**CBSE Sample Paper-04**
**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 a chemical reaction occurs?
2. Name the pigment present in plants, which can absorb solar energy.
3. A wire of resistivity p is stretched to double its length. What is its new resistivity?
4. (a) What is observed when sulphur dioxide is passed through (i) water, (ii) limewater?
   (b) Also write chemical equations for the reactions that takes place.
5. Name the hormone responsible for regulation of:
   (i) Metabolism of carbohydrates, fats and proteins.
   (ii) Balance of calcium and phosphate.
   (iii) Blood pressure.
   (iv) Water and electrolytic balance.
6. With the help of neat diagram describe how you can generate induced current in the circuit.
7. Identify the substances oxidized and the substances reduced in the following reactions. Write the ionic equation for the substances oxidized and reduced.
   (a) $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)$
   (b) $H_2(g) + CuO(s) \longrightarrow Cu(s) + H_2O(l)$
   (c) $H_2S(g) + SO_2(g) \longrightarrow S(s) + H_2O(l)$

8. $2FeSO_4(s) \longrightarrow Fe_2O_3(s) + SO_2(g) + SO_3(g)$. Is it a redox reaction or not? If yes, why?
9. (a) Write the formula and chemical name of Bleaching powder.
   (b) Write chemical equation to represent the action of atmospheric $CO_2$ gas on bleaching powder when left exposed in open.
   (c) State for what purpose is bleaching powder used in water treatment plants.
10. Dinesh is a student of class $10^{th}$ standard. He went to a remote area of Rajasthan for trekking with his friends. Dinesh found that it was a sparsely inhabited area. He was surprised to know that there was still no electricity in this area. The people used kerosene oil lamps to light up their homes at night and there were no street lights. The children also had to study with kerosene lamps at night. The village farmers used diesel to run irrigation pumps. Actually there were no pwer transmission lines which could bring electricity to this remote area. Dinesh was really disturbed by the living conditions of the people in thei part of Rajasthan. One day Dinesh gathered all the people of village in the village school. He told them thay if they put pressure on their area MLAs and MPs for making available the required funds, then he could tell them about the devices to light up their homes and streets at night, play radio and television and also run irrigation pumps with electricity without there being power transmission lines. All the people agreed and Dinesh described them the devices to get electricity in their area in detail. The village people were very happy to know this and soon they got electricity in their area.
    Read the passage and answer the following questions:
    (a) What was the device described by Dinesh to the village people to obtain electricity locally?
    (b) What source of energy is made uses of in this device to obtain electricity?
    (c) Why do you think this device is more appropriate for an area like Rajasthan?
    (d) What is the name of the single unit of this device?
    (e) What values are shown by Dinesh in this incident?

    [Value Based Question]
11. (a) Why is *ZnO* called a amphoteric oxide? Name another amphoteric oxide.
    (b) What are alkali's? Give one example of alkali.
12. How is haemoglobin associated with respiration explained?
13. With the help of diagram, show pulmonary circulation in man.
14. Draw a diagram of human brain and label the following parts:
    (a) Cerebrum (b) Meninges (c) Medulla oblongata (d) Cerebellum
15. (a) State Ohm's law.
    (b) Draw a schematic diagram of the circuit for studying Ohm's law.
16. The flow of a current in a circular loop of wire creates a magnetic field at its centre. How many existence of this field be detected? State the rule which helps to predict the direction of this magnetic field.
17. (a) Describe the steps involved in obtaining biogas and explain what is meant by anaerobic decomposition.
    (b) Which isotope of Uranium can undergo fission readily?
18. (a) State one limitation of solar energy available from solar cells.

(b) What is the minimum wind velocity required to obtain useful energy with a wind mill.
(c) Define the term 'Nuclear fission'.

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

**Or**

During the reaction of some metals with dilute hydrochloric acid, following observations were made:
(i) Silver metal doesn't show any change.
(ii) The temperature of reaction mixture rises when aluminium (Al) is added.
(iii) The reaction of sodium metal is found to be highly explosive.
(iv) Some bubbles of a gas are seen when lead (Pb) is reacted with the acid.
(v) A gas produced when sodium carbonate is added to the acid.
Explain these observations giving suitable reasons.

20. Give reasons for the following:
    (a) Metals conduct electricity.
    (b) Metals generally do not form compounds with hydrogen.
    (c) A piece of zinc placed in blue copper sulphate solution decolourize it.
    (d) Alumina is dissolve in molten cryolite for electrolysis to obtain aluminium metal.
    (e) Nitrogen gas is used to preserve food.

**Or**

(a) What is corrosion of metals? Name one metal which does not corrode and one which corrodes on being kept in atmosphere.
(b) How will you show that the rusting of iron needs oxygen and moisture at the same time.

21. (a) Draw a diagram of human alimentary canal.
    (b) Label oesophagus, Liver, Pancreas and Gall bladder on the diagram drawn.
    (c) What is the function of enzyme 'pepsin' in the digestion process?

**Or**

(a) Draw a diagram of the human urinary system and label on it:
(i) Kidney (ii) Ureter (iii) Urinary bladder (iv) Urethra
(b) Name the two major components of normal human urine.

22. (a) What is the function of an earth wire in electrical instruments? Why is it necessary to earth the metallic electric appliances?
    (b) Explain what is short circuiting and overloading in an electric supply.

(c) What is the usual capacity of the fuse wire in the line to feed:
(i) Lights and fans?
(ii) Appliances of 2 kW or more power?

**Or**

(a) Define the unit of electric current.
(b) Describe the activity with the help of a diagram to establish the relationship between current (I) flowing in a conductor and potential difference (V) maintained across its two ends.
(c) Draw the shape of the curve obtained when a graph is plotted between I and V.

23. (a) What is meant by a magnetic field?
(b) How is the direction of magnetic field at a point determined?
(c) Describe an activity to demonstrate the direction of the magnetic field generated around a current carrying conductor.
(d) What is the direction of magnetic field at the centre of current carrying circular loop?

**Or**

(a) What is an electromagnet?
(b) List any of its two uses.
(c) Draw a labelled diagram to show how is an electromagnet made?
(d) What is the purpose of the soft iron core used in making an electromagnet?

24. What is biogas? Describe the working of a biogas plant with the help of a labelled diagram.

**Or**

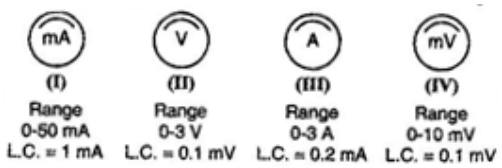
Explain why:
(a) It is difficult to burn a piece of wood fresh from a tree.
(b) Pouring dry sand over the fire extinguishes it.
(c) It is difficult to use hydrogen as a source of energy.
(d) Charcoal is considered a better fuel than wood.

## Section B

25. If phenolphthalein is added to dilute HCl, then what will happen? Justify your answer also.
26. (a) Why does plant cool the atmosphere?
(b) Define that term also.
27. The given wire made of material resistivity '$\rho$' is stretched to triple its length. Then what will be new resistivity? Justify your answer also.
28. Conc. $H_2SO_4$ should be kept away from body because:
(a) it is oily liquid.
(b) it reacts with skin which gets burnt.
(c) of its pungent smell.
(d) it has high boiling point.
29. If we invert a gas jar of $SO_2$ over water, the observation and conclusion will be:
(a) Water level rises up because $SO_2$ is insoluble in water.
(b) Water level rises up because $SO_2$ is soluble in water.

(c) There is no change in water level as $SO_2$ is lighter than air.
(d) Water level rises up because $SO_2$ is heavier than air.

30. The thistle funnel should dipped into conc. $H_2SO_4$ because:
    (a) $SO_2$ gas will come out from the thistle funnel.
    (b) $SO_2$ is lighter than air.
    (c) $SO_2$ is soluble in water.
    (d) $SO_2$ is pungent smelling gas.
31. Which of the following is not a part of reflex arc:
    (a) Sensory neuron (b) Brain
    (c) Relay neuron (d) Spinal cord
32. Which hormone is not released from pituitary gland:
    (a) Growth hormone (b) Oestrogen (c) Oxytocin (d) Prolactin
33. A resistor is connected to an ammeter in series and a voltmeter in parallel to a source of energy. The quantity that cannot be found directly is:
    (a) Current (b) Potential Difference
    (c) Resistance (d) All of these
34. Four different measuring instruments are shown below. Out of these, the instrument that can be used for measuring current is/are the instruments labelled as:



