Goa Board
Class X Science
Term 1
Sample Paper – 5 Solution

Time: 3 hrs **Total Marks: 90**

SECTION A

1. **Ans.**

$KClO_3(s) \xrightarrow[MnO_2]{\triangle} KCl(s) + O_2(g)$

The balanced equation will be

$2KClO_3(s) \xrightarrow[MnO_2]{\triangle} 2KCl(s) + 3O_2(g)$

2. **Ans.** Ohm's law states that $\frac{V}{I} = R$.
If V = 1 V and I = 1 A, then R = 1 ohm.
The resistance of a conductor is said to be one ohm if a current of one ampere flows through it when a potential difference of one volt is applied across its ends.

3. **Ans.** The brain box called the cranium protects the brain and has shock-absorbing fluid in it which prevents it from shock and injuries.

4. **Ans.** 'X' is more reactive than 'Y'; hence, 'X' is able to displace 'Y' from its salt, whereas 'Y' is not able to displace 'X' from its salt because it is less reactive than 'X'.

5. **Ans.**
Given P = 24 W, V = 12 V.

$$P = \frac{V^2}{R} \Rightarrow 24W = \frac{(12V)^2}{R} \text{ or } R = \frac{(12)^2}{24}$$

Let the effective wattage (i.e. power) be P_1 when it operates on 6 V supply, then

$$P_1 = \frac{(6V)^2}{R} = \frac{(6V)^2}{(12V)^2} \times 24W = \frac{24W}{4} = 6W$$

The effective wattage when it operates on a 6 V battery = 6 W

6. **Ans.** Observation 1 is correct.
Because force experienced by a current-carrying conductor in a magnetic field is proportional to the strength of the current.

7. **Ans.** A large number of alveoli in the lungs provides a large surface area for the exchange of gases. Walls of alveoli contain an extensive network of blood vessels. Walls of alveoli are extremely thin and made of a single layer of cells.

8. **Ans.**
$CaCO_3$ + dil. $H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$
(Water insoluble)
(A) (B)
$Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$
(Lime water) (A)
Milky
A: $CaCO_3$ (Limestone)
B: CO_2 (g)

9. **Ans.**
(i) X: Copper (Cu)
Y: Copper oxide (CuO)
(ii) First: Oxidation of X; Second: Reduction of Y
(iii) $2Cu + O_2 \rightarrow 2CuO$
$CuO + H_2 \rightarrow Cu + H_2O$

10. **Ans.** HCl gas is produced.
Chemical reaction: $2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl \uparrow$
- The gas when passed through dry litmus paper will show no change in colour because it cannot show acidic properties as H^+ ions are not present.
- The gas when passed through moist litmus paper will show colour change to red as it shows acidic properties because H^+ ions are produced when HCl dissolves in water.

11. **Ans.**
(i) It will not undergo any colour change because the solution of Na_2SO_4 (sodium sulphate) in water is almost neutral.
(ii) Concentrated sulphuric acid is highly hygroscopic. It absorbs moisture from air and gets diluted. Because the volume increases, the acid starts flowing out of the bottle.

12. Ans.

(i) We should always purchase gold jewellery from a branded shop with proper receipt and hallmark certificate.

(ii) The government insists on purchasing hallmarked jewellery as it contains gold and its alloyed metal (i.e. copper or silver) in a fixed ratio.

Associated Value:

They will be more careful and educated and thus cannot be fooled easily while shopping for jewellery and other products.

13. Ans.

(i) Total resistance $R = R_1 + R_2 = 18\ \Omega + 6\ \Omega = 24\ \Omega$

(ii) Current flowing through the circuit, $I = V/R = 6/24 = 0.25$ A

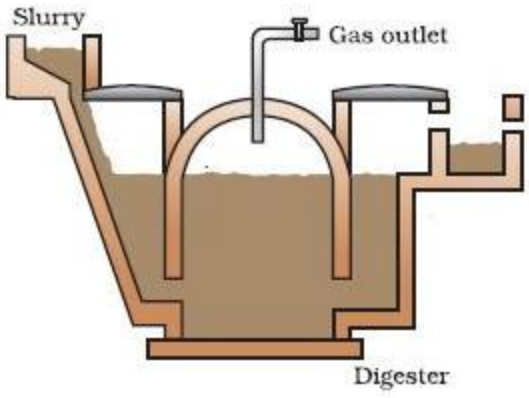
(iii) Potential difference across the lamp

