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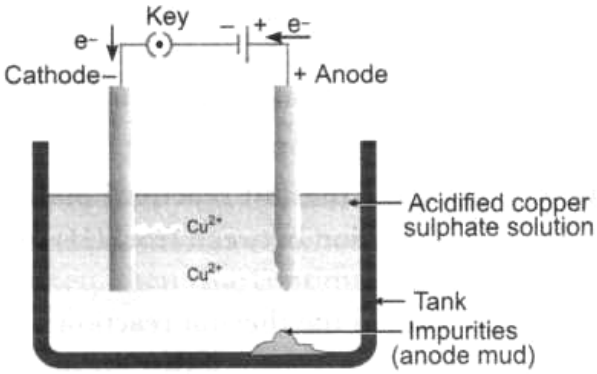
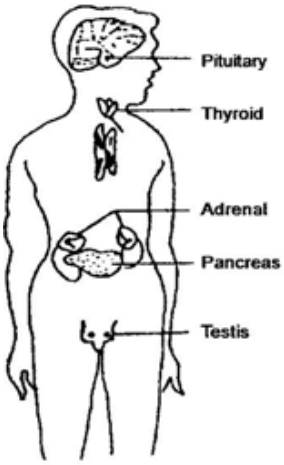
CBSE Sample Paper-02
SUMMATIVE ASSESSMENT –I
SCIENCE (Theory)
Class – X
(Solutions)
SECTION-A

1. Pure iron is very soft and stretches easily when hot. When it is mixed with a small quantity of carbon (0.05%), it becomes hard and strong and hence becomes more useful.
2. Nephron.
3. Tungsten metal has high resistivity and high melting point.
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. In electrolytic refining process, the impure metal is made as is anode and a thin strip of pure metal is made as cathode. A solution of the metal salt is made as an electrolyte. On passing the current through the electrolyte, the pure metal from the anode dissolves into the electrolyte. An equivalent amount of pure metal from the electrolyte is deposited on the cathode. The soluble impurities go into the solution, whereas, the insoluble impurities settle down at the bottom of the anode and are known as anode mud.
   At anode: $Cu \rightarrow Cu^{2+} + 2e^{-}$
   At cathode: $Cu^{2+} + 2e^{-} \rightarrow Cu$



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) It reacts with both acids as well as bases therefore, it is called amphoteric oxide.
    (b) It is because they are highly reactive and catch fire in moist air.
    (c) It is because nitric acid is strong oxidizing agent
12. Lungs are two soft spongy structures lodged in the thoracic cavity. Each lung is enclosed in a double-walled sac called pleura. In the lungs, the air passage (wind pipe) divides into smaller tubes, called bronchi which in turn form bronchioles.
    The bronchioles later terminates in balloon-like structures, called alveoli.
    The presence of alveoli in the lungs provides a very large area for the exchange of gases and this availability of large surface area maximises the exchange of gases. The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.
13. The small intestine is the site of the complete digestion of fats. The food coming from the stomach is acidic and has to be made alkaline for the pancreatic enzymes to act. It is made alkaline by bile juice secreted by the liver. The upper part of small intestine, also called duodenum, receives bile juice from the liver and the enzyme lipase from pancreatic juice. Bile salts break them down into smaller globules thereby increasing the efficiency of enzyme action and lipase for breaking down emulsified fats. The wall of the small intestine contain glands which secrete intestinal juice. The enzymes present in it finally convert the fats into fatty acids and glycerol. The latter are absorbed by villi and passed into their lacterals where fat is again formed.
14.



15. Resistance of wire $A(R_1) = \frac{\rho l}{A} = \frac{\rho l}{\pi r^2}$

Resistance of wire $B(R_2) = \frac{\rho l'}{A'} = \frac{\rho 2l}{\pi(2r^2)} = \frac{\rho 2l}{4\pi r^2}$

Total resistance in series R= $R_1 + R_2$

$$R = \frac{\rho l}{\pi r^2} + \frac{\rho 2l}{4\pi r^2}$$

$$R = \frac{\rho l}{\pi r^2}(1+\frac{1}{2}) = \frac{3\rho l}{2\pi r^2}$$

Ratio of the total resistance is series to the resistance of A

$$\frac{R}{R_1} = \frac{\rho l}{\pi r^2} / \frac{3\rho l}{2\pi r^2}$$

$$\Rightarrow \frac{R}{R_1} = \frac{\rho l}{\pi r^2} \times \frac{2\pi r^2}{3\rho l}$$

$$\frac{R}{R_1} = \frac{2}{3}$$

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	(i) Lighter nuclei fuse together to form

nuclei. (ii) Products are radioactive. (iii) Energy released to nearly 200 MeV. (iv) Energy per nucleon is less.	heavy nucleus. (ii) Products are non-radioactive. (iii) Energy released to nearly 21.6 MeV. (iv) Energy per nucleon is more.

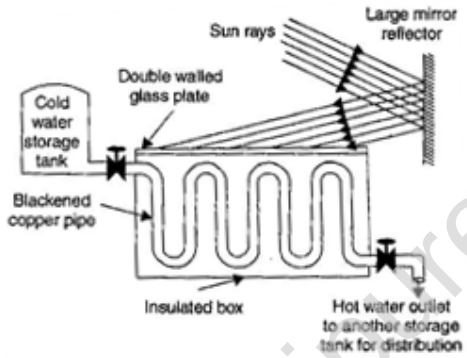
Example:

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

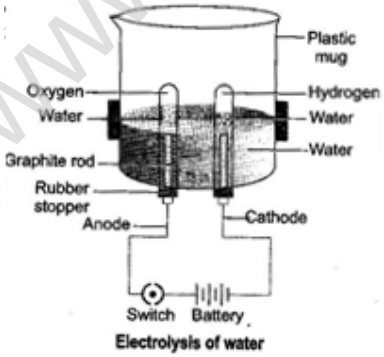
Fusion: $^{2}_{1}H + ^{2}_{1}H \longrightarrow ^{4}_{2}He$ + Energy

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 $(CuSO_4.5H_2O)$.

(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.

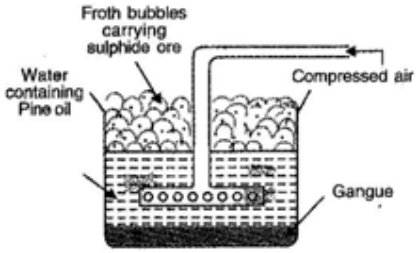
Brass does not get rusted easily whereas copