CBSE Sample Paper-03 (solved)
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. Define Electrolysis.
2. What is breathing?
3. A wire of resistance $10\,\Omega$ is bent in the form of a closed circle. What is the effective resistance between the two points at the ends of any diameter of the circle?
4. A calcium compound which is a yellowish white powder is used as a disinfectant and also in textile industry. Name the compound. Which gas is released when this compound is left exposed to air?
5. Name the ovarian hormones and give the function of any one of them.
6. What is the difference between direct and alternating currents? Write one important advantage of using alternating current.
7. Balance the ionic equation:
   (a) $Cu(s) + Ag^{+} \longrightarrow Cu^{2+} + Ag$
   (b) $Al + H^{+} \longrightarrow Al^{3+} + H_2$
   (c) $Fe^{3+} + Cr \longrightarrow Fe^{2+} + Cr^{3+}$
8. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light or electricity.
9. (i) Differentiate between 'strong' and 'weak' electrolyte.

(ii) Select the strong electrolytes from amongst the following:
Molten NaCl, glacial CH_3COOH, strong NH_4OH solution, dil. HCl

10. Give reasons:
    (a) Germanium is called a metalloid.
    (b) Zirconium is known as a strategic metal.
    (c) Nitrogen in used to preserve food.
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. What is the function of epiglottis in man? Draw a labelled diagram showing the human respiratory system.
13. Draw a diagram of the front view of human heart and label any six parts including at least two, that are concerned with arterial blood supply to the heart muscles.
14. Draw the diagram of a neuron.
15. In a household 5 tubelights of 40 W each are used for 5 hours and an electric press of 500 W for 4 hours everyday. Calculate the total electrical energy consumed by the tubelights and press in a month of 30 days.
16. Aslam is a welder by profession who was working at Mohan's house. After making a 'railing' by using electric welding with naked eyes, Aslam was using a grinder on it to smoothen the welding joints. Just them some particles fell into Aslam's eye. He started crying with pain. Mohan hired an auto and took him to an eye hospital, doctor used a device connected to two electric wires to remove the particles form Aslam's eye. Aslam asked Mohan what had fallen into his eye and what device was used by the doctor to remove that particle from the eye. Being a science student of class X, Mohan explained everything to Aslam and asked him to be careful in future.
    Read the above passage and answer the following questions:
    (a) What could be the particle fell into Aslam's eye?
    (b) What device was used by the doctor to remove the particle and how it worked?
    (c) What values are shown by Mohan during this episode?

    [Value Based Question]
17. Explain the difference between nuclear fission and nuclear fusion reaction with examples. Give reason why the energy due to fusion is not being used to meet our day to day energy needs?
18. With the help of a labelled diagram, describe the working of a solar water heater.
19. With the help of an activity, explain that hydrogen and oxygen are released when electric current is passed through water.

Or

(a) Crystal of copper sulphateare heated in a test tube for some time:
    (i) What is the colour of copper sulphate crystals before heating and after heating?

(ii) What is the source of liquid droplets seen on the inner upper side of the test tube during the heating process?

(b) A metal 'X' when dipped in aqueous solution of aluminiumsulphate no reaction is observed whereas when it is dipped in an aqueous solution of ferrous sulphate, the pale green solution turns colourless. Identify the metal 'X' with reason.

20. (i) Define the term alloy and amalgam. Name the alloy used for welding electric wires together. What are its constituents.

(ii) Name the constituents of the following alloys:

(a) Brass (b) Stainless steel (c) Bronze

State one property in each of these alloys, which is different from its main constituents.

Or

What method of concentration of ore is preferred in each of the following cases and why?

(i) The ore has higher density particles interspersed with a large bulk of low density impurities.

(ii) The ore consists of copper sulphide intermixed with clay particles.

(iii) Give an example of amalgam.

21. (i) Name the blood vessel that brings oxygenated bloof to human heart.

