood.
Reason : Wood is smokeless and leaves no residue.
Ans : (c) Assertion (A) is true but reason (R) is false.
Charcoal is better fuel than wood because it is smokeless and leaves no residue. It has higher heat of combustion.

19. **Assertion :** Solar energy, wind energy and hydro energy are considered to be exhaustible source of energy.
Reason : The rate of depletion of these energy sources, because of extraction of usable energy, is practically negligible.
Ans : (d) Assertion (A) is false but reason (R) is true.

20. **Assertion :** Wind energy is an environment friendly and efficient of energy.
Reason : Wind energy farms can be established everywhere.
Ans : (c) Assertion (A) is true but reason (R) is false.
Wind energy is an environment friendly and efficient of energy. Wind energy farms cannot be established everywhere because it needs back-up facilities of large area and high cost of maintenance.

21. **Assertion :** Silver metal is used for joining various solar cells in a solar cell panel.
Reason : Silver is a shiny metal.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

22. **Assertion :** Nuclear forces are independent of charges.
Reason : Nuclear force is not a central force.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

23. **Assertion :** Solar cooker is a device used to cook food by utilising the energy radiated by the Sun.
Reason : Solar cooker can be used to cook food on cloudy days and during night.
Ans : (c) Assertion (A) is true but reason (R) is false.
Solar cooker cannot be used to cook food on cloudy days and during night.

CHAPTER 15

Our Environment

1. OBJECTIVE QUESTIONS

1. Sulphur dioxide affects
(a) haemoglobin of blood (b) Arteries
(c) Alveoli of lungs (d) Nerves

Ans : (c) Alveoli of lungs

2. Which of the following is not a functional component of an ecosystem?
(a) Communities (b) Decomposers
(c) Sunlight (d) Energy flow

Ans : (d) Energy flow

The flow of energy is not a functional component of an ecosystem.

3. Free services provided to humans by ecosystems include
(a) control of atmospheric carbon dioxide concentration
(b) prevention of soil erosion
(c) filtering of pollutants from water and air
(d) all of the above

Ans : (d) all of the above

4. Why do scientists think that human-induced global warming will be more harmful to plants and animals than were past, natural climate fluctuations?
(a) because temperatures will change faster
(b) because the temperature changes will be larger
(c) because species now are less adaptable than species in the past
(d) because ecosystems are now more complicated than they used to be

Ans : (a) because temperatures will change faster

5. As energy is passed from one trophic level to another, the amount of usable energy
(a) increases
(b) decreases
(c) remains the same
(d) energy is not passed from one trophic level to another

Ans : (b) decreases

6. Each step in a food chain is called a
(a) trophic level (b) consumer level
(c) food web (d) producer

Ans : (a) trophic level

7. CO_2 absorbs some of the ..... that radiates from the surface of earth to space
(a) ozone (b) heat
(c) food web (d) producer

Ans : (b) heat

8. The biological process by which carbon is returned to its reservoir is
(a) photosynthesis (b) de-nitrification
(c) carbon fixation (d) cellular respiration

Ans : (d) cellular respiration

9. For corrosion of metals, there should be
(a) Exposed surface of metal
(b) Moisture
(c) Air
(d) All of the above

Ans : (d) All of the above

10. The last chain of food is
(a) producers (b) decomposers
(c) parasites (d) none of the above

Ans : (b) decomposers

11. Replacing of plastic cups by the paper cups for selling tea on train is preferred because
(a) paper cups are more aesthetic
(b) paper cups are more hygienic
(c) paper cups are cheaper
(d) paper cups are biodegradable and eco-friendly

Ans : (d) paper cups are biodegradable and eco-friendly

The paper cups are preferred over plastic cups because being biodegradable they are not potential wastes.

12. Food web is the
(a) food that a spider collects using its web
(b) network of interlinked trophic levels
(c) network of interlinked food chains
(d) display of food items on a website

Ans : (c) network of interlinked food chains

A food web is a network of inter-linked food chains operating at various trophic levels.

13. In the biosphere, which of the following is the ultimate source of energy?
(a) Carbon (b) Water
(c) Sunlight (d) Nitrogen

Ans : (c) Sunlight

14. In a food chain, the snake predated as rabbit which fed on fresh green bushes. What percentage amount of the energy accumulated by rabbit, would be acquired by snakes?

(a) 90% (b) 10%

(c) 50% (d) 25%

Ans : (b) 10%

According to Lindeman's 10% energy law, only 10% of the energy is transferred from one trohic level to the subsequent trophic level.

15. The part of earth comprising water is called an

(a) atmoshphere (b) hydrosphere

(c) lithosphere (d) none of the above

Ans : (b) hydrosphere

16. Burning to waste products at high temperature to form ash, reduces waste considerably. This method of waste disposal is called

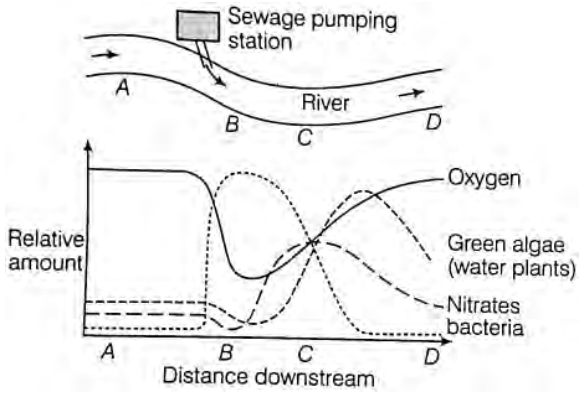
(a) composting (b) sewage treatment

(c) recycling (d) incineration

Ans : (d) incineration

Incinerators involve degradation of wastes by burning them at high temperatures.

17. The diagram shows part of a river into which sewage is being pumped. Some of the effects of adding sewage to the river are shown in the graph. At which point in the river are decomposers most active?



(a) *D* (b) *C*

(c) *B* (d) *A*

Ans : (c) *B*

The number of bacteria will suddenly rise near the sewage pumping station. They are effective decomposers and can breakdown complex molecules into simpler forms in sewage.

