CBSE Sample Paper-02
SUMMATIVE ASSESSMENT –I
SCIENCE (Theory)
Class – X

Time allowed: 3 hours Maximum Marks: 90

General Instructions:

a) All questions are compulsory.
b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
d) Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
e) Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
f) Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
g) Questions 25 to 27 in section B are 2 marks questions and Questions 28 to 36 are multiple choice questions based on practical skills. Each question of multiple choice questions is a one mark question. You are to select one most appropriate response out of the four provided to you.

Section A

1. What happens when Hydrogen combines with Oxygen in the presence of an electric current?
2. Why is energy required by an organism even during sleep?
3. A current of 0.5 A is drawn by a filament of an electric bulb for 10 minutes. Find the amount of electric charge that flows through any point of the circuit.
4. Why alkalis like sodium hydroxide and potassium hydroxide should not be left exposed to air?
5. Which signal will get disrupted in case of a spinal cord injury?
6. Draw magnetic field lines around a bar magnet? Give one point of difference between uniform and non- uniform magnetic field.
7. (a) What is an ionic equation? Give an example.
   (b) Write the name of following compounds:
   (i) $Mn(OH)_2$ (ii) $FeCl_3$
8. Explain the following in terms of gain and loss of oxygen with two examples each?
   (a) Oxidation
   (b) Reduction
9. (i) What is the action on litmus of:
   (a) Dry ammonia gas. (b) Solution of ammonia gas in water

(ii) State the observations you would make on adding ammonium hydroxide to aqueous solutions of (a) Ferrous sulphate, (b) Aluminium chloride.

10. What is an alloy? Name the constituents of 22-carat gold. Why is 24-carat gold converted to 22-carat gold?
11. (a) What are strategic metals? Give one example also.
    (b) State the reason for the following behaviour of Zinc metal:
    On placing a piece of Zinc metal in a solution of mercuric chloride, it acquires a shining silvery surface but when it is placed in a solution of magnesium sulphate no change is observed.
12. Discuss the major steps involved in process of nutrition in human beings.
13. Describe the structure of human kidney.
14. Differentiate between axon and dendrons?
15. Calculate:
    (a) effective resistance
    (b) current
    (c) Potential difference across $10\,\Omega$ resistor of a circuit shown in the figure.
16. Draw the pattern of lines of force due to magnetic field associated with a current carrying straight conductor. State how the magnetic field produces changes:
    (i) with an increase in current in the conductor and
    (ii) the distance from the conductor
17. Vinod went to his ancestral village along with his father during the summer holidays. He found that the women of the village used dried cow-dung cakes (uple) as the fuel to cook food and for other heating purposes. One day Vinod went to Panchayat meeting in a village which is attended by all the village elders and requested them to install "Gobar Gas plant" in the village and used cow-dung in it to produce gobar gas, instead of burning cow-dung cakes directly. He explained the advantages of using the gobar gas as a fuel instead of cow-dung cakes. Everyone liked the idea and thanked Vinod for guidance.
    Read the above passage and answer the following questions:
    (a) State one disadvantage of using dried cow-dung cakes as a fuel for cooking food.
    (b) State one advantage of using gobar gas as a fuel for cooking food.
    (c) What values are displayed by Vinod in this whole episode?

    [Value Based Question]
18. (a) Write the principle of generation of electric power by a boiling water type nuclear reactor. Name the coolant used in such a reactor.
    (b) Explain the process of generation of energy in the Sun and name the scientist who was first to propose it.
19. Translate the following statements into chemical equations and then balance them:
    (a) Hydrogen gas combines with nitrogen to form ammonia.
    (b) Hydrogen sulphide gas burns in air to give water and sulphur dioxide.
    (c) Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.

(d) Potassium metal reacts with water to give potassium hydroxide and hydrogen gas.
(e) Hydrogen sulphide gas reacts with oxygen gas to form solid sulphur and liquid water.

Or

Write the difference between Displacement reaction and Double displacement reactions. Write equations for these reactions also.

20. (i) Crystals of copper sulphate are heated in a test tube for some time.
(a) What is the colour of copper sulphate crystals before heating, and after heating?
(b) What is the source of liquid droplets seen on the inner upper side of the test tube during the heating process?
(ii) A metal **'X'** when dipped in aqueous solution of aluminium sulphate no reaction is observed whereas when it is dipped in an aqueous solution of ferrous sulphate, the pale green solution turns colourless. Identify metal **'X'** with reason.