(ii) Which chamber of human heart receives oxygenated blood?

(iii) Explain how oxygenated blood from this chamber is sent to all parts of the body.

Or

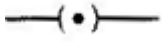
(i) Name the blood vessel that brings deoxygenated blood to human heart.

(ii) Which chamber of human heart receives deoxygenated blood?

(iii) Explain how deoxygenated blood from this chamber is sent to lungs for oxygenation.

22. (a) Name an instrument that measures electric current in a circuit. Define the unit of electric current.

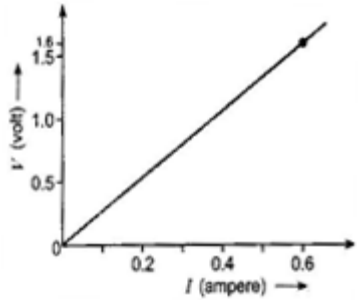
(b) What do the following symbols represent in a circuit diagram:

(i)  (ii) 

(c) An electric circuit consisting of a 0.5 m long Nichrome wire XY, an ammeter, a voltmeter, four cells of 1.5 V each and a plug key was set up.

(i) Draw the electric circuit diagram to study the relation between the potential difference maintained between the points X and Y and the electric current flowing through XY.

(ii) Following graph was plotted between V and I values using above circuit:



What would be the values of $\frac{V}{I}$ ratios when the potential difference is 0.8 V, 1.2 V and 1.6 V respectively? What conclusion do you draw from these values?

Or

Explain the following:

(i) Why is the tungsten used almost exclusively for filament of an electric lamp?
(ii) Why are the elements of electric heating devices, such as bread-toaster and electric irons, made of an alloy rather than a pure metal?
(iii) Why is the series arrangement of appliances not used for domestic circuits?
(iv) How does the resistance of a wire vary with its area of cross-section?
(v) Why are copper and aluminium wires usually employed for electric energy transmission?

23. What is electromagnetic induction? Give two methods of inducing electric current in a coil. Explain each method with the help of diagram.

Or

Draw a labelled diagram of domestic circuit. What is the importance of earthing in a circuit?

24. State the principle on which an electromagnet works. Describe an activity to make an electromagnet. Give two uses of electromagnet.

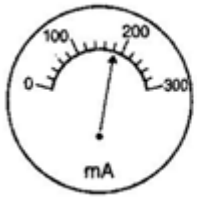
Or

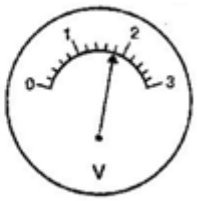
Describe an activity to draw magnetic lines of force around a current carrying (a) straight conductor, (b) circular loop.

Section B

25. Which of the following gas turn limewater milky:
(a) CO_2 (b) SO_2
(c) Both CO_2 and SO_2 (d) Neither CO_2 nor SO_2
Write chemical reactions involved.
26. A student wanted to decolourise a leaf. In which solvent, he should boil the leaf? Justify your answer.

27. The current flowing through a resistor connected in an electrical circuit and the potential difference developed across its ends is shown in figure. Calculate the value of resistance of the resistor in ohms.





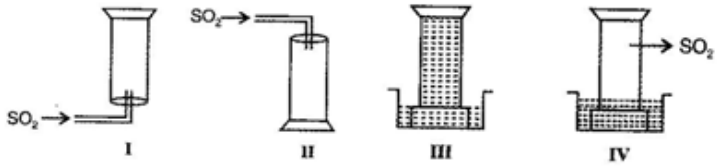
28. Given below are the observations reported by four students I, II, III and IV for the changes observed with dilute HCl or dilute NaOH and different materials.

Material	DilHCl	Dil. NaOH
I. Moist litmus paper	Blue to red	Red to blue
II. Zinc metal	React at room temperature	Does not react at room temperature
III. Zinc metal on heating	Liquid becomes milky	Remains clear and transparent
IV. Solid sodium bicarbonate	No reaction	Brisk effervescence

The incorrectly reported observation is:

(a) I (b) II (c) III (d) IV

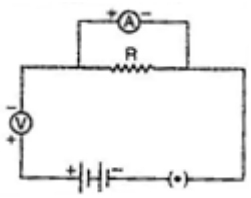
29. Dil. H_2SO_4 cannot be used in preparation of SO_2 because:
    (a) It is not a good oxidizing agent.
    (b) It is a good reducing agent.
    (c) It is bleaching agent.
    (d) It is dehydrating agent.
30. A student asked to demonstrate the following two properties of sulphur dioxide gas:
    I. It is heavier than air and
    II. It is highly soluble in water.
    Which two of the following four arrangements would the student use to demonstrate these properties:



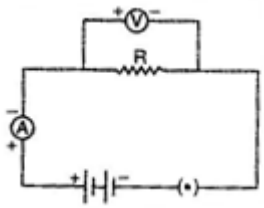
(a) I and II (b) II and III (c) I and III (d) II and IV

31. Medulla Oblongata is originated from:
    (a) Mesoderm (b) Ectoderm (c) Endoderm (d) Ectomesoderm
32. The innermost layer of the human eye is:
    (a) sciera (b) cornea (c) retina (d) lens
33. In the experiment on studying the dependence of current (I) on potential difference (V), four student set up their circuits as shown below:

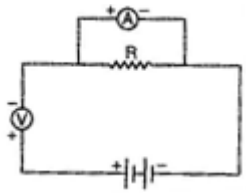
(I)



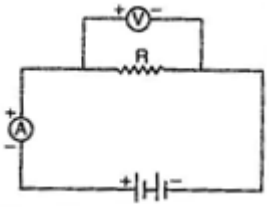
(II)



(III)



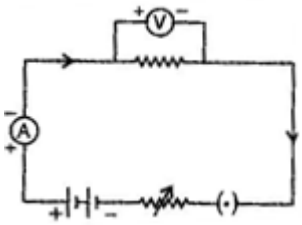
(IV)



The best set up is that of:

(a) student I (b) student II (c) student III (d) student IV

34. The following circuit diagram shows the experimental set-up for the study of dependence of current on potential difference. Which two circuit components are connected in series:



(a) Battery and Voltmeter (b) Ammeter and Voltmeter

(c) Ammeter and Rheostat (d) Resistor and Voltmeter

35. For a current in a long straight solenoid N and S-poles are created at the two ends. Among the following statements, the incorrect statement is:

(a) The field lines inside the solenoid are in the form of straight lines which indicate that the magnetic field is the same at all the points inside the solenoid.

(b) The strong magnetic field produced inside the solenoid can be used to magnetize a piece of magnetic material like soft iron, when placed inside the coil.

(c) The pattern of magnetic field associated with the solenoid is different from the pattern of the magnetic field around a bar magnet.

(d) The N and S-poles exchange position when the direction of current through the solenoid is reversed.

36. Which is the ultimate source of energy:

(a) Water (b) Sun (c) Uranium (d) Fossil fuels

CBSE Sample Paper-03 (solved)
SUMMATIVE ASSESSMENT –I
SCIENCE (Theory)
Class – X

(Solutions)

SECTION-A

1. **Electrolysis** is a process in which a compound is broken down in simpler substance when electric current is passed through it in motion state or in aqueous solution.
2. The process of letting in oxygen from air into the lungs and carbon dioxide out of the lungs is called breathing.
3. Two points at the ends of any diameter will divide the resistor into two equal parts. So parts are in parallel combination.

$$\therefore \quad \frac{1}{R_{eq}} = \frac{1}{5} + \frac{1}{5} = \frac{2}{5} \qquad \Rightarrow \qquad R_{eq} = \frac{5}{2} = 2.5\ \Omega$$