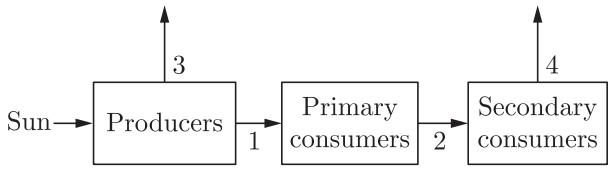
18. Individuals of any species at a place form

(a) biotic community (b) ecosystem

(c) population (d) biome

Ans : (c) population

19. The diagram shows the flow of energy through an ecosystem.



The smallest amount of energy transferred between organisms and the largest amount of energy lost to the ecosystem is represented by which arrows?

	Smallest energy transfer	**Largest energy loss**
(a)	4	3
(b)	2	1
(c)	2	3
(d)	1	4

Ans : (c)

About 90% of the chemical energy received by the rabbit is utilised for metabolic activities and lost as heat and undigested matter. Only 10% is used for the growth and formation of new tissues.

20. As a black widow spider consumes her mate, what is the lowest trophic level she could be occupying

(a) third (b) first

(c) second (d) fourth

Ans : (d) fourth

21. Human-caused changes to the nitrogen cycle are expected to result in

(a) an increase in acid rain

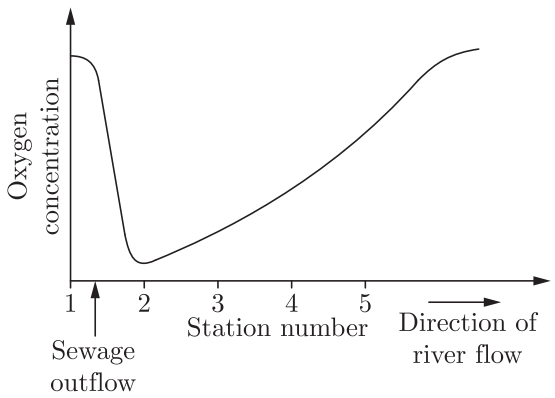
(b) an increase in the loss of species from ecosystems

(c) higher concentrations of a greenhouse gas

(d) all of the above

Ans : (d) all of the above

22. The following graph shows the concentration of oxygen in a river, measured at stations 1-5 each 100 m apart. A sewage outflow is observed just after station 1. At which stations will the concentration of organic matter be lowest?



(a) 1 and 5 (b) 2 and 3

(c) 3 and 4 (d) 4 and 5

Ans : (a) 1 and 5

Sewage contains large amounts of organic matter which is utilised as an energy source by aerobic bacteria.

At point 1, there is little consumption of oxygen by aerobic bacteria which decomposes the organic matter. At region 2 and 3, most bacterial activity occurs due to organic matter. At point 5, again there is little aerobic activity because the oxygen concentration is higher.

23. Trophic levels are formed by-
(a) only plants
(b) only animals
(c) only carnivores
(d) organisms linked in food chain

Ans : (d) organisms linked in food chain

24. Fertilisers are used on farmlands to increase the nutritive quality of soil and thus, the crop productivity. However, they greatly impact our environment in negative ways. A fertiliser industry is planning to release nitrate-free or reduced nitrate containing fertiliser to make it more environment-freindly. This control of nitrate rich fertilisers is necessary because
(a) nitrates cause acid rain, killing trees and fishes when released in the environment
(b) they decrease the natural fertility to the soil
(c) nitrates may lead to excessive growth of water plants
(d) it poisons different crop plants

Ans : (c) nitrates may lead to excessive growth of water plants

Acid rain is a result of accumulation of SO_2 and SO_3 along with NO_2 which gets converted into acids.

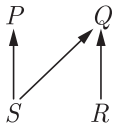
Nitrates are not involved in making nitric acid, rather these are essential for soil fertility. They leads to the formation of amino acids which make proteins.

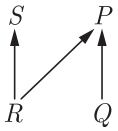
25. A decrease in the grass population will most immediately decrease the available energy for the
(a) mouse (b) snake
(c) hawk (d) frog

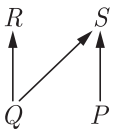
Ans : (a) mouse

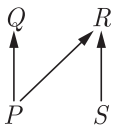
26. The diagram shows the organisms in a habitat.

Which of the following indicates the feeding relationships of these organisms?

(a) 

(b) 

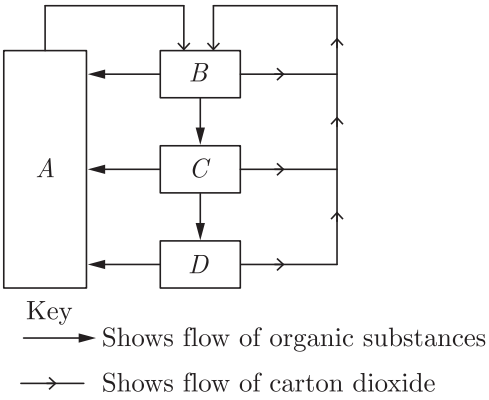
(c) 

(d) 

Ans : (c)

P and Q are producers. S is the organisms which derives its nutrition from decaying leaves of both the plants. The R organism gets its food only from flowering plant (Q).

27. The diagram represents the flow of substances within a balanced ecosystem. The boxes are various trophic levels. Which box represents the producers?



(a) B (b) D
(c) A (d) C

Ans : (a) B

Producers carry out photosynthesis, absorb CO_2 and produce carbon compounds. All these functions are performed by B, hence it represents producers.