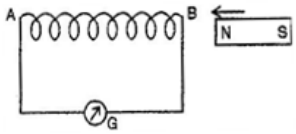

    (a) I and III with III more reliable of the two.
    (b) I and IV with IV more reliable of the two.
    (c) II and III with II more reliable of the two.
    (d) II and IV with IV more reliable of the two.
35. Choose the incorrect statement from the following regarding magnetic lines of field:
    (a) The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points.
    (b) Magnetic field lines are closed curves.
    (c) In magnetic field lines are parallel and equidistant, they represent zero field strength.
    (d) Relative strength of magnetic field is shown by the degree of closeness of the field lines.
36. 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 changes are produced due to friction amongst clouds.
    (d) Earth atmosphere contains acids.

**CBSE Sample Paper-04**
**SUMMATIVE ASSESSMENT –I**
SCIENCE (Theory)
**Class – X**

(Solutions)

**SECTION-A**

1. When a chemical reaction occurs, new products are obtained.
2. Chlorophyll.
3. It remains same because resistivity depends on nature of material.
4. (a) Sulphurous acid is formed.
   $SO_2 + H_2O \longrightarrow H_2SO_3$ (Sulphurous acid)
   (b) Limewater turns milky due to formation of calcium sulphate.
   $SO_2 + Ca(OH)_2 \longrightarrow CaSO_3 + H_2O$
5. (i) Thyroxine hormone (ii) Calcitonine hormone
   (iii) Adrenaline hormone (iv) Vasopressin hormone
6. Connect a coil AB of wire having a number of turns. Connect it to a sensitive galvanometer as shown in figure.




   Move a bar magnet towards the coil. When North Pole is taken fast towards or South Pole is taken fast towards the coil, the deflection occurs in the galvanometer but will be in opposite direction. When the coil and magnet both are stationary, there is no deflection in the galvanometer. Thus the motion of a magnet, with respect to the coil, produces an induced potential difference which sets up an induced electric current in the circuit.
7. (a) $H_2 \longrightarrow 2H^+ + 2e^-$ (Oxidation)
   Substance getting oxidized is $H_2$.
   $Cl_2 + 2e^- \longrightarrow 2Cl^-$ (Reduction)
   Substance getting reduced is $Cl_2$.
   (b) $Cu^{2+} + 2e^- \longrightarrow Cu$ (Reduction)
   Substance getting reduced is Cu.
   $H_2 \longrightarrow 2H^+ + 2e^-$ (Oxidation)
   Substance getting oxidized is $H_2$.
   (c) $2S_2^{2-} \longrightarrow 2S + 4e^-$ (Oxidation)
   Substance getting oxidized is $H_2S$.
   $S^{4+} + 4e^- \longrightarrow S$ (Reduction)
   Substance getting reduced is $SO_2$.

8. It is a redox reaction because Ferrous $\left(Fe^{2+}\right)$ is getting oxidized to Ferric $\left(Fe^{3+}\right)$ whereas $SO_4^{2-}$ is getting reduced to $SO_2$.

9. (a) $CaOCl_2$, Calcium oxychloride
   (b) $CaOCl_2 + CO_2 \longrightarrow CaCO_3 + Cl_2$
   (c) It is used as disinfectant in water treatment plants.

10. (a) Solar panals
    (b) Solar energy.
    (a) Because Rajasthan gets a lot of sunshine throughout the year.
    (b) Solar cell.
    (c) General awareness, concern for the environment to improve it, desire to help people.

11. (a) Zinc oxide (ZnO) is called amphoteric oxide as it behaves bath as acidic oxide and basic oxide.