Or

You are given the following materials:
(i) Iron nails (ii) Copper sulphate solution (iii) Barium chloride solution
(iv) Copper powder (v) Ferrous sulphate crystals (vi) quick lime
Identify the type of chemical reaction taking place when:
(a) Barium chloride solution is mixed with copper sulphate solution and a white precipitate is observed.
(b) On heating copper powder in air in a China dish, the surface of copper powder turns black.
(c) On heating green coloured ferrous sulphate crystals, reddish brown solid is left and smell of a gas having odour of burning sulphur is experienced.
(d) Iron nails when left dipped in blue copper sulphate solution become brownish in colour and the blue colour of copper sulphur fades away.
(e) Quick lime reacts vigorously with water releasing a large amount of heat.

21. Describe the respiration process in human beings.

Or

Draw a diagram showing 'Human respiratory system'. Label its following parts:
(i) Larynx (ii) Trachea (iii) Primary Bronchus (iv) Lungs
Why do the walls of the trachea not collapse when there is less air in it?

22. The value of current I flowing in a given resistor for the corresponding values of potential difference V across the resistor are given below:

I (amperes)	0.5	1.0	2.0	3.0	4.0
V (volts)	1.6	3.4	6.7	10.2	13.2

Plot a graph between V and I and calculate the resistance of that resistor.

Or

(i) The potential difference between two points in an electric circuit is 1 volt. What does is mean? Name a device that helps to measure the potential difference across a conductor.

(ii) Why does the connecting cord of an electric heater not glow while the heating element does?

(iii) Electric resistivities of some substances at 20° C are given below:

Silver	$1.60\times10^{-8}\ \Omega$ m	Copper	$1.62\times10^{-8}\ \Omega$ m
Tungsten	$5.2\times10^{-8}\ \Omega$ m	Iron	$10.0\times10^{-8}\ \Omega$ m
Mercury	$94.0\times10^{-8}\ \Omega$ m	Nichrome	$100\times10^{-6}\ \Omega$ m

Answer the following questions using above data:

(a) Among Silver and Coper, which one is a better conductor and why?

(b) Which material would you advise to be used in electrical heating devices and why?

23. (a) State Flemings left hand rule with a labelled diagram.

(b) A coil of insulated copper wire is connected to a galvanometer.

What happens if a bar magnet is

(i) pushed into the coil ,

(ii) withdrawn from inside the coil

(iii) held stationary inside the coil?

Or

Explain with a neat diagram, the principle, construction and working of an A.C. generator.

24. What are magnetic field lines? How will you draw them? Write their characteristics.

Or

Show a domestic electric circuit with fuse, a bulb and a geyser from main electric line. Indicate also the capacity of fuse used for geyser and the bulb.

SECTION – B

25. In test tube A

(i) the solution turns blue litmus red

(ii) evolves H_2 gas with Zn metal

(iii) gives out CO_2 on treatment with Na_2CO_3.

In test tube B

(i) the solution turns red litmus blue,

(ii) liberate H_2 with Zn metal and

(iii) does not react with Na_2CO_3.

What are A and B? Give the chemical reactions involved.

26. (a) In plant, when stomata is opened in night, are called _____.

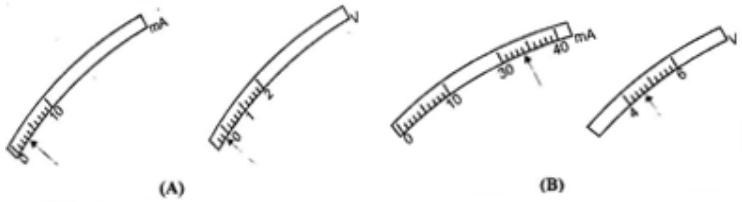
(b) Justify your answer.