4. Bleaching powder (Calcium oxychloride)
   Chlorine gas is released.
   $CaOCl_2 + CO_2 \longrightarrow CaCO_3 + Cl_2$ (g)
5. The hormones secreted by ovaries are estrogen and progesterone.
   At puberty, estrogens stimulate the growth, maturation and functions of female secondary sex organs such as uterus, fallopian tubes and the duct system of mammary glands.
6. **Difference between direct and alternating current:**
   Direct current always flows in one direction only whereas alternating current reverses its direction periodically.
   Advantage of an alternating current:
   Alternating current can be transmitted over a long distances without loss of energy.
7. (a) $Cu(s) + 2Ag^{+} \longrightarrow Cu^{2+} + 2Ag$
   (b) $2Al + 6H^{+} \longrightarrow 2Al^{3+} + 3H_2$
   (c) $3Fe^{3+} + Cr \longrightarrow 3Fe^{2+} + Cr^{3+}$
8. (a) $CaCO_3(s) \xrightarrow{\text{heat}} CaO(s) + CO_2(g)$
   (b) $2AgCl(s) \xrightarrow{\text{Sunlight}} 2Ag(s) + Cl_2(g)$
   (c) $2H_2O(l) \xrightarrow{\text{electricity}} 2H_2(g) + O_2(g)$
9. (i) Strong electrolytes are those which dissociate into ions completely in aqueous solution.
   Weak electrolytes are those which do not associate into ions completely in aqueous solution.
   (ii) CH_3COOH and NH_4OH are weak electrolytes whereas molten NaCl and dilute HCl are strong electrolytes.

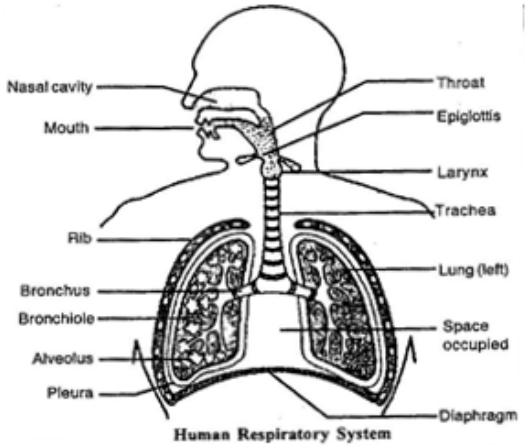
10. (a) Germanium shows the properties of both metals and non-metals, therefore, it is regarded as metalloids.
    (b) Zirconium is highly valuable for economy for country as it is very useful in nuclear reactor, therefore it is called a strategic metal.
    (c) Nitrogen prevents food from getting oxidized, therefore, it is used to preserve food.

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.

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

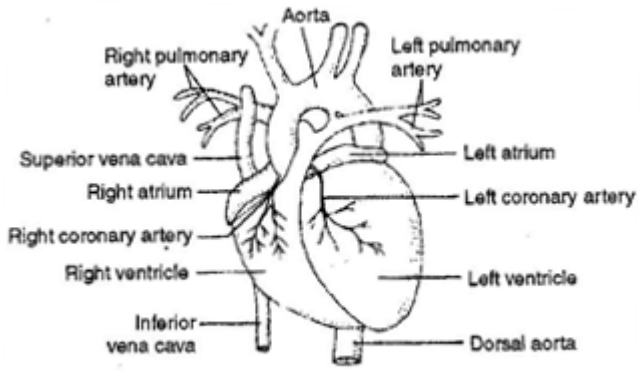
    When zinc metal is placed in $MgSO_4$ solution, no reaction takes place because Zn is less reactive than Mg, therefore it cannot displace Mg from $MgSO_4$.

12. The function of epiglottis in man is that at the time of swallowing food, the epiglottis closes the tracheal opening thereby preventing the food from entering the windpipe.