28. As a biologist, if you become very interested in the study of the interaction of organisms with each other and the environment your subspeciality would be
(a) Zoology (b) Ecology
(c) Botany (d) Herpetology

Ans : (b) Ecology

29. An example of a producer in the aquatic food web would be
(a) Duckweed (b) Ducks
(c) Fish (d) Insects

Ans : (a) Duckweed

30. In an ecosystem green plants are known as
(a) primary consumers (b) secondary consumers
(c) producers (d) tertiary consumers

Ans : (c) producers

31. Sun gives radiations in the form of
(a) Infra-red radiation (b) Arteries
(c) Alveoli of lungs (d) Nerves
Ans : (d) Nerves

2. FILL IN THE BLANK

1. The waste we generate may be ..... or .....
Ans : Biodegradable, non-biodegradable.

2. ..... is defined as sum total of all conditions and influences that affect the life of organisms.
Ans : Environment

3. Substances that are broken-down by biological processes are said to be .....
Ans : Biodegradable

4. Substances that are not broken-down by biological processes are said to be .....
Ans : Non-biodegradable

5. All the interacting organisms in an area together with the non-living constituents of the environment form an .....
Ans : Ecosystem

6. Gardens and crop fields are examples of .....
Ans : Artificial Ecosystem

7. Organisms can be grouped as producers, consumers and ..... according to the manner in which they obtain their substances from the environment.
Ans : Decomposers

8. The decomposers comprising micro-organisms like ..... and .....
Ans : Bacteria, Fungi

9. The materials which are locked up in dead complex organic substance are made available to plants in the form of simple inorganic substances by the .....
Ans : Decomposers

10. Every food chain starts from ..... .
Ans : Producers

11. The energy flows from autotrophs to the heterotrophs and ..... .
Ans : Decomposers

12. The flow of energy is always ..... in food chains.
Ans : Unidirectional

13. The inter locking pattern of various food chains is referred as ..... .
Ans : Food Web

14. The disposal of the waste we generate is causing serious ..... problems.
Ans : Environmental

15. Climate refers to the prevailing ..... conditions.
Ans : Weather

16. The total amount of ..... per unit time produced in an ecosystem is called the gross primary productivity.
Ans : Organic material

17. The hierarchies within a food web are called ..... levels.
Ans : Trophic

18. Without the ..... in a food web many chemicals would not be recycled.
Ans : Decomposers

19. Because there is a loss of energy at each trophic level ..... biomass can be supported at each successive level.
Ans : Less

20. The contamination of air by adding gases, smoke and ash is called .....
Ans : Pollution

21. Burning of fossil fuels is the main cause of release of ..... gas in air.
Ans : Carbon dioxide

22. It is ..... to sleep in closed room with a coke fire burning.
Ans : Dangerous

23. Decrease in ozone in stratosphere is linked to release of synthetic chemicals like .....
Ans : Chlorofluorocarbons

24. Improvement in life style often results in increased generation of ..... material.
Ans : Waste

25. The ..... make the energy from sunlight available to the rest of the ecosystem.
Ans : Producers

26. The use of chemicals like CFCs has endangere the ..... layer.
Ans : Ozone

27. Total number of individuals of any species at a place is known as .....
Ans : Population

28. The various populations of living organisms in an area together form ..... .
Ans : Biotic community

29. ..... absorb UV rays and protect the earth.
Ans : Ozone layer

30. All the ecosystems taken together in a geographical area form a bigger unit known as.
Ans : Biome

31. ..... absorb UV rays and protect the earth.
Ans : Ozone layer

32. Hydrosphere, lithosphere and atmosphere along with living organism form ..... .
Ans : Biosphere

33. The sequential process of one organism consuming the other forms a ..... .
Ans : Food chain

34. ..... act as scavengers of environment.
Ans : Decomposers

35. The two important functions that food chains depict are transfer of ..... and ..... .
Ans : Energy, materials

36. Decrease in ozone concentration has been linked to synthetic chemicals like ..... which are used as ..... in the refrigerators.
Ans : chlorofluorocarbons, refrigerants

37. The plants trap ..... energy and convert it into ..... energy.
Ans : Light, chemical

38. ..... and ..... are the biotic components of ecosystem.
Ans : Plants, animals

39. The energy available at each successive trophic level is ..... of the previous level.
Ans : 10%

40. The physical and biological world where we live in is called .....
Ans : ecosystem

41. In an ecological pyramid, the base represents ..... level.
Ans : Producer

42. Harmful by products of fertiliser industries are ..... and .....
Ans : SO_2, NO

43. In nature, all green plants are ..... whereas animals are consumers.
Ans : Producers

44. The physical factors like temperature, rainfall, wind and soil of an ecosystem are the ..... factors.
Ans : abiotic

45. Nitrogen-fixing bacteria live in nodules on the roots of ..... plants.
Ans : Leguminious

46. Nitrates and nitrites present in the soil are changed into ..... by micro-organisms.
Ans : Ammonia

47. The increased nitrogen in rivers and lakes boosts the growth of ..... and other phytoplankton at the cost of other aquatic organism.
Ans : Algae

48. The amount of various chemical materials cycling through the biosphere more or less remains ..... .
Ans : Constant

49. Ozone is a molecule formed by ..... of .....
Ans : oxygen, atmosphere

50. Waste substances that are broken down by microbes are called .....
Ans : Biodegradable

3. TRUE/FALSE

1. The energy takes place from autotroph to the heterotrophs.
Ans : True

2. Secondary consumers in food chain are always carnivores.
Ans : True

3. Forests, and ponds are natural ecosystem while gardens and fields are artifical ecosystem.
Ans : True

4. The inter locking pattern of various food chains is referred as food web.
Ans : True

5. Carbon dioxide causes depletion of ozone layer thereby allowing more UV-radiations to reach the earth.
Ans : False

6. Biodegradable wastes should be separated and kept in blue colour bins for garbage collectors.
Ans : False

7. Phytoplanktons are primary consumers.
Ans : False

8. UNEP has foraged an agreement to freeze CFC

production.
Ans : True

9. An ecosystem consists of biotic and abiotic components.
Ans : True

10. Different materials are not cycled in the environment.
Ans : False

11. Specific enzymes are needed for the break-down of a particular substance.
Ans : True

12. Forests, and ponds are natural ecosystem while gardens and fields are artifical ecosystem.
Ans : True

13. Wastes are of two types, biodegradable and non-biodegradable.
Ans : True

14. Non-biodegradable articles are the ones which cannot be digested.
Ans : True

15. Organism can make organic compounds from inorganic substances by using the radiant energy of the sun in the presence of chlorophyll.
Ans : True

16. Ecology is the scientific study of the interaction of organisms with each other and the environment.
Ans : True

17. The abiotic components of the environment are the living factors.
Ans : False

18. An ecosystem is made up of one type of community.
Ans : False

19. In general, food webs consist of producers, consumers, and decomposers.
Ans : True

20. Earth is kept warm due to green house flux.
Ans : True

21. Rag pickers remove reusable articles.
Ans : False

22. Forests, and ponds are natural ecosystem while gardens and fields are artifical ecosystem.
Ans : True

23. Blue green algae are producers.
Ans : True

24. Decomposers reduce the fertility of soil.
Ans : False

25. The amount of usable energy remains constant as it is passed from one trophic level to another.
Ans : False

26. The energy within an ecosystem is fixed and never changes.
Ans : False

27. Ozone is formed in stratosphere by action of ultraviolet radiations on oxygen.
Ans : True

28. Forests, and ponds are natural ecosystem while gardens and fields are artifical ecosystem.
Ans : True

29. The reproduction and other activities of living organisms are affected by the abiotic components of ecosystem.
Ans : True

30. The materials like plastics are not acted upon by physical process.
Ans : False

31. Decomposers reduce the fertility of soil.
Ans : False

32. Food ensures survival of all types of trophic levels.
Ans : True

33. Human population and technology are having a destructive impact on the biosphere.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Tundra	(p)	This area on the planet has permanently frozen soil that does not allow for the growth of large plants.

Column I		Column II	
(B)	Grassland	(q)	This area on the planet has few trees, very fertile soil and usually many species of grasses. The rainfall amounts are low and the rain is more abundant during the summer months.
(C)	Tropical rainforest	(r)	This biome is usually located near the equator. Rainfall amounts are very high, vegetation is dense and soil quality is poor.
(D)	Savanna	(s)	A type of grassland biome that experiences rainy seasons and long periods of drought.

Ans : A-p- B-q, C-r, D-s

2.

Column I		Column II	
(A)	Grass	(p)	Primary carnivore
(B)	Grasshopper	(q)	Secondary carnivore
(C)	Frog	(r)	Producer
(D)	Hawk	(s)	Primary consumer

Ans : A-r, B-s, C-p, D-q

3.

Column I		Column II	
(A)	Eastern Ghats	(p)	Western and Eastern
(B)	Estuarine ecosystem	(q)	Rajasthan, Punjab and part of Gujarat
(C)	Indus plains	(r)	West Bengal and Andman Nicobar
(D)	Arctie zone	(s)	Cape Comarine to Gujarat

Ans : A-s, B-r, C-q, D-p

4.

Column I		Column II	
(A)	Third trophic level	(p)	Ozone
(B)	Accumulation of pesticides at higher trophic level	(q)	CFCs
(C)	Green plants	(r)	Herbivore
(D)	Flow of energy in an ecosystem	(s)	Biomagnification
(E)	Consists of 3 atoms of oxygen	(t)	Decomposers
(F)	Main cause of depletion of depletion of ozone layer	(u)	Producers
(G)	Second trophic level	(v)	Unidirectional
(H)	Break-down of dead organic compounds	(w)	Carnivores

Ans : A-w, B-s, C-u, D-v, E-p, F-q, G-r, H-t

5.

	Column I		Column II
(A)	Filament of electrical bulb	(p)	Copper
(B)	Heating elements	(q)	Lead-tin alloy
(C)	Connection wire	(r)	Tungsten
(D)	Fuse wire	(s)	Nichrome

Ans : A-r, B-s, C-p, D-q

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Green plants of the ecosystem are the transducers.
Reason : Producers trap the radiant energy of the sun and change it into chemical energy.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

2. **Assertion :** Aquariums are known as the man-made ecosystems.
Reason : Aquariums are created and maintained by humans.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Aquariums are known as the man-made ecosystems because these are created and maintained by humans.

3. **Assertion :** Flow of energy in a food chain is unidirectional.
Reason : Energy captured by autotrophs does not revert back to the solar input and it passes to the herbivores.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The flow of energy through different steps in the food chain is unidirectional. This means that energy captured by autotrophs does not revert back to the solar input and it passes to the herbivores.

4. **Assertion :** Biomagnification is caused due to the accumulation of biodegradable toxicants in organisms at each successive trophic level.
Reason : Biomagnification leads to the maximum accumulation of chemicals in small fishes.
Ans : (e) Both Assertion and Reason are false.

Biomagnification is caused due to the accumulation of non-biodegradable toxicants in organisms at each successive trophic level. The maximum concentration of these chemicals gets accumulated in human body because they occupy the topmost place in any food chain.

5. **Assertion :** Animals adopt different strategies to survive in hostile environment.
Reason : Praying mantis is green in colour which merges with plant foliage.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Animals blend with the surroundings or background to remain unnoticed for protection and aggression.

6. **Assertion :** A network of food chains existing together in an ecosystem is known as food web.
Reason : An animal like kite cannot be a part of a food web.
Ans : (c) Assertion (A) is true but reason (R) is false.

In the food web different food chains are interconnected. Each chain consists of different trophic levels i.e., producers, consumers and detrivoroes. So, kite can also be a part of food web

7. **Assertion :** CFCs deplete the ozone layer.
Reason : CFCs are used as refrigerants and in fire extinguishers.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Ozone layer is getting depleted at the higher levels of the atmosphere due to effect of chlorofluorocarbons (CFCs) which are used as refrigerants and in fire extinguishers.

8. **Assertion :** The concentration of harmful chemicals is more in human beings.
Reason : Man is at the apex of the food chain.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Harmful chemicals accumulate progressively at each trophic level. Since the man is at the apex of all the food chains, the concentration of harmful chemicals may be more in human beings. The phenomenon involved is known as biomagnification.

9. **Assertion :** The crown fires are most destructive as they burn the tree top.
Reason : Due to crown fire the temperature of that area may rise upto 700°C.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

10. **Assertion :** Tropical rain forests are disappearing fast from developing countries such as India.
Reason : No value is attached to these forests because these are poor in biodiversity.
Ans : (c) Assertion (A) is true but reason (R) is false.

Tropical rain forests have disappeared mainly due to man's activities. Due to over population in countries like India, rain forests are cut to make place available for man to live and build houses. To build buildings and factories man has incessantly cut down trees. This has caused the depletion of rain forests.

11. **Assertion :** Abiotic component of an ecosystem involves cycling of material and flow of energy.
Reason : This is essential to keep biotic factors alive.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

12. **Assertion :** First trophic level in a food chain is always a green plant.
Reason : Green plants are called producers.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Green plants are producers. The first trophic level in a food chain is a producers i.e. those organisms which produce food by photosynthesis.