$$ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$$

(Basic oxide) (Acid) Zinc chloride

$$ZnO + 2NaOH \rightarrow Na_2ZnO_2 + H_2O$$

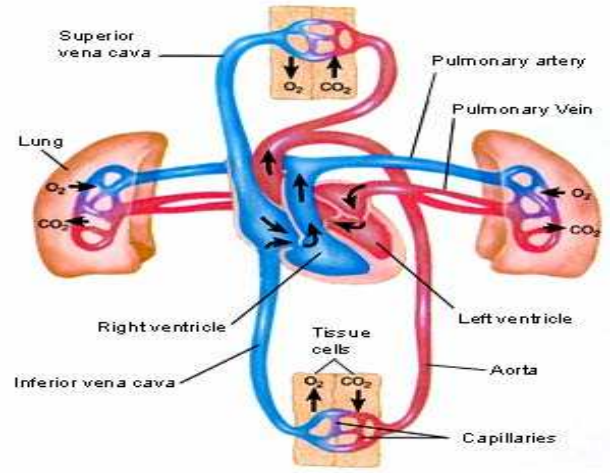
(Acidic oxide) (Base) (Sodium zincate)

Aluminum oxide $\left(Al_2O_3\right)$ is another amphoteric oxide.

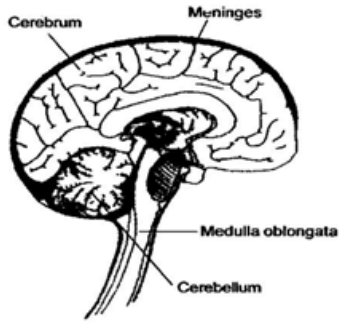
(b) Water soluble hydroxides of metals are known as alkalies. For example $Na\ OH$

12. Transportation of oxygen and carbon – dioxide occurs with the help of respiratory pigment haemoglobin. Haemoglobin is a red pigment having very high affinity for oxygen. Oxygen is transported from the lungs to the body cells in the form of oxyhemoglobin. Carbon – dioxide is transported from the body cells to the lungs in the form of carbamino – haemoglobin

13.



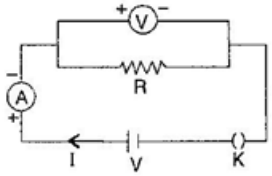

14.



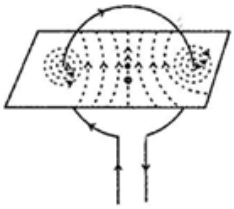

**Human Brain**

15. (a) Ohm's law: Under similar physical conditions, such as temperature remains constant, the current flowing through a wire is directly proportional to the difference in potential applied across its ends, i.e., $I \propto V$. or V = IR where R is the resistance offered.

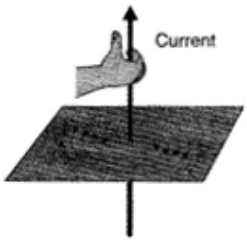
    (b)




16. To detect the presence of the magnetic field created by the current in a circular loop at the centre, one can draw the magnetic field lines with the help of compass needle. The magnetic field lines appear as a straight line at the centre and other lines appear in the same direction without the loop.



Right hand thumb rule: Hold the wire in your right hand with your extended thumb pointing in the direction of current. Your folded fingers will indicate the direction of magnetic field around the wire.




17. (a) **Anaerobic decomposition**: The process in which the complex compound of cow dung slurry decomposes or breaks down in the absence of oxygen by anaerobic micro organisms called anaerobic bacteria is known as anaerobic decomposition.

    **Steps involved in obtaining biogas**:

    (i) Slurry is made by mixing of animal dung with an equal amount of water.

(ii) Slurry is passed through an inlet chamber of an underground digester tank.

(iii) In digester tank, slurry is decomposed by anaerobic bacteria in about 50-60 days to produce biogas.

(iv) The biogas collected in domes built over the digester tank and has a gas outlet with valve.

(v) The pressure exerted by the biogas on the slurry forces the spent slurry to the overflow tank via outlet chamber.

(vi) The spent slurry is periodically removed and used as a good manure.

(vii) The whole process is repeated again for regular supply of biogas.

(b) $^{235}_{92}U$ can undergo fission readily.

18. (a) Conversion efficiency is less.

(b) Approximately 15 km/h.

(c) The process in which the heavy Uranium nucleus splits into lighter nuclei of smaller atomic numbers is called Nuclear fission.

$$^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{141}_{56}Ba + {}^{92}_{36}Kr + 3{}^{1}_{0}n + Q$$

Q refers to the energy of 200 MeV released.

19. (a) Double displacement reaction, precipitation reaction.

(b) Combination reaction, oxidation reaction.

(c) Thermal decomposition

(d) Displacement reaction

(e) Combination and exothermic reaction

**Or**

(i) Silver is very less reactive metal. So it does not react with dilute HCl.