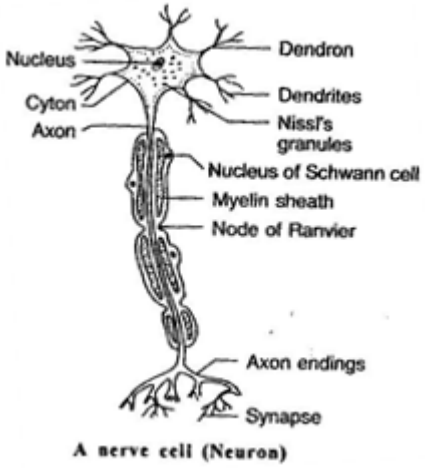
Human Respiratory System

13.



External Structure of Human Heart

14.



A nerve cell (Neuron)

15. Energy consumed by 5 tubelights of 40 W for 5 hours in 1 day = $5\times\frac{40}{1000}\times 5$ = 1 kWh

Energy consumed by an electric press of 500 W for 4 hours in 1 day = $\frac{500\times 4}{1000}$ = 2 kWh

Energy consumed in 1 day = 1 + 2 = 3 kWh

$\therefore$ Total electrical energy consumed in 30 days = 3 x 30 = 90 kWh = 90 units

16. (a) An iron particle fell into Aslam's eye while using the grinder on iron railing.
(b) The doctor used an electromagnet to remove the tiny iron particle. Electromagnet is a powerful magnet and the iron particle in the eye is strongly attracted by the electromagnet, sticks to the electromagnet and gets removed.
(c) Mohan showed the values of (i) Ability to handle a serious situation with calmness and (ii) Desire to help others (by rushing Aslam to an eye hospital).

17. Difference between Nuclear fission and Nuclear fusion:

Nuclear Fission	Nuclear Fusion
(i) Heavy nucleus splits to form lighter nuclei.	(i) Lighter nuclei fuse together to form heavy nucleus.
(ii) Products are radioactive.	(ii) Products are non-radioactive.
(iii) Energy released to nearly 200 MeV.	(iii) Energy released to nearly 21.6 MeV.
(iv) Energy per nucleon is less.	(iv) Energy per nucleon is more.

Example:

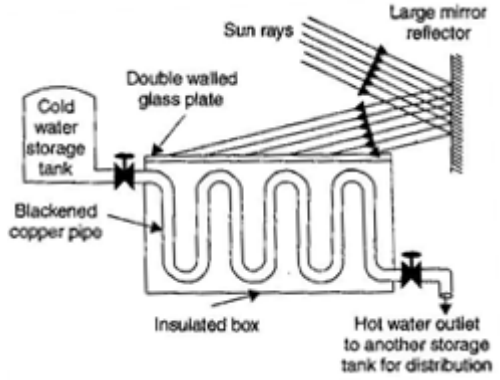
Fission: $^{235}_{92}\text{U} + {}^{1}_{0}n \longrightarrow {}^{139}_{56}\text{Ba} + {}^{94}_{36}\text{Kr} + 3{}^{1}_{0}n$ + Energy

Fusion: $^{2}_{1}\text{H} + {}^{2}_{1}\text{H} \longrightarrow {}^{4}_{2}\text{He}$ + Energy

Fusion is not used to meet day-to-day energy requirements because it is not controlled so far, and it can be self sustained only at 10^8 K temperature.

18. **Solar water heater**: It is a device in which water is heated by using solar energy.
Principle: Solar water heater works on the heat absorbing property of balck surfaces and greenhouse effect.

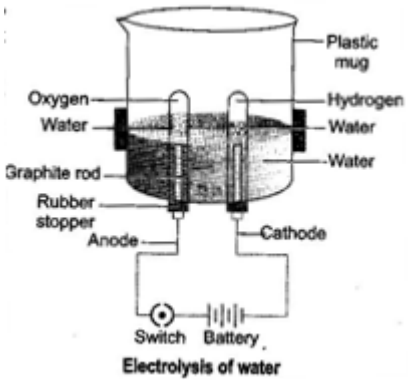
It consists of an insulated box B which is painted black from inside and in which copper tube is fitted in the form of a coil. These copper tubes are painted black from outside so that they may absorb hot rays of the sun more efficiently. The box is covered with glass lid so as to prevent heat loss by convection and radiation. The two ends of the copper tube of solar water heater are joined to the water storage tank.