27. Why key used in electric circuit should be kept off? Give reason.

28. The pH of soft drink is _____ and they are _____.
    (a) less than 7, acidic (b) more than 7, basic
    (c) equal to 7, neutral (d) less than 7, basic
29. Conc. H_2SO_4 reacts with copper to form a sulphur dioxide gas. In this reaction, conc. H_2SO_4 act as a:
    (a) Oxidizing agent (b) Reducing agent
    (c) Dehydrating agent (d) Bleaching agent
30. When acidified potassium dichromate solution is added to a jar containing sulphur dioxide gas, the solution becomes:
    (a) colourless (b) brown (c) dark orange (d) green

31. The autotrophic mode of nutrition requires
    (a) carbon dioxide and water
    (b) chlorophyll
    (c) sunlight
    (d) All of these

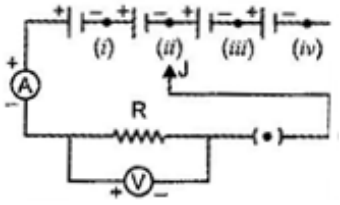
32. Name the part of alimentary canal receiving bile from the liver.
    (a) Oesophagus
    (b) Stomach
    (c) Small intestine
    (d) Large intestine
33. The rest positions of the needles in a Milliammeter and Voltmeter were shown in figure A. When a student used these in her experiment, the final readings of the needle were in the position shown in figure B.

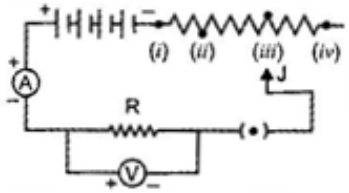


(A) (B)

    The correct readings of the two instruments are:
    (a) 34 mA and 4.2 V respectively (b) 37 mA and 4.8 V respectively
    (c) 31 mA and 4.8 V respectively (d) 31 mA and 4.2 V respectively

34. To study the dependence of current (I) on the potential difference (V) across a resistor, two students used the two set ups shown in figure (A) and (B) respectively. They kept the contact J in four different positions, marked (i), (ii), (iii), (iv) in the two figures.

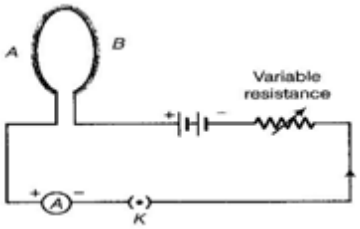
(a) 

(b) 

For the two students, their Ammeter and Voltmeter readings will be minimum when the contact J is in the position:

(a) (i) in both the set ups.
(b) (iv) in both the set ups.
(c) (iv) in set up (A) and (i) in set up (B)
(d) (i) in set up (A) and (iv) in set up (B)

35. A circular loop placed in a plane perpendicular to the place 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 respectively. The magnetic field lines from B to A. The N-pole of the resultant magnet is on the face close to:



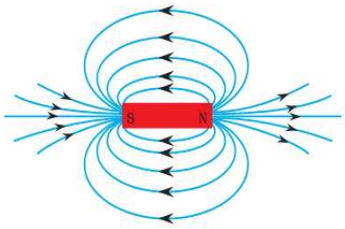
(a) A
(b) B
(c) A, if the current is small and B, if the current is large.
(d) B, if the current is small and A, if the current is large.

36. 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.

CBSE Sample Paper-02
SUMMATIVE ASSESSMENT –I
SCIENCE (Theory)
Class – X

(Solutions)
Section A

1. When Hydrogen combines with Oxygen in the presence of electric current, water is formed.
$$2H_2 + O_2 \xrightarrow[\text{current}]{\text{electric}} 2H_2O$$
2. This is because even when an organism is asleep, various biological process keeps on occurring in its body which requires energy.
3. It is given, I = 0.5 A; t = 10 min = 600 s.
We know that, Q = $I \times t$
=0.5 A × 600 s **= 300 C**
4. Alkalis should not be left exposed to air because they are hygroscopic in nature and absorb moisture from atmosphere in which they get dissolved.
5. (i) It disturbed all the involuntary actions.
(ii) Reflex actions will be disrupted because reflexes are located in the spinal cord. Therefore, the quick response required to safe guard the body will not take place.
6. The space or region where field is same everywhere is known as Uniform magnetic field. The magnetic field which is unequal in magnitude and direction at every point in the space is called non- uniform magnetic field.