13. **Assertion :** Man is a herbivore.
Reason : Omnivores eat both plant food and meat of animals.
Ans : (d) Assertion (A) is false but reason (R) is true.

14. **Assertion :** In an ecosystem, the function of producers is to convert organic compounds into inorganic compounds.
Reason : Green plants, the producers, transduce solar energy.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

15. **Assertion :** Trophic levels are formed by only plants.
Reason : Food chains and webs are formed due to linked organisms on the basis of their nutrition.
Ans : (d) Assertion (A) is false but reason (R) is true.

16. **Assertion :** Herbivores are called first order consumers.
Reason : Tiger is a top carnivore.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Herbivores obtain their food from plants. Hence, are known as first order carnivores. The carnivores like tiger cannot be preyed upon further, lie at the top of food chain and hence termed as top carnivores.

17. **Assertion :** Ecology is study of relationship between living organisms and their environment.
Reason : The biotic community and non-living environment of an area function together to form an ecosystem.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

18. **Assertion :** Polythene bags and plastic containers are non-biodegradable substance.
Reason : They can be broken down by micro-organisms in natural simple harmless substances.
Ans : (c) Assertion (A) is true but reason (R) is false.

Substances like polythene bags and plastics are non-biodegradable because they cannot be broken down by micro-organisms into simpler harmless substance in nature. Substance that can be broken down by micro-organisms in natural simple harmless susbstances are biodegradable substances.

19. **Assertion :** Consumers are present at the first trophic level.
Reason : Consumers or heterotrophs fix energy making it available for autotrophs.
Ans : (e) Both Assertion and Reason are false.

Autotrophs are present at the first trophic level because they fix solar energy, making it available for consumers or heterotrophs.

20. **Assertion :** Aquatic food chain is the food chain present in water bodies.
Reason : The example of aquatic food chain is phytoplankton ⟶ zooplankton ⟶ fish ⟶ shark.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Aquatic food chain is the food chain present in water bodies, e.g. phytoplankton ⟶ zooplankron ⟶ fish ⟶ shark.

21. **Assertion :** Decomposers keep the environment clean.
Reason : They recycle matter by breaking down the organic remains and waste products of plants and animals.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Decomposers keep the environment clean by decomposing or consuming the dead remains of other organisms.

22. **Assertion :** Ozone is both beneficial and damaging.
Reason : Stop the release of chlorofluorocarbons to protect the ozone.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Ozone is damaging as it is a deadly poison. It is beneficial as it shields the surface of the earth from UV radiations of the Sun. We should stop the release of Chlorofluorocarbons (CFCs) to protect the ozone.

23. **Assertion :** Garden is an artificial ecosystem.
Reason : Biotic and abiotic components are manipulated by humans.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

24. **Assertion :** Supersonic jets cause pollution as they thin out ozone.
Reason : Depletion of ozone cause green house effect.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

25. **Assertion :** Biotic components of ecosystem continuously require energy to carry on life processes.
Reason : Abiotic comonents are the non-living factors of the ecosystem.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

26. **Assertion :** Decomposers act as cleaning agents of the environment.
Reason : The decomposers recycle waste material in the hydrosphere.
Ans : (c) Assertion (A) is true but reason (R) is false.

CHAPTER 16

Management of Natural Resources

1. OBJECTIVE QUESTIONS

1. New approach of conversation is the establishment of:
(a) Sancturies (b) Reserve forests
(c) National parks (d) Biosphere reserves

Ans : (d) Biosphere reserves

2. Ganga Action Plan was started in
(a) 1975 (b) 1985
(c) 2004 (d) 1982

Ans : (b) 1985

Ganga Action Plan (GAP) was a programme launched by Government of India in April 1985 in order to reduce the pollution load on the river Ganga.

3. Which of the following statements about the construction of a dam are incorrect?
(a) It provides an eco-friendly environment
(b) It is used to generate electricity
(c) It displaces the largely poor tribals that do not get any benefit
(d) It prevents the occurrence of floods in the river

Ans : (a) It provides an eco-friendly environment

The incorrect statement for the construction of a dam is that it provides eco-friendly environment.

4. Ground water will not be depleted due to
(a) afforestation
(b) untreated sewage and industrial waste discharge
(c) loss of forest and decreased rainfall
(d) cropping of high water demanding crops

Ans : (a) afforestation

Ground water will not be depleted due to afforestation (i.e., plantation of trees).

5. Which of the following statement(s) is/are correct about the renewable natural resource?
(a) It gets exhausted soon
(b) It requires millions of years to replenish
(c) It reappears at the rate it is used
(d) It cannot be replenished within a short period

Ans : (c) It requires millions of years to replenish

Renewable natural resource reappears at the rate it is used.

6. Destruction of forest can cause
(a) habitat loss
(b) floods and droughts
(c) soil erosion and degradation
(d) All of the above

Ans : (d) All of the above

The indiscriminate destruction of forest cover leads to problems like habitat loss, ecological imbalance that cause floods and draughts, soil erosion and degradation, etc.

7. Which one of the following is a greenhouse gas?
(a) CO_2 (b) CO
(c) SO_2 (d) NO_2

Ans : (a) CO_2

Carbon dioxide is a greenhouse gas. Its increased concentration in atmosphere leads to global warming.

8. 'Narmada Bacho Andolan' has been organised under the leadership of
(a) Ravi Shankar Maharaj (b) Medha Patekar
(c) Amrita Devi Bishnoi (d) Baba Ramdev

Ans : (b) Medha Patekar

'Narmada Bacho Andolan' has been organised under the leadership of Medha Patekar.

9. Which is preserved in National Park?
(a) Flora (b) Fauna
(c) Both (a) and (b) (d) None of these

Ans : (c) Both (a) and (b)

10. Opposition to the construction of large dams is due to
(a) social reasons (b) economic reasons
(c) environmental reasons (d) All of the above

Ans : (d) All of the above

Opposition to the construction of large dams by local people is due to social, economic and environmental problems.

11. Which of the following causes imbalance in the environment?
(a) Excess growing of green plants
(b) Using more renewable resources
(c) Biodiversity
(d) Increasing human population

Ans : (d) Increasing human population

Increasing human population causes inbalance in the environment with excess growing of green plants, afforestation and biodiversity causes balance in the environment.