19. Activity

(i) Take a plastic vessel. Drill two holes at its bottom and set rubber stoppers in these holes.

(ii) Insert carbon electrodes in these rubber stoppers and connect these electrodes to a 6 volt battery and a switch.



Electrolysis of water

(iii) Fill the vessel with water such that the electrodes are immersed. Add a few drops of dilute sulphuric acid to the water in the vessel.

(iv) Take two graduated test tubes filled with water and invert them over the two carbon electrodes.

(v) Switch on the current.

(vi) After sometime you will observe the formation of bubbles at both the electrodes. These bubbles displace water in the graduated tubes.

(vii) Once the test tubes are filled with the respective gases, remove them carefully.

(viii) Test these gases one by one by bringing a burning splinter of wood close to the mouth of the test tubes.

(ix) When the glowing splinter of wood is brought close to the mouth of one test tube, it relights and when it is brought close to the mouth of other test tube, the gas burns with a pop. Oxygen is the only common gas that relights the splinter and hydrogen gas buns with a pop.

Or

(a) (i) Blue; white

(ii) The liquid droplets are actually the water droplets. The source of water droplets is the water of crystallization of hydrated copper sulphate crystals $\left(CuSO_4.5H_2O\right)$.

(b) 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 form 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.

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

20. (i) Alloy is homogeneous mixture of two or more metals. One of them can be a non-metal also. Amalgam is an alloy of any metal with mercury.

Solder is an alloy used for welding electric wire together. It contains lead (Pb) and tin (Sn)

(ii) (a) Brass contains copper and zinc.

(b) Stainless steel containing iron, carbon along with chromium and nickel.

(iii) Bronze is an alloy of copper and tin.

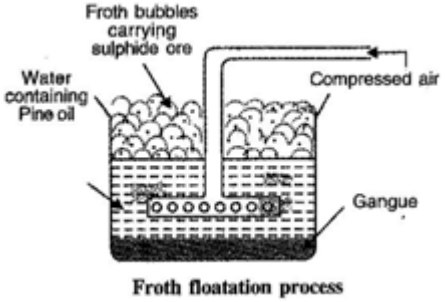
Brass does not get rusted easily whereas copper does. Stainless steel does not get rusted whereas iron does. Bronze is harder than copper and tin

Or

(i) **Hydraulic washing**: It is used for enrichment of oxides ore in which density of impurities is less than that of ore.

In this process, the crushed and finally powdered ore is washed with a steam of water. The lighter impurities are washed away, leaving behind the heavier ore particles.

(ii) **Froth floatation process**: It is used to separate gangue from the sulphide ores especially of copper. In this process, the finally powdered ore is mixed with water in a large tank to form a slurry. Then some pine oil is added to it. The sulphide ores are preferentially wetted by the pine oil whereas the gangue particles are wetted by water. When air is blown through the mixture, the lighter oil froth carrying the metal sulphides rises to the top of the tank and floats as scum. It is then skimmed off and dried. The gangue particles being heavier, sink to the bottom of the tank.



Froth floatation process

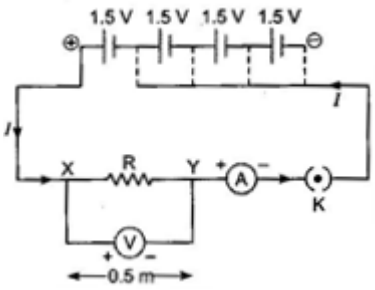
(iii) Amalgam are alloys of mercury with other metals, e.g., Sodium amalgam, Zinc amalgam.