7. (a) The equation involving ions and elements is called an ionic equation, e.g.,
$$2I^-(aq) + Br_2(aq) \longrightarrow I_2(aq) + 2Br^-(aq)$$
(b) (i) Manganese Hydroxide, (ii) Ferric chloride
8. Oxidation- addition of oxygen or removal of hydrogen in a chemical reaction is called oxidation reaction. For example:
$2Cu + O_2 \rightarrow 2CuO$
$4Al + 3O_2 \rightarrow 2Al_2O_3$
Reduction- addition of hydrogen or removal of oxygen in a chemical reaction is called oxidation reaction. For example:
$CuO + H_2 \rightarrow Cu + H_2O$
$H_2S + Cl_2 \rightarrow 2HCl + S$
9. (i) (a) Litmus has no action on dry ammonia gas.

(b) Solution of ammonia gas in water turns red litmus blue.

(ii) (a) When ammonium hydroxide is added to ferrous sulphate solution, geren precipitate is formed.

$FeSO_4 + 2NH_4OH \longrightarrow Fe(OH)_2 + (NH_4)_2SO_4$

(b) Gelatinous white precipitate is formed.

$AlCl_3 + 3NH_4OH \longrightarrow Al(OH)_3 + 3NH_4Cl$

10. An Alloy is homogeneous mixture of two or more metals. Ore of them can be non-metals also.

22-carat gold contains $\frac{22}{24} \times 100 = 90.66\%$ gold and remaining copper.

It is because 24-carat gold (pure gold) is too soft to make ornaments.

11. (a) Strategic metals are those which are very important for the economy or defence of a country. These metals and their alloys are used in atomic energy, space science projects, jet engines, high grade steels, etc., e.g., Titanium, Zirconium, Chromium, Manganese etc.

(b) When Zinc metal is placed in solution of mercuric chloride, Zn displaces mercury and a shining silvery surface is formed because zinc is more reactive than mercury.

$$Zn(s) + HgCl_2(aq) \longrightarrow ZnCl_2(aq) + Hg(l)$$

When zinc metal is placed in $MgSO_4$ solution, no reaction takes place because Zn is less reactive than Mg, therefore it cannot displace Mg from $MgSO_4$.

12. Major steps involved in human nutrition are –

(a) Ingestion – Intake of food through mouth. Humans have holozoic mode of nutrition. They engulf solid particles.

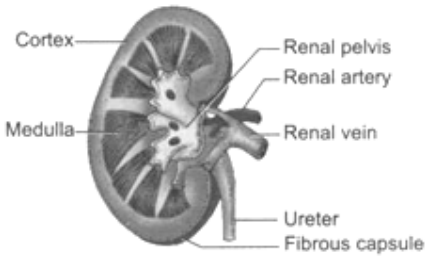
(b) Digestion – The break down complex food material into simpler one in alimentary canal with the help of mechanical as well as chemical process.

(c) Absorption – Digested food is absorbed by the small finger like projections, villi present in the small intestine.

(d) Assimilation – Absorbed food reaches to all cells via blood, and utilized for energy, growth and development.

(e) Excretion – Undigested food from small intestine passed into large intestine, and then it is thrown out by Anus.

13. **Kidneys** are bean-shaped and located at the back of abdomen, one on either side of backbone. Its inner concave surface has a depression called **hilum** through which renal artery enters and renal vein leaves the kidney. Kidney has two regions: outer **cortex** and inner **medulla.** Each kidney has a large number of filtering units called nephrons.



Longitudinal section of kidney

14.

Axon	Dendron
They are long in size and one in number	They are small in size and numerous.
Generally unbranched	Branched
Terminal branches have swollen knobs	Terminal swollen knobs are absent.
Direction of nerve impulse is away from cyton	Direction of impulse is towards cyton.

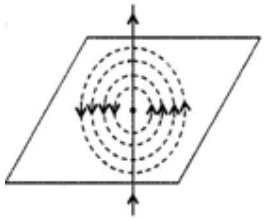
15. (i) $R = R_1 + R_2 = 5 + 10 = 15\Omega$

(ii) $I = \frac{V}{R} = \frac{2}{15} = 0.133$ A

(iii) Potential difference across 10Ω

$V = IR = \frac{2}{15} \times 10 = 1.33$ volt

16.