12. Marked climatic variations take place in the:
(a) troposphere (b) stratosphere
(c) ionosphere (d) exosphere

Ans : (a) troposphere

13. Which one of the following is not a fossil fuel?
(a) uranium (b) coal
(c) natural gas (d) petroleum

Ans : (a) uranium

14. Genetic diversity in agricultural crops is threatened by:
(a) introduction of high yielding varieties
(b) intensive use of fertilizers
(c) extensive intercropping
(d) imbalance in biological diversity

Ans : (a) Introduction of high yielding varieties

15. Overuse of resources leads to:
(a) floods and droughts (b) energy crisis
(c) imbalance in biological diversity (d) all the above

Ans : (d) all the above

16. If the Bengal tiger becomes extinct:
(a) Hyenas and volves will become scarce
(b) The wild area will be safe for man and domestic animals
(c) Its gene pool will be lost for ever
(d) The population of beautiful animals like deers will be stabilized

Ans : (c) Its gene pool will be lost for ever

17. Soil erosion can be prevented by:
(a) deforestation (b) afforestation
(c) overgrazing (d) removal of vegetation

Ans : (b) afforestation

18. The biosphere utilizes:
(a) geothermal energy (b) solar energy
(c) tidal energy (d) atomic energy

Ans : (b) solar energy

19. Plants and animals are known as:
(a) biotic resources (b) abiotic resources
(c) Machines (d) None of these

Ans : (a) biotic resources

20. Which of the following animal has become almost extinct in India?
(a) Wolf (b) Rhinoceros
(c) Hippopotamus (d) Cheetah

Ans : (d) Cheetah

21. Which of the following movements means 'Hug the trees movement'?
(a) Narmada Bachao Andolan
(b) Chipko Andolan
(c) Tehri Andolan
(d) Biodiversity movement

Ans : (b) Chipko Andolan

The Chipko Andolan means Hug the Trees movement was the result of a grass roor level effort to end the alienation of people from their forests.

22. Domestic cooking gas cylinder is filled with:
(a) Alcohol (b) Diesel oil
(c) Liquid petroleum gas (d) Coal gas

Ans : (c) Liquid petroleum gas

23. Complete the following by choosing the correct option. In 1972, the West Bengal Forest Department recognised its failures in reviving the degraded ..... forests in the South-Western districts of the state.
(a) Teak (b) Bamboo
(c) Sal (d) Rosewood

Ans : (c) Sal

In 1972, the West Bengal Forest department recognised its failures the degraded sal forests in South Western districts of the state.

24. Maximum air which we breathe is present at:
(a) Troposphere (b) Stratosphere
(c) Ionosphere (d) Mesosphere

Ans : (a) Troposphere

25. Which of the following is a free living nitrogen fixing bacteria present in soil?
(a) Azotobacter (b) Nitrosomonas
(c) Rhizobium (d) Pseudomonas

Ans : (a) Azotobacter

26. Nitrogen fixation is:
(a) Nitrogen $\longrightarrow$ Ammonia
(b) Nitrogen $\longrightarrow$ Nitrates
(c) Nitrogen $\longrightarrow$ Amino acid
(d) Both (a) and (b)

Ans : (d) Both (a) and (b)

27. A renewable source of energy is:
(a) Petroleum (b) Coal
(c) Nuclear fuel (d) Trees

Ans : (d) Trees

28. Decrease in species diversity in tropical countries is mainly due to:
(a) Urbanisation (b) Pollution
(c) Deforestation (d) Soil erosion
Ans : (c) Deforestation

29. Wildlife conservation means the protection and preservation of
(a) Ferocious wild animals only
(b) Wild plants only
(c) Non-cultivated plants and non-domesticated animals
(d) All the above living in natural habitat
Ans : (d) All the above living in natural habitat

30. Which of the following is not done in a wildlife sanctuary?
(a) Fauna is conserved (b) Flora is conserved
(c) Soil and flora is utilised (d) Hunting is prohibited
Ans : (c) Soil and flora is utilised

31. Which one of the following is a non-replenishable resource?
(a) minerals (b) forests
(c) mineral fuel (d) hydroelectricity
Ans : (c) mineral fuel

2. FILL IN THE BLANK

DIRECTION : Complete the following statements with an appropriate word/term to be filled in the blank space(s).

1. ..... sacrified her life along with 363 others for protection of 'Khejri' trees.
Ans : Amrita Devi Bishnoi

2. An Arabari forest range of Midnapore (West Bengal), a forest officer ..... rejuventated badly damaged sal forest.
Ans : A. K. Banerjee

3. The presence of coliform bacteria beyond the prescribed limit indicates ..... by disease causing micro-organisms.
Ans : contamination

4. Management of forest resources has to take into account the interests of various ..... .
Ans : stakeholders

5. Water and forest are the two kinds of ..... resources.
Ans : Natural

6. Forests, pastures, wildlife and aquatic life constitute ..... .
Ans : renewable resources

7. Solar energy is a ..... resource.
Ans : renewable

8. In Rajasthan, conservation of forest and wildlife has been a religious act for ..... community.
Ans : Bishnoi

9. We can reduce pressure on the environment by sincerely applying the maxim of ..... in our lives.
Ans : 'Reduce, Reuse and Recycle'

10. The five R's to save environment are ....., ..., ..., ... and .....
Ans : Reduce, Reuse, Repurpose, Recycle, Renew

11. Plants manufacture their food by using ..... energy.
Ans : solar

12. Reactor generates ..... energy.
Ans : atomic

13. Environmental problems arise mainly due to ..... of natural resources.
Ans : over exploitation

14. The harnessing of water resources by building dams has social, economic and ..... implications.
Ans : environmental

15. Planting of trees in rows along with crop is called ..... .
Ans : Agroforestry

16. Planting of trees by road side and in available space of colonies by people is known as ..... .
Ans : social forestry

17. Natural resources can be of two types ..... and ..... .
Ans : renewable, non-renewable

18. The various kinds of species of organisms and their range found in a particular area is called ..... .
Ans : biodiversity

19. All naturally occuring animals, plants and other forms of life in the forest are collectively called ..... .
Ans : wildlife