(ii) The reaction of Al with dilute HCl is exothermic i.e. heat is produced in the reaction, so the temperature of the reaction mixture rises.

(i) Sodium is a very reactive metal. It react vigorously with the evolution of heat too.

(ii) Bubbles are seen due to the evolution of $H_2$ gas.

$$Pb(s) + 2HCl(aq) \longrightarrow PbCl_2 + H_2(g)$$

(iii) $CO_2$ gas is produced when $Na_2CO_3$ reacts with dilute HCl.

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

20. (a) It is due to presence of free electrons.

(b) Metals are good reducing agents and $H_2$ is weak oxidizing agent therefore, metals do not react with hydrogen to form hydrides.

(c) $Zn + CuSO_4 \longrightarrow ZnSO_4 + Cu$

It is due to formation of $ZnSO_4$ (aq) which is colourless.

(a) It increases electrical conductivity and molten cryolite acts as a solvent.

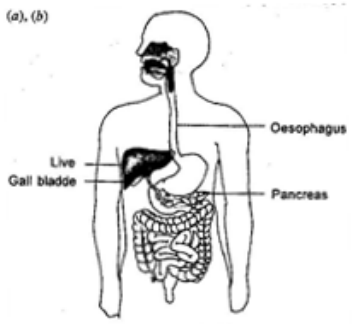
(b) It prevents oxidation of food which prevents its spoilage.

**Or**

(a) Corrosion of metal is a process in which metal reacts with substances present in atmosphere to form surface compounds. 'Al' does not corrode whereas 'Fe' corrodes when placed in atmosphere.

(b) Take three test tubes and put iron nails in each of them. In the first test tube add $H_2O$ up to brim and leave no space for air. In the second test tube add fused $CaCl_2$ so as to absorb moisture. In the third test add water and leave space for air. Leave them for few days.
Rusting will not take place in first and second test tubes. But rusting will take place in third test tube showing that rusting of iron requires both air and moisture.

21.

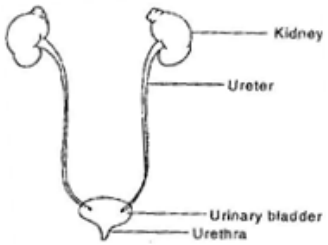


Alimentary Canal of Man

(c) The function of the enzyme 'pepsin' in the digestion process is that it breaks down proteins into peptones in acidic medium of gastric juice.

**Or**

(i)



Human Urinary System

(ii) The two major components of normal human urine are water and nitrogenous substances, most of which is urea.

22. (a) The earth wire helps us by offering a low resistance path to the high potential that might have come in contact with the body or other unwanted part of the device. This will not bring any damage to the device or to the person handling the device. The fuse may disconnect the electrical link in such cases.

(b) Overloading is the situation which causes a sudden draw of larger current by the electrical appliances, when operated at the same time from a single parallel connection.
In short-circuit the live wire comes in contact with the neutral line. This gives a large drop of potential and flow or current through the fuse wire. So it burns.

(c) (i) 5 A (ii) 15 A

**Or**

(a) The SI unit of electric current is ampere (A). When 1 coulomb of electric charge flows through any cross-section of a conductor in 1 second, the electric current flowing through it is said to be 1 ampere.

$$1 ampere(A) = \frac{1 coulomb\,(C)}{1 \sec ond\,(s)}$$

(b) **Aim**: To establish the relationship between potential difference across the resistor and current passing through it.

**Apparatus required**: Nichrome or eureka wire (length 0.5 m) , an ammeter, a voltmeter and four cells if 1.5 V each.

**Procedure**:

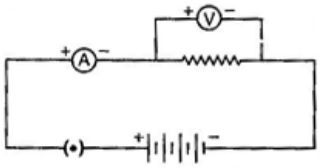
(i) Set the circuit as shown in the figure.

(ii) First use only one cell as the source and note the reading of the ammeter and voltmeter.

(iii) Now connect two cells in series and note the reading of the ammeter and voltmeter again.

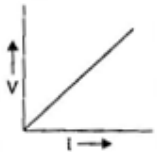
(iv) Now connect three cells in series in the circuit and again take the reading of both devices.