21. (i) The pulmonary vein brings oxygenated blood to the human heart.
(ii) The left auricle of human heart receives oxygenated blood.
(iii) (a) When oxygenated blood comes into the left atrium it contracts and pours blood into left ventricle.
(b) The left ventricle contracts and the oxygenated blood from here is distributed to all parts of the body though aorta.

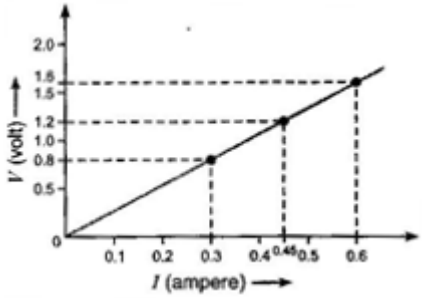
Or

(i) The pulmonary artery brings deoxygenated blood to the human heart.
(ii) The right auricle of human heart receives deoxygenated blood.
(iii) (a) Right auricle pours deoxygenated blood into right ventricle.
(b) From right ventricle deoxygenated blood flows to the lungs through pulmonary artery for oxygenation.

22. (a) An instrument that measures electric current in a circuit is called Ammeter. The unit of electric current is Ampere (A). 1 ampere is constituted by the flow of 1 coulomb of charge through any point in an electric circuit in 1 second.
(b) (i) Variable resistance or rheostat (ii) Plug key or switch (closed)
(c)



(ii) Following graph was plotted between V and I values:



Or

(i) Pure tungsten has a high resistivity and a high melting point (nearly 3000° C). When an electric current is passed through the filament, the electric energy is converted to heat and

light energy due to the heating of the filament to a very high temperature. Due to the high melting point of tungsten, the filament does not melt.

(ii) The resistivity of an alloy is generally higher than that of its constituent metals. Alloys do not oxidize (burn) readily at higher temperatures. Therefore conductors of electric heating devices such as toasters and electric irons are made of an alloy rather than pure metal.

(iii) The series arrangement is not used for domestic circuit because:

(a) If connected in series total resistance will increase. Therefore current flowing through the circuit will be low.

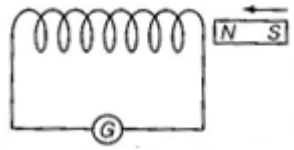
(b) If one appliance is switched off or gets damaged than all other appliances will also stop working because their electricity supply will be cut-off.

(iv) The resistance of a wire is inversely proportional to its cross-sectional area. Thus, a thick wire has less resistance and a thin wire has more resistance.

(v) Copper and aluminium wires are usually employed for electric energy transmission because copper and aluminium have very low resistivities.

23. The production of electric current due to relative motion between a conductor and a magnetic field is called **electromagnetic induction**. Electric current produced due to this phenomenon is called **induced current**. This was discovered by Michael Faraday and Joseph Henry.

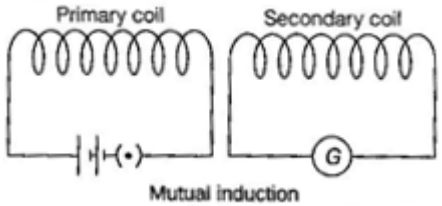
The direction of induced current can be reversed by reversing the direction of magnetic field. If the coil as well as the magnet are stationary, no current is induced in the coil.



There are two ways to producing induced current in the coil:

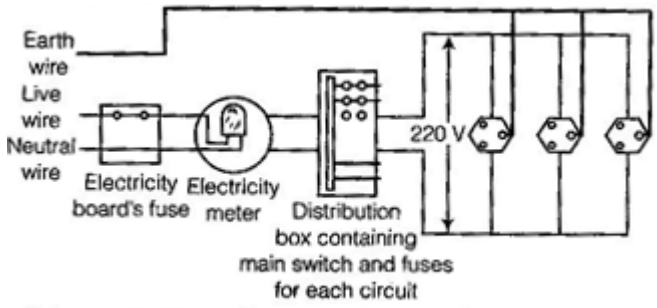
Self Induction: When the current flowing through a coil changes, then the current is induced in the coil itself. This phenomenon is called Self induction.

Mutual Induction: Another way to induce current in a coil is by the process of mutual induction. A current carrying coil called primary coil is placed close to a secondary coil as shown in figure.



When the current in primary coil is switched on, it takes a little time to rise from zero to a maximum value. This causes a momentary change in the magnetic field around this coil and hence induces a momentary current in the secondary coil. The same happens in reverse direction when the current in primary coil is switched off.

Or



Schematic diagram of one of the common domestic circuits

To avoid risk of electric shock, the metal body of appliances is earthed. Earthing means to connect the metal case of the appliance to earth (i.e. zero potential) by mean of a metal wire called earth wire (in green insulation cover).

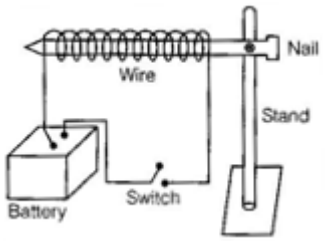
One end of the metal wire is buried in the earth. The appliances is connected to the earth by using he top pin of a 3-pin plug which connects to earth. Earthing saves us from electrical shocks.

24. An electromagnet works on the principle of magnetic effect of current.

Aim: To construct an electromagnet.

Material required: Iron nail, copper wire, sand paper, cell, iron filings

Procedure:



(i) Take an iron nail and clean it with cloth.

(ii) Take insulated copper wire of length 1 m and shave off both its end with the help of sand paper.

(iii) Wind the wire nearly on the iron nail to form a cylindrical coil.

(iv) Connect the free ends of the wire to the terminals of a cell.

(v) Bring iron filings near the nail and observe what happen.

Iron filings get attracted to the iron nail because iron nail behaves like a magnet when current passes through it.

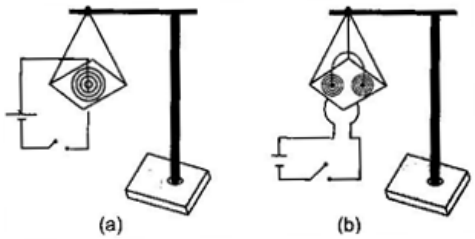
Uses: Electromagnets are used in electric bell, cranes etc.

Or

Aim: To draw magnetic lines of force around a current carrying (a) straight conductor, (b) circular loop

Material required: A cell, switch, connecting wires, an insulated copper wire, iron filings, card board.

Procedure:



(i) Hang the cardboard horizontally on a stand.
(ii) Pass the copper wire through the centre of the cardboard.
(iii) Connect cell, switch and copper wire in series through the connecting wires.
(iv) Switch the circuit on sprinkle iron filings gently on the card board and tap it.
(v) The iron filings will arrange themselves in the form of connecting rings around the wire.
(vi) Now bend the wire into a loop and pass it through the cardboard as shown. Repeat step (iv) again.
(vii) Observe the pattern of field lines.

The magnetic field around a current carrying conductor appears in the form of concentric circles.

The magnetic field in the centre of a current carrying circular loop appears as straight lines.

25. Option (c) is correct. Both CO_2 and SO_2turns limewater milky.

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

Carbon dioxide Limewater white ppt.

$SO_2 + Ca(OH)_2 \longrightarrow CaSO_3 + H_2O$

Sulphur dioxide Limewater white ppt.

26. He should boil the leaf in Alcohol. Alcohol dissolved the chlorophyll and decolourise the leaf.

27. $R = \frac{V}{I} = \frac{1.8\ V}{180\ mA} = \frac{1.8 \times 10^3}{180} = \frac{1800}{180} = 10\ \Omega$

28. (d)
29. (a)
30. (d)
31. (b)
32. (c)
33. (b)
34. (c)
35. (c)
36. (b)