20. ..... is the major source of fresh water and this water is neither used by animals nor exposed to evaporation.
Ans : underground water

21. Forests, mangroves and wildlife are our ..... source.
Ans : renewable

22. Minerals, metal ores and natural gas are our ..... source.
Ans : Non-renewable

23. The use of components of biological diversity in a way that does not disturbs the natural functioning of ecological processes is called ..... .
Ans : sustainable development

24. The aim of the Ganga Action Plan is to install ..... for 27 cities at the bank of the river.
Ans : sewage treatment plants

25. Scraps and old used metals can be remelted and ..... for useful purposes.
Ans : recycled

26. A layer of ..... present about 25 km from earth's surface absorbs a great deal of incoming ..... rays of the sunlight.
Ans : ozone, ultraviolet

27. ..... also known as the breath of life, is essential for the chemical processes that sustain life.
Ans : oxygen

28. Resources which are inexhausitble are called ..... and the resources which once used are lost forever, are known as ..... .
Ans : renewable resources, non-renewable

29. The uppermost layer of the land forms ..... .
Ans : soil

30. Domestic and municipal waste water can be used for ..... .
Ans : irrigation

31. ..... and ..... of water refers to management of water resources to sustainable benefit to the present generation while maintaining.
Ans : conversation, preservation

32. Dams are large or small structure which stop the natural flow of water for the purpose of ..... generation and ..... .
Ans : electricity, irrigation

33. ..... is a greenhouse gas.
Ans : Carbon dioxide

34. ..... gas causes green house effect that mostly increases due to use of fossil fuels.
Ans : carbon-di-oxide

35. ..... is the best method for conservation of environment.
Ans : Reuse

36. Forests are ..... hot spots.
Ans : biodiversity

37. Khadin is an example of traditional.
Ans : Water harvesting

38. In blood carbon monoxide forms ..... that is unable to transport oxygen.
Ans : Carboxyhaemoglobin

39. Glaciers are a source of .....
Ans : water

40. Our resources like forests, wildlife, water, coal and petroleum need to be used in a ..... manner.
Ans : sustainable

41. ..... are termed as biodiversity hotspots.
Ans : forests

42. ..... is remembered for protection of Khejri trees in Rajasthan.
Ans : Amrita Devi Bishnoi

43. To save energy and prevent warming, I use ..... instead of incandescent bulbs.
Ans : CFL

44. ..... is a blanket around the earth, that protects it from scorching during the day and freezing during the night.
Ans : atmosphere

3. TRUE/FALSE

DIRECTION : Read the following statements and write your answer as true of false.

1. Check dams are build along seasonal flooded gullies for water harvesting.
Ans : True

2. Coal and petroleum are non-renewable inexhaustible resource.
Ans : False

3. An important protective function of forests is reduction of atmospheric pollution.
Ans : False

4. Forest department has been able to maintain biodiversity by growing Pine, Teak and Eucalyptus on large tracts.
Ans : False

5. Electricity is a natural resource.
Ans : True

6. The most rapidly dwindling natural resource in the world is forests.
Ans : True

7. A natural resource is a substance/commodity that is a gift of nature which is very useful to mankind.
Ans : True

8. Biodiversity means variations present in the species of the flora of an area.
Ans : False

9. The fossil fuels, coal and petroleum, will ultimately be exhausted.
Ans : True

10. Alternatives to large dams does not exist.
Ans : False

11. Coliform bacteria cause many diseases.
Ans : True

12. Combustion of fossil fuels pollutes our environment.
Ans : True

13. Ozone layer is being depleted by excess carbon dioxide.
Ans : False

14. Forests are reservoirs of wildlife.
Ans : True

15. Water harvesting method increases groundwater level.
Ans : True

16. Chipko Andolan originated in Haridwar during 1980s.
Ans : False

17. Deforestation replenishes forests.
Ans : False

18. The three R's referred to conserve natural resources are - recycle, regenerate and reuse.
Ans : False

19. Sustainable development means planned growth with minimum damage to the environment.
Ans : True

20. When a single species of plant is cultivated in an area, it promotes monoculture.
Ans : True

21. Dams prevent water logging.
Ans : True

22. Improper use of land converts fertile land into unusable land.
Ans : True

23. Geo-thermal energy is a conventional source of energy.
Ans : False

24. The wildlife resources are renewable resources.
Ans : True

25. Forest and wildlife are conserved to continue food chain.
Ans : False

26. Successful forest conservation strategy should involve protection of only consumers.
Ans : False

27. Sustainable development does not consider the view points of stakeholders.
Ans : False

28. Forests provide variety of products.
Ans : True

29. Khadins, Ahars and Kattas are ancient structures that are example of of water harvesting.
Ans : True

30. Solid waste serve as useful resource for providing energy for our industries.
Ans : True

31. Monitoring of resource utilisation is best done through remote sensing.
Ans : True

32. Use of sewage, domestic waste, farm yard manure, etc. will decrease the fertility of the degraded lands.
Ans : False

33. An environmentally friendly decision is reuse jam and pickle bottles.
Ans : True

34. Increase in human population puts more pressure on land.
Ans : True

4. MATCHING QUESTIONS

DIRECTION : Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column-I have to be matched with statements (p, q, r, s) in column II.

1.

Column I		Column II	
(A)	Kulhs	(p)	Karnataka
(B)	Kattas	(q)	Maharashtra
(C)	Tals	(r)	Rajasthan
(D)	Khadin	(s)	Himachal Pradesh

Ans : A-s, B-p, C-q, D-r

2.

Column I		Column II	
(A)	Wullvar	(p)	Orissa
(B)	Chilka	(q)	Rajasthan
(C)	Sambhar	(r)	Jammu and Kashmir
(D)	Harike	(s)	Punjab

Ans : A-r, B-p, C-q, D-s

3.

Column I		Column II	
(A)	Desertification	(p)	Amrita Devi Bishnoi
(B)	Khejri	(q)	Incomplete combustion
(C)	Khadin	(r)	Deforestation
(D)	Carbon monoxide	(s)	Water harvesting

Ans : A-r, B-p, C-s, D-q

4.