(v) Lastly connect fourth cell in series in the circuit also note the reading of the ammeter and voltmeter again.




**Observation**: In this activity, we will observe that the current increases with potential difference, i.e. more cells being connected in series. We will get approximately the same value for $\frac{V}{I}$ in each case and we will also obtain straight line graph of V vs I passing through the origin as shown in figure. From the graph, we observe that

$\frac{V}{I}$ = constant, i.e. V = constant x I or $V \propto I$




**Conclusion**: The constant is called Resistance. If we change the wire, the graph will vary but remain a line with a different slope/resistances.

(c) Shape of the V-I curve is a straight line passing through the origin as shown in figure.


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

(b) 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.

(c) **Aim**: To demonstrate the direction of the magnetic field generated around a current carrying conductor.

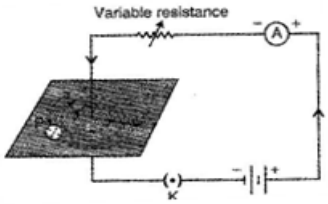
Procedure:

(i) Obtain the concentric circles pattern of iron fillings around the copper wire by flowing current through it as shown.

(ii) Place a magnetic needle (compass) at any point (P) over a circle.

(iii) Observe the direction of needle.

(iv) Show the direction by arrows.




**Conclusion**: The direction of the north pole of the compass needle would give the direction of the field lines produced by the electric current through the straight wire at that point.

(d) The direction of the field is perpendicular to the plane of the coil and directed inwards for the clockwise current flowing. For anticlockwise current, it will be outwards.

**Or**

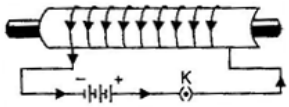
(a) **Magnetizing a material**: When a material like soft iron, is placed inside a coil carrying current (may be a solenoid), it will get magnetized. Once the current is put-off, the magnetic field will also be lost. Such magnets are called electromagnets.

(b) **Two uses of electromagnet**:

(i) In electric bells.

(ii) For sorting scrap metal.

(c)



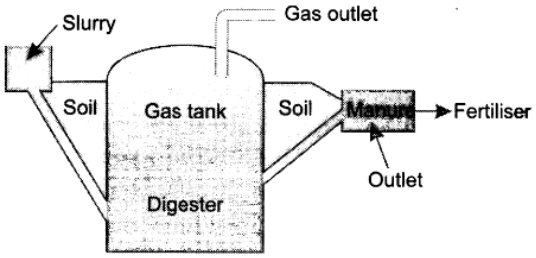

(d) The purpose of soft iron core used in making an electromagnet that:

(i) It is temporary magnetized.

(ii) It retains magnetism as long as current flow is maintained.

(iii) It will ensure an uniform and stronger field.

24. Biogas is a mixture of methane, carbon dioxide, hydrogen and hydrogen sulphide. The major constituent of biogas is methane. Biogas is produced by the anaerobic degradation of animal wastes like cow-dung or plant wastes in the presence of water.
The biogas plant has a dome-like structure built with bricks. A slurry of cow-dung and water is made in the mixing tank from where it is fed into the digester. The digester is a sealed chamber in which there is no oxygen.
Anaerobic micro-organisms that do not require oxygen decompose or break down complex compounds of the cow-dung slurry. It takes a few days for the decomposition process to be complete and generate gases. The biogas is stored in the gas tank above the digester from which they are drawn through pipes for use.



**Fixed dome type biogas plant**

**Or**

(a) It is because a piece of fresh wood is not dry and therefore it is to be heated at high temperature before it catches fire that is why it is difficult to burn.
(b) It cuts off the supply of air (oxygen) which is required for combustion to take place.
(c) Hydrogen is highly combustible and burns with an explosion, therefore, it is difficult to store and transport.
(d) Charcoal, has higher calorific value than wood and produces less smoke than wood.

## Section - B

25. The solution remains colourless because HCl is acid and It does not react with phenolphthalein.
26. (a) Transpiration.
(b) Water loss due to evaporation from the plane is called transpiration.
27. No change will be there i.e. the resistivity '$\rho$' will be same because it is a material constant.
28. (b)
29. (b)
30. (a)
31. (b)
32. (b)
33. (c)
34. (a)
35. (c)
36. (b)