(i) Magnitude of field increases as $(B \propto I)$

(ii) Magnetic field decreases with an increase in distance from the conductor $\left(B \propto \frac{1}{r}\right)$

17. (a) Burning of dried cow-dung cakes as fuel produces a lot of smoke which cause air pollution in the houses and damage the health of all the family members, especially women and children.

(b) Gobar gas burns without producing any smoke and hence does not cause any air pollution. This ensures good health for village people especially women and children who spend most of their time inside the house.

(c) General awareness of the alternative sources of energy and concern about the environment and health of village people.

18. (a) It is based on the fission of self sustaining controlled chain reaction of U-235. The heat produced in the reactor is taken away the coolant such as water or heavy water or liquid sodium and used to heat the water and convert it into steam. The high pressure steam rotates the turbine which generates electricity.

(b) The process of generation of energy in the sun is nuclear fusion. For every fusion of deuterium, it releases 21.6 MeV energy. It was Hans Bethe who first proposed it. Helium is the product of the fusion.

$${}_1^2H + {}_1^2H \longrightarrow {}_2^4He + 21.6 \text{ MeV}$$

19. (a) $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$

(b) $2H_2S(g) + 3O_2(g) \longrightarrow 2H_2O(l) + 2SO_2(g)$

(c) $3BaCl_2(aq) + Al_2(SO_4)_3(aq) \longrightarrow 2AlCl_3(aq) + 3BaSO_4(s)\downarrow$

(d) $2K(s) + 2H_2O(l) \longrightarrow 2KOH(aq) + H_2(g)$

(e) $2H_2S(g) + O_2(g) \longrightarrow 2S(s) + 2H_2O(l)$

Or

Displacement reaction: In a displacement reaction, a more reactive element displaces or removes another element from its compound.

For example, Zinc being more reactive, displaces copper from its compound.

$$Zn(s) + CuSO_4(aq) \longrightarrow ZnSO_4(aq) + Cu(s)$$

Double Displacement reaction: In case double displacement reaction, two compounds react by exchanging their ions and form two new compounds.

For example, Silver and Sodium exchange their ions, NO_3^- and Cl^- respectively and form two new compounds in the following reaction.

$$AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$$

20. (i) (a) Blue; white

(b) The liquid droplets are actually the water droplets. The source of water droplets is the water of crystallisation of hydrated copper sulphate crystals $(CuSO_4.5H_2O)$.

(ii) When metal 'X' is dipped in aqueous solution of aluminiumsulphate no reaction is observed, it means it is less reactive than aluminium. But when it is dipped in ferrous sulphate solution, the solution turns from pale green to colourless, so 'X' is more reactive than iron and thus displaces it from its solution.

Therefore, 'X' must be zinc. It reacts with ferrous sulphate to form colourless zinc sulphate solution by displacing iron.

$Zn(s) + FeSO_4(aq) \rightarrow ZnSO_4(aq) + Fe(s)$

Or

(a) $BaCl_2$ (aq) + $CuSO_4$ (aq) $\longrightarrow$ $BaSO_4$ (s) + $CuCl_2$ (aq)

Barium Chloride — Copper sulphate — White ppt (Barium sulphate) — Copper chloride

It is precipitation reaction and Double Displacement reaction.

(b) 2Cu (s) + O_2 (g) $\longrightarrow$ 2CuO (s)

Copper — Oxygen — Black copper oxide

It is Combination reaction. It can also be called as Oxidation reaction.

(c) $2FeSO_4$ (s) $\xrightarrow{heat}$ Fe_2O_3 (s) + SO_2 + SO_3 (g)

Iron (II) sulphate — Green; (Ferric oxide) — Reddish Brown Solid; Sulphur dioxide; Sulphur trioxide (smell of burning sulphur)

It is Decomposition reaction.

(d) $Fe\ (s) + CuSO_4\ (aq) \longrightarrow FeSO_4\ (aq) + Cu(s)$

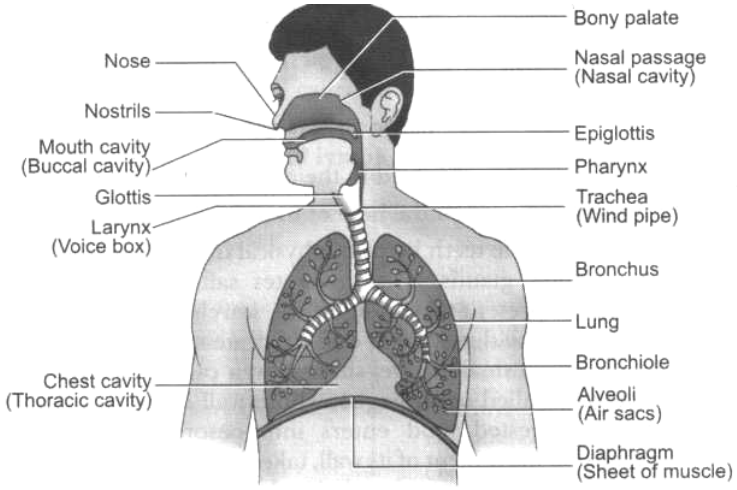
Iron Blue Pale green Copper (reddish brown)

It is Single Displacement reaction. Iron can displace copper from copper sulphate solution.

21. **Human respiratory system:** The human respiratory system begins from nose cavities called nostrils. The air from cavity enters into the pharynx and then into the trachea (or wind pipe). The trachea runs down the neck and divides into two tubes called bronchi. Each bronchi is connected to a lung. In the lungs each bronchi divides into a large number of thin tubes called bronchioles. The bronchioles have a tiny air sac at their ends called alveoli. It is in the alveoli where exchange of gases takes place.

Mechanism of breathing:

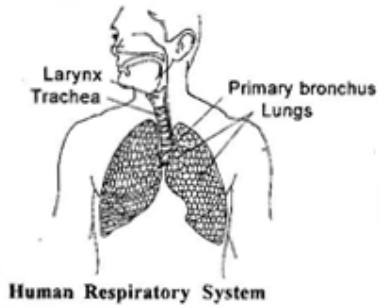
(i) When we breathe in air, the diaphragm contracts which results in the increase in volume of chest cavity. Due to this expansion of chest cavity, the air pressure in the lungs decreases. Thus, air from outside rushes into the lungs through nostrils, trachea and bronchi. Therefore, air sacs of lungs get filled with air when we breathe in. The exchange of gases between alveoli and blood takes place by the process of diffusion.



Human respiratory system

(ii) Now, the air present in air sacs of the lungs is rich in $C0_2$. When we breathe out air, the diaphragm relaxes which results in the decrease in volume of chest cavity. This contraction pushes the air from the lungs into the trachea, nostrils and then out of the body into air. Breathing in air is called inhalation and breathing out air is called exhalation.

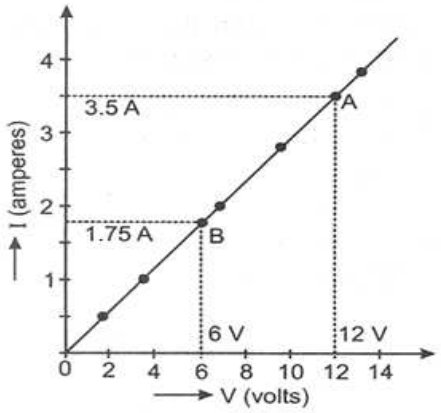
Or



Human Respiratory System

The walls of trachea does not collapse when there is less air in it as it is supported by rings of cartilage.

22. From the given data the I-V graph is a straight line as shown below:



Resistance of resistor (R) = V_A-V_B/1_A-1_B = 12 V – 6 V/ 3.6 A – 1.8 A
= 6V/ 1.8 A = 3.3 Ω

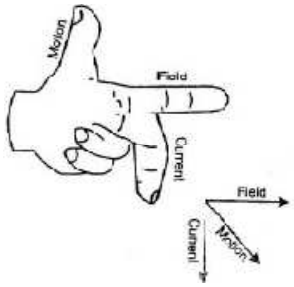
Or

(i) The potential difference between two points is 1 volt means that if a charge of 1 coulomb is moved from one point to other, 1 joule of work is required.
The potential difference across a conductor us measured by means of an instrument called the "Voltmeter".

(ii) The electric power P is given by $P = I^2R$
The resistance of the heating element is very high. Large amount of heat generates in the heating element and it glows hot.
The resistance of connecting cord is very low. Thus, negligible heat generates in the connecting cord and it does not glow.