$V_1 = IR_1 = 0.25 \times 18 = 4.5$ V

The potential difference across the resistor R_2, $V_2 = IR_2 = 0.25 \times 6 = 1.5$ V

14. Ans.

A biogas plant:



15. Ans.

(i) Total resistance in arm $CE = 5\Omega + 4\Omega = 9\Omega$

(ii) Current in the arm $AB = \frac{4.5V}{9\Omega} = 0.5A$

(iii) Current in the arm $CE = \frac{4.5\ A}{9\ \Omega} = 0.5$ A

Therefore, the potential difference across the $4\ \Omega$ resistor $= 4\Omega \times 0.5A = 2V$

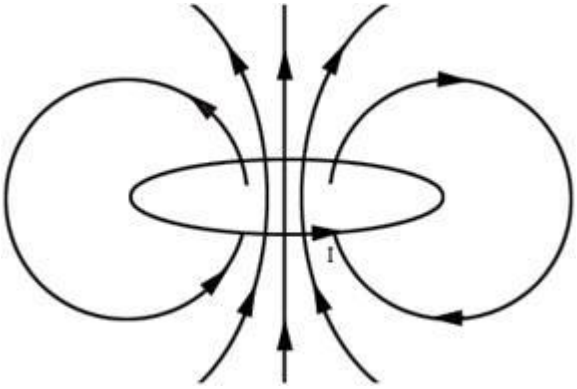
16. Ans.

(a) The strength of the magnetic field (B) is inversely proportional to the radius of the circular loop (r)

$$B \propto \frac{1}{r}$$

(b) The strength of the magnetic field (B) is directly proportional to the number of turns in the coil (N) $B \propto N$

(c) The magnetic field lines will be as shown below.



17. Ans. The hindbrain controls involuntary actions.

It consists of pons, medulla and cerebellum.

Functions of medulla and cerebellum:

1. The medulla helps in controlling involuntary actions such as blood pressure, salivation and vomiting.
2. The cerebellum is responsible for the precision of voluntary actions and maintaining the posture and balance of the body.

18. Ans.

1. When the resistors are connected in parallel:

$$\frac{1}{R_{effective}} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R_{effective} = \frac{R_1 R_2}{R_1 + R_2}$$

$$R_{effective} = \frac{20 \times 20}{20 + 20} = 10\Omega$$

$$\text{Power in parallel, } P_1 = \frac{V^2}{R_{effective}} = \frac{10^2}{10} = 10 \text{ W}$$

2. When the resistors are connected in series:

$$R_{effective} = R_1 + R_2$$

$$R_{effective} = 20 + 20 = 40\ \Omega$$

$$\text{Power in series, } P_2 = \frac{V^2}{R_{effective}} = \frac{10^2}{40} = 2.5 \text{ W}$$

$$\text{Ratio, } \frac{P_1}{P_2} = \frac{10 \text{ W}}{2.5 \text{ W}} = 4:1$$

The ratio of power consumed in the combination of resistors in the two cases is 4:1.

19. Ans.

(a)

(i) The milkman shifts the pH of the fresh milk from 6 to slightly alkaline because in the alkaline condition milk does not set as curd easily.

(ii) Because this milk is slightly basic than usual milk, acids produced to set the curd are neutralised by the base. Therefore, it takes a longer time for the curd to set.

(b) A reaction in which an acid and a base react with each other to give a salt and water is termed a neutralisation reaction. In this reaction, energy is evolved in the form of heat.

Examples:

(i) Sodium hydroxide which is a base reacts with hydrochloric acid to form sodium chloride and water.

$NaOH + HCl \rightarrow NaCl + H_2O$

(ii) During indigestion (caused because of the production of excess of hydrochloric acid in the stomach), we administer an antacid (generally milk of magnesia, $Mg(OH)_2$ which is basic in nature). The antacid neutralises the excess of acids and thus gives relief from indigestion.

$Mg(OH)_2 + 2HCl \rightarrow MgCl_2 + 2H_2O$

20. Ans.

(a) Diamond and graphite are the two allotropes of carbon.