Column I		Column II	
(A)	Ganga Sagar	(p)	Forests
(B)	Coliform Bacteria	(q)	Amrita Devi
(C)	Plastic	(r)	Chipko Andolan
(D)	Biodiversity hot spots	(s)	A. K. Banerjee
(E)	Protection of Khejri trees	(t)	Bay of Bengal
(F)	Ahars and Pines	(u)	Ganga water
(G)	Protection of sal forest	(v)	Recycle
(H)	Hug the trees movement	(vi)	Bihar

Ans : A-t, B-u, C-v, D-p, E-q, F-w, G-s, H-r

5. ASSERTION AND REASON

DIRECTION : In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

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

1. **Assertion :** Conservation of biological diversity under natural conditions is in situ conservation.
Reason : Increase of Manipur deer from 17 animals to 150 in Calcutta and Delhi zones is one of an example of these.
Ans : (c) Assertion (A) is true but reason (R) is false.

2. **Assertion :** Inexhaustible natural resources are present in limited amount in nature.
Reason : Inexhaustible natural resources are non-renewable and non-replenish able.
Ans : (e) Both Assertion and Reason are false.

Inexhaustible natural resources are present in unlimited quantity in the nature and they are not likely to be exhausted by human activities. These resources are renewable and thus replenish able.

3. **Assertion :** Coal is a combustible organic fuel.
Reason : It occurs inside the volcanoes.
Ans : (c) Assertion (A) is true but reason (R) is false.

Coal is a combustible organic fuel that occurs inside the earth.

4. **Assertion :** Consumption of coal and petroleum can be reduced by many ways.
Reason : One of them is to switch off the lights, fans, etc.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Consumption of coal and petroleum can be reduced by many ways. One of them is to switch off the lights, fans, television, etc.

5. **Assertion :** Water is a valuable resource.
Reason : Turn off the taps when not in use.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Water is a valuable resource. So, we need to conserve it by turning off the taps when not in use.

6. **Assertion :** Coal and petroleum are categorised as natural resources, so should be used judiciously.
Reason : They are formed from the degradation of bio-mass subjected to various biological and geological processes over a million of years.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Coal and petroleum are formed from the degradation of bio-mass subjected to various biological and geological processes over a million of years. Thus, cannot be manufactured by humans. Therefore, coal and petroleum are categorised as natural resource.

7. **Assertion :** Water harvesting is the method to capture every trickle of water that falls on the land.
Reason : Water harvesting recharges wells and ground water.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Water harvesting is a technique of capturing rain water when it falls and taking measure to keep the water clean. It recharges wells/ground water and provides moisture for vegetation over a wide area.

8. **Assertion :** Ethnography is important for ecologist and genetists.
Reason : It helps in dealing with distribution of different races of mankind and eugenics.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

9. **Assertion :** We need to conserve natural resources.
Reason : Natural resources are limited.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

We need to manage natural resources because natural resources are limited. Human population is increasing at a tremendous rate and utilization of natural resources is increasing at an exponential rate. Therefore, we need to conserve resources for future generations.

10. **Assertion :** Reuse is better than recycle.
Reason : Recycle prevents environmental pollution.
Ans : (c) Assertion (A) is true but reason (R) is false.

Reuse is better than recycle because it saves energy by using material again without any changes and also, it prevents environmental pollution.

11. **Assertion :** The development which can be maintained for a long time without can be maintained for a long time without undue damage to the environment is called sustainable development.
Reason : It provide the economic well being to the present and future generation.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

Sustainable development is the development which can be maintained for a long time without undue damage to the environment. It has two main objectives. To provide economic well being to the present and future generation and to maintain a healthy environment and life support system.

12. **Assertion :** Deforestation should be stopped or reduced to minimum.
Reason : Afforestation damages the top soil and lead to desertification.
Ans : (c) Assertion (A) is true but reason (R) is false.

13. **Assertion :** Dams cause discontentment among people.
Reason : Local people are alienated from their land without adequate compensation.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

14. **Assertion :** The gases released by burning of coal and petroleum are poisonous.
Reason : The oxides of sulphur, nitrogen and carbon monoxide are poisonous at high concentrations.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

The gases released by burning of coal and petroleum (oxides of sulphur, nitrogen and carbon monoxide) are poisonous at high concentrations.

15. **Assertion :** Forest cover balances the temperature level of the area.
Reason : Forests reduce atmospheric pollution by absorbing carbon dioxide from the atmosphere.
Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

16. **Assertion :** Coliform is a group of bacteria found in human stomach.
Reason : Presence of coliform in water indicates contamination by disease causing microorganisms.
Ans : (d) Assertion (A) is false but reason (R) is true.

Coliform is a group of bacteria found in human intestine whose presence in water indicates contamination by disease causing micro-organisms.

17. **Assertion :** Chipko Andolan was done by women of Reni village.
Reason : Chipko Andolan was done to protect wild life.
Ans : (c) Assertion (A) is true but reason (R) is false.

Chipko movement was started in early 1970s in village in Garhwal by the women of Uttarakhand to stop cutting of forest trees of their area.

18. **Assertion :** Regions in Gangetic plains are very fertile.
Reason : It has mainly alluvial soils.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

19. **Assertion :** Wildlife should be conserved.
Reason : Human activities cause several plants and animals to extinct.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Wild life is found in forests. Over a period of time, wildlife has become extinct because of certain human activities like deforestation, hunting, poaching etc.

20. **Assertion :** The flora of tundra consists of lichens, mosses and conifers.
Reason : Temperature and water supply to plants are the limiting factors.
Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

21. **Assertion :** An estimation of BOD gives an indication

of water pollution.
Reason : It is measure of O_2 requirement of bacteria living in that media.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

22. **Assertion :** Local people are the major stakeholders of the forest.
Reason : Actions of local masses do not result in depletion of natural resources.

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

23. **Assertion :** Every biological system resist a change and wants to remain in state of equilibrium.
Reason : Climax communities of an ecosystem are produced after several changes it has gone through succession.

Ans : (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

24. **Assertion :** Dams are the barriers constructed across the rivers to hold the water.
Reason : These dams ensure the storage of adequate water for different uses.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

Dams are the barriers constructed across the rivers to hold the water. They ensure the storage of adequate water for different uses.

25. **Assertion :** Natural resources need to be used carefully.
Reason : Resources are finite in supply and human population is tremendously increasing.

Ans : (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).