(iii) (a) Silver is a better conductor due to its lower resistivity.
(b) Nichrome should be used in electrical heating devices due to very high resistivity.

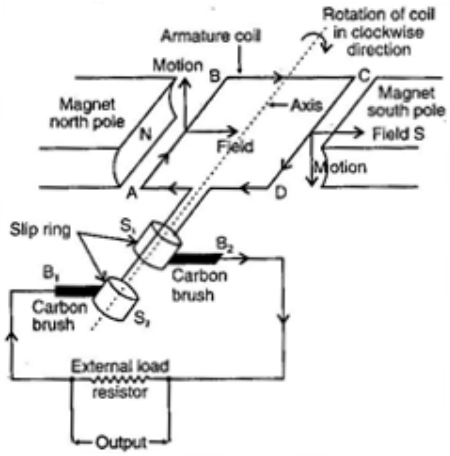
23. (a) According to Fleming's left hand rule, let the thumb, forefinger and central finger of the left hand be stretched so that they are mutually perpendicular to each other. If the forefinger points in the direction of the magnetic field and the central finger points in the direction of current, the thumb gives the direction of the force acting (or motion) on the conductor.



(b) (i) When bar magnet is pushed into the coil, due to electromagnetic induction an induced current is produced. The galvanometer will show deflection.
(ii) Same as above but deflection will be in opposite direction.
(iii) No deflection.

Or

AC electric generator produces potential which reverses after every 180° rotation of the coil.

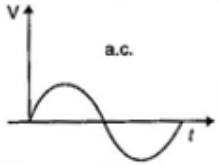


Working of an A.C. generator:

When the armature coil ABCD rotates in the magnetic field, with the help of some external mechanical work in clockwise direction i.e. arm AB moves up and CD moves down, due to change in the magnetic flux, induce current sets up in the coil. Then according to Fleming's right-hand rule, the current is flowing in the direction ABCD.

After half rotation, CD starts moving up and AB moves down. Hence net induced current in the direction DCBA.

Thus after every half rotation, the polarity of the induced emf thereby induced current across the load resistance changes. Therefore in the external circuit, we get alternating current.



24. **Magnetic field**: Surrounding a magnet its influence is felt by any other magnetic element. It may be an attractive of a repulsive influence.

The direction of magnetic field at a point is determined by drawing a tangent at that point. The direction of tangent gives the direction of magnetic field.

Characteristics of Magnetic field lines:

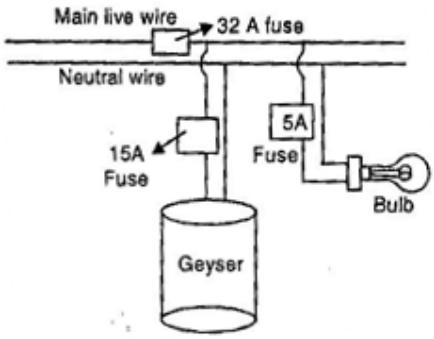
(i) The direction of the magnetic field is indicated by the arrow in the line at any point (Tangent).

(ii) The field lines come out of the North pole and get into the South pole (closed loops are formed).

(iii) The strength of magnetic field is indicated by the closeness of the field lines. Closer the lines, more will be the strength and farther the lines, lesser will be the field strength.

(iv) No two field lines will intersect each other – if they intersect there will be two different directions for field at the same point which is not possible.

Or



Section B

25. 'A' is HCl because it turns blue litmus red and liberates H_2 with Zinc and CO_2 with Na_2CO_3.

$Zn + 2\ HCl \longrightarrow ZnCl_2 + H_2$

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

'B' is NaOH because it turns red litmus blue and liberates H_2 gas with Zinc metal.

$Zn + 2\ NaOH \longrightarrow Na_2ZnO_2 + H_2$

$Na_2CO_3 + NaOH \longrightarrow$ No reaction

26. (a) Scotoactive

(b) Due to deficiency of oxygen, in most plants, stomata opens at night, e.g., Opuntia, Bryophyllum.

27. Key used in electric circuit should be kept off to avoid heating of the resistor because heating changes resistance.

28. (a)

29. (a)

30. (d)

31. (d)

32. (c)

33. (c)

34. (b)

35. (a)

36. (a)