Diamond:

· Hardest substance

· Electrical insulator

Graphite:

· Comparatively soft; it is slippery over layers

· Good electrical conductor

(b) Aluminium articles have a longer life and attractive finish compared to many other metals because of the formation of a thin transparent protective film cover of aluminium oxide on the surface of aluminium formed due to its spontaneous reaction with oxygen.

(c)

(i) Ore: An ore is a type of rock which contains minerals with important elements including metals. The ores are extracted through mining; these are then refined to extract the valuable element(s).

(ii) Gangue: In mining, gangue is the commercially worthless material which surrounds, or is closely mixed with, a wanted mineral in an ore deposit.

(d) The electronic configuration of a metal atom is significant to know about the kind of bond which the metal will be forming. For example, in the formation of calcium chloride, chlorine only needs one electron to complete its octet, so two atoms of chlorine accept one electron each lost by the calcium ion.

21. Ans.

(a)

(i) Right-hand thumb rule: If one holds a wire carrying current in the right hand in such a way that the thumb indicates the direction of current, then the folded fingers indicate the direction of the magnetic field surrounding the wire.

(ii) Fleming's left-hand rule: If we stretch the first three fingers of the left hand mutually perpendicular to each other such that the forefinger points along the direction of the magnetic field and the middle finger points along the direction of the current, then the thumb indicates the direction of the force experienced by the conductor.

(iii) Fleming's right-hand rule: If the forefinger, second (central) finger and thumb of the right hand are stretched at right angles to each other, with the forefinger in the direction of the field and the thumb in the direction of the motion of the wire, then the induced current in the wire is in the direction of the second or central finger.

(b) The direction of AC changes after equal intervals of time. The direction of DC does not change.

Advantage of AC over DC: AC can be transmitted to long distances without much loss of energy.

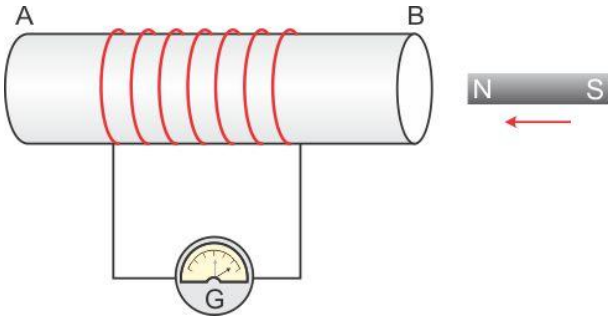
22. Ans.

(a) The process by which a changing magnetic field in a conductor induces a current in another conductor is called electromagnetic induction.

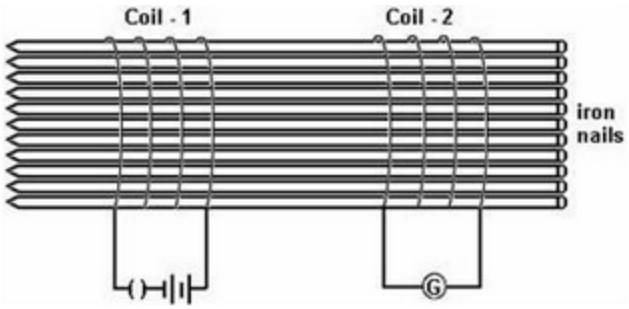
(b)

(i) By moving a magnet towards or away from a coil.

We take a coil with several turns and it is connected to a sensitive galvanometer. When a bar magnet is moved towards the coil, we see a deflection in the galvanometer. This deflection dies down after some time. The deflection is because of the induced current.



(ii) By varying current in one coil, an induced emf is produced in the other coil.

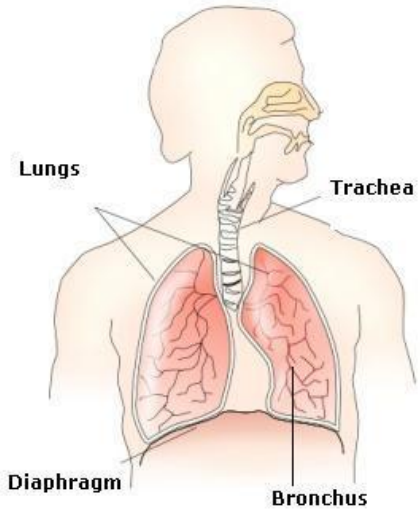


Two coils of insulated copper wire are wrapped on few long iron rods. Coil-1 is connected to a battery through a switch and Coil-2 is connected to a galvanometer. Now, the current is switched on in Coil-1. A momentary deflection is seen in the galvanometer attached to Coil-2. The deflection is due to current induced in Coil-2 momentarily as the magnetic field builds up along the axis of Coil-1 when current is switched on.

(c) Fleming's right-hand rule: Stretch the thumb, forefinger and middle finger of the right hand so that they are perpendicular to each other. If the forefinger indicates the direction of the magnetic field and the thumb shows the direction of motion of the conductor, then the middle finger will show the direction of induced current. This is called Fleming's right-hand rule.

23. Ans.

(a) Respiratory system:



(b) Haemoglobin.

Role of haemoglobin → It is an iron–protein compound in red blood cells which gives blood its red colour and transports oxygen and carbon dioxide.

(c) The rate of breathing in aquatic organisms is much faster than that in terrestrial organisms because the amount of dissolved oxygen in water is fairly low compared to the amount of oxygen in the air.

24. Ans.

(i) The growth of a plant part in response to a stimulus is called positive tropism, and if the growth of a plant part is away from the stimulus, then it is called negative tropism. Examples: The roots of a plant go towards the earth in response to gravity is an example of positive geotropism, whereas the stem grows away from the earth against gravity is an example of negative geotropism.

(ii) The directional growth movement of a plant part in response to the touch of an object is called thigmotropism. Example: Tendrils grow towards any support which they happen to touch and wind around it.

(iii)

Thigmotropism	Thigmonasty
The directional growth movement of a plant part in response to the touch of an object is called thigmotropism. Example: Tendrils	The non-directional movement of a plant part in response to the touch of an object is called thigmonasty. Example: *Mimosa pudica*

Tendrils grow towards a stimulus; hence, it is a directional movement which shows that it is a case of thigmotropism. The folding of leaves in the mimosa plant does not depend on the direction of stimulus (touch) which shows that it is an example of thigmonasty.

SECTION B

25. Ans. C. Acetic acid is flammable and corrosive in nature.

26. Ans. D. Sodium hydroxide is in the form of small white pellets and is soluble in water. Being basic in nature, it turns red litmus paper blue.
So, the correct observation is I, II and IV.

27. Ans. B. When acetic acid reacts with sodium bicarbonate and sodium carbonate, carbon dioxide gas is formed which extinguishes fire.

28. Ans. D. The positive terminal of the ammeter should be connected to the positive terminal of the cell and the negative terminal should be connected to the negative terminal.

29. Ans. D. $R = V/I$. Here, $V = 1.8$ V, $I = 180 \times 10^{-3}$ A
$R = 1.8/(180 \times 10^{-3}) = 10$ ohm

30. Ans. D. A rheostat controls the current in a circuit by varying the resistance.

31. Ans. A cell is used to maintain the potential difference between two points of a conductor.

32. Ans. B. No photosynthesis occurs and no more starch is produced in the dark.

33. Ans. C. Chloroplast is located in guard cells which is II, while IV is the stomatal pore and I is the epidermis.

34. Ans. Light is essential for photosynthesis. First, we have to destarch the plant for 3 days and we can cover the leaf with black paper strip. After keeping the plant in sunlight, we can perform the starch test.

35. Ans. The voltmeter and ammeter have not been correctly connected in the circuit because the voltmeter should be connected in parallel and the ammeter should be connected in series.
An ammeter is a device used to measure the magnitude of current flowing through the circuit, and a voltmeter is used to measure the potential difference between any two points in the circuit.

36. Ans. The reaction between iron nails and copper sulphate solution is a displacement reaction. In this reaction, iron being more reactive than copper displaces copper from the copper sulphate solution, forming ferrous sulphate solution and copper metal. Because ferrous sulphate is pale green, its formation makes the solution of copper sulphate fade.

$$Fe_{(s)} + \underset{\text{Copper sulphate}}{CuSO_{4(aq)}} \rightarrow \underset{\text{Ferrous sulphate}}{FeSO_{4(aq)}} + Cu_{(s)}$$

Further, during the reaction, copper deposits on the iron nail because of which the iron nail appears brownish.