COIMBATORE SAHODAYA SCHOOL COMPLEX

SCIENCE (086) 2024-25

SET A (Answer Key)

CLASS: X **Total Marks: 80**

Duration: 3Hours

SECTION A(20X1=20)

1. (c) $2KClO3 \rightarrow 2KCl + 3O2$
2. (c) 1-D, 2-E, 3-C, 4-B, 5-A
3. (a) pH of acetic acid is more than that of hydrochloric acid.
4. (a) (i) and (iii)
5. (d) x = physical state of KClO3 and KCl; y = reaction condition; z = physical state of O2
6. (d) Sodium > Magnesium > Zinc > Iron
7. (d) Decomposition of calcium carbonate to form quick lime and carbon dioxide.
8. (b) Mitochondria
9. (c) A is guard cell, B is stomatal pore
10. (c) Y, W, X, Z
11. (c) (ii) and (iii)
12. (c) Auxin
13. (a) 6.67 mm
14. (a) Red color scattered least by smoke
15. (a) 6000 kJ
16. (c) Chemical energy
17. (a) Both A and R are true, and R is the correct explanation of A.
18. (a) Both A and R are true, and R is the correct explanation of A.
19. (b) Both A and R are true, but R is not the correct explanation of A.
20. (c) A is true, but R is false.

SECTION B (6 × 2 = 12 Marks)

21. i) As ferrous sulphate crystals are heated, the following two observations occur:
(a) Green colour of $FeSO_4$ disappears which means a change in state and colour occurs.
(b) The reddish brown solid is formed and gas is generated during this process.
(ii) It is a decomposition reaction since the compound (ferrous sulphate) decomposes into two or more substances.
(iii) The following is the chemical reaction equation.

$2FeSO_4(s)+Heat(\Delta)\longrightarrow Fe_2O_3(s)+SO_2(g)+SO_3(g)$

.22. Leaves of Mimosa are sensitive. When touched the stimulus reaches the base of the leaf and the water in the vacuoles of the cells of the leaf loses water to the adjacent cell. All the water escapes the leaf which then becomes flaccid. This causes the leaves to close.

23. (a)The septum helps keep oxygen-rich blood from the lungs from mixing with oxygen-poor blood from the body.

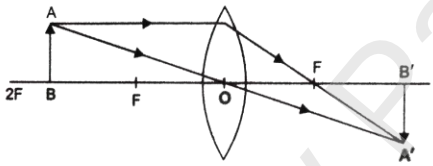
(b)Lymph helps in the absorption of fats to our body. It help in the formation of immune cells.

OR

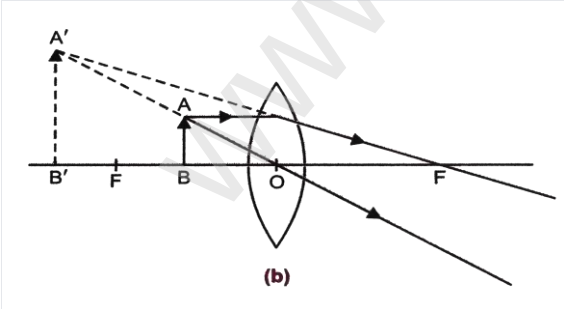
(a)Xylem transports water and minerals in plants from roots up to the stem, to the leaves. If Xylem is removed from a plant, the plant will not be able to transport water to leaves, hindering various processes like photosynthesis, transpiration, growth etc. The plant will initially wilt and then ultimately die.

(b)Transpiration gives cooling effect to plant body. It also helps them to generate a suction pull which is required for the transport of water.

24. (a) For three times magnified real image, the object has to be held between F and 2F of a converging lens



(b) For three times magnified virtual image, the object has to be held between optical centre O and principal focus F of convex lens



(a) Power Calculation

As calculated earlier:

$$P = V \times I = 5.0\,\text{V} \times 0.1\,\text{A} = 0.5\,\text{W}$$

So, the power of the bulb is $0.5\,\text{W}$.

(b) Resistance Calculation

Now, let's calculate the resistance:

$$R = \frac{V}{I} = \frac{5.0\,\text{V}}{0.1\,\text{A}} = 50\,\Omega$$

Answer:

- (a) The power of the bulb is $0.5\,\text{W}$.
- (b) The resistance of the bulb is $50\,\Omega$.

25.

OR

For the given metal wire,
length, l = 2 m
area of cross-section, A = 1.55×10^{-6} m²
resistivity of the metal, p = 2.8×10^{-8} Ω m
Since, resistance, R = ρlA
So R = (2.8×10−8×21.55×10−6)Ω
= 5.61.55 × 10^{-2} Ω = 3.6 × 10^{-2}Ω or R = 0.036Ω

26. O_2 in presence of UV converted to O +O

O+ O_2 will combine and form ozone.

Damage to ozone may bring harmful UV rays of sun to earth and can cause skin cancer, sun burns etc. to animals.

SECTION C (7 × 3 = 21 Marks)

27. (a) Due to the formation of a layer of oxide i.e., Al_2O_3.

3Al+4HNO3⟶3Al(NO3)2+NO+2H2O

(b) Na and Mg are more reactive as compared to carbon. The two metals have more affinity to oxygen than carbon and thus cannot be reduced by it.

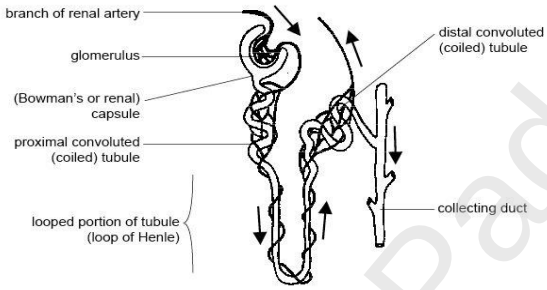
(c) In solid NaCl, the movement of ions is not possible due to its rigid structure but in aqueous solution or molten state, it disassociates into ions which move about and conduct electricity.

- 28. (i) When Silver Chloride (AgCl) is exposed to sunlight it changes from White to Gray.

- Reason: When Silver Chloride is exposed to sunlight, it undergoes photochemical decomposition to produce Silver and Chlorine.
- $2AgCl \rightarrow 2Ag + Cl_2$
- (ii) Upon strongly heating Copper powder in the presence of oxygen, it changes its colour from brown to black.
- Reason: When Copper powder is strongly heated in the presence of oxygen, then Copper reacts with oxygen present in the air to form copper oxide.
- $Cu(powder) + O_2(air) \rightarrow$ (iii) When a piece of zinc is dropped in a copper sulphate solution, the colour of the solution fades from blue to colourless.
- Reason: The oxidation potential of Zinc is much higher than Copper, so Zinc replaces the Copper from the solution.
- And, the colour of the solution fades from blue to colourless.

$$\underset{\text{Zinc}}{Zn} + \underset{\text{Copper Sulphate}}{CuSO_4} \rightarrow \underset{\text{Zinc Sulphate}}{ZnSO_4} + Cu$$

29. Diagram of a nephron: Include Bowman's capsule, glomerulus, proximal tubule, loop of Henle, distal tubule, and collecting duct.



Stages of urine formation: Filtration, reabsorption, secretion, and excretion.

30. (a) All F1 generation plants will be tall due to dominant trait.
(b) In F2 generation, the ratio of tall to dwarf plants is 3:1.
(c) Dwarf plants appear in F2 generation due to the presence of recessive alleles.

- 31. **Planets don't twinkle**

  Planets appear larger than stars because they are closer to Earth. Planets are made up of many point-sized light sources, and the average of the brighter and dimmer effects from these sources is zero. This means that the twinkling effects cancel each other out, and planets don't twinkle.

- **The sun appears reddish in the morning**

  The sun appears reddish in the morning because red light has the longest wavelength and is scattered the least. This means that red light travels the longest distance, while other light rays in the visible spectrum are scattered away.

32. For the second nichrome wire, resistance R2 = R1 * (L2 / A2) = 10 * (3 / 4) = 7.5 Ω

$R = \frac{\rho l}{A}$

$R = 10\,\Omega$

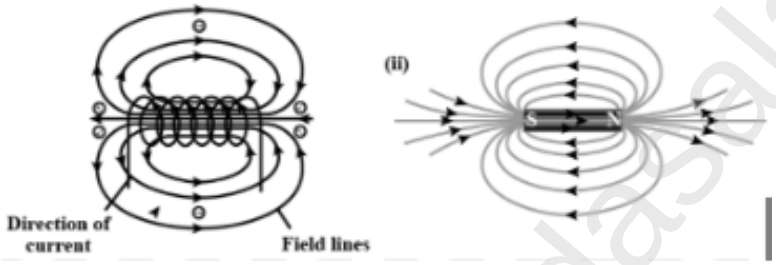
$R' = \frac{\rho l'}{A'}$ $\quad l' = 3l$ $\quad A' = 4A$

$R' = \frac{\rho 3l}{4A} = \frac{3}{4}\frac{\rho l}{A}$

$= \frac{3R}{4} = \frac{30}{4} = 7.5\,\Omega$

33. Solenoid: A coil of wire that generates a magnetic field similar to a bar magnet when electric current passes through.

Diagram: Show magnetic field lines for both a solenoid and a bar magnet.



SECTION D (3 × 5 = 15 Marks)

34- - Isomers are compounds having the same molecular formula but different structures.
.Isomers of Butane and IUPAC names are Butane and 2-methyl propane
The two isomers of butane, C_4H_{10} are:

Since branching is not possible, isomers are not possible for the first three members of alkane series.(Butane and 2-methyl propane)

OR

Esterification: Reaction between acid and alcohol, producing an ester and water.

$RCOOH + R'OH \rightarrow RCOOR' + H2O$

Saponification: Reaction of ester with a base to produce soap and glycerol.

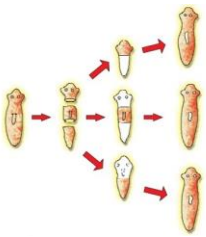
$RCOOR' + NaOH \rightarrow RCOONa + R'OH$

35. Barrier method: Prevents sperm from entering the uterus (e.g., condoms).

Hormonal method: Uses hormones to prevent ovulation (e.g., birth control pills).
Intrauterine devices (IUDs): Placed in the uterus to prevent fertilization.

OR

(a) Binary fission: Parent divides into two equal halves (e.g., Amoeba).
Multiple fission: Divides into multiple cells (e.g., Plasmodium).
(b) Regeneration: Cells regrow to form a new organism, but it's not actual reproduction as it depends on cell division, not creating new organisms.



36. **Step 1: Parallel Connection in the household electric circuit:**

1. In a household electric circuit, different appliances are connected in parallel to one another, because in parallel connection, each appliance is operated by a separate fuse.
2. If the fuse blows off only that appliance is to be checked that is the loads can be operated individually. whereas in a series circuit, the current that flows through each component will be the same.
3. Hence if there is any damage to one appliance, the whole circuit will be damaged.

Step 2: Current and Power rating:
Given:
Power P=1.5kW
Voltage V=220V
Current in terms of power and voltage, I=PV
Substituting the values, we get a I=1.5kW220V
Current , I=6.8A
Here, the amount of current is greater than the rated value of fuse current, hence the fuse will melt and break the circuit.
Therefore, a fuse of rating 6.8A must be used to operate a heater of 1.5kW with voltage of 220V.

OR

The **current** in bulb A is 0.75 A, and the current in bulb B is 0.5 A. Bulb A will consume more energy.

Explanation:

When two bulbs are connected in parallel across a voltage source, they share the same **voltage** but have different currents based on their individual resistances.

First, let's find the current in each bulb using **Ohm's law**, V = IR, where V is the voltage (120 V), I is the current, and R is the resistance.

For bulb A:

V = 120 V

P (power) = 90 W

Using the formula P = IV, we can find the current I for bulb A:

90 W = 120 V * I_A

I_A = 90 W / 120 V

I_A = 0.75 A

For bulb B:

V = 120 V

P = 60 W

Using the same formula:

60 W = 120 V * I_B

I_B = 60 W / 120 V

I_B = 0.5 A

Now, let's compare the **energy consumption** of both bulbs. The energy consumed by a device can be calculated using the formula E = Pt, where E is energy in watt-hours (Wh), P is power in watts (W), and t is time in hours (h).

Let's assume both bulbs are operated for the same amount of time. Since bulb A has a higher power rating, it will consume more energy:

Energy consumed by bulb A = 90 W * t

Energy consumed by bulb B = 60 W * t

Since 90 W is greater than 60 W, bulb A will consume more energy in the same amount of time.

In conclusion, the current in bulb A is 0.75 A, and the current in bulb B is 0.5 A. Bulb A will consume more energy because it has a higher power rating.

SECTION E (3 × 4 = 12 Marks)

37.

1. (a) $MgSO_4 + Cu$
2. (b) Displacement
3. (a) $Zn + 2AgNO_3 \rightarrow Zn(NO_3)_2 + 2Ag$
4. (d) I. Sodium, II. Magnesium, III. Copper

OR

1. (a) thermal decomposition reaction
2. (b) decomposition reaction
3. (c) lead oxide
4. (a) $CaO\ (s) + H_2O\ (l) \rightarrow Ca(OH)_2\ (aq)$

38.

1. (a) Pancreas 2. (a) Insulin 3. (a) Diabetes 4. (b) Diabetic person

OR

1. (a) neurons 2. (c) axon and dendrites 3. (a) synapse 4.(c) dendrite

39.

1. (a) $\mu = C/v_m$
2. (b) B
3. (d) 1.5
4. (a) angle of incidence > angle of refraction

OR

1. (c) Convex mirror
2. (d) Either plane or convex
3. (c) (iii)
4. (b) 7.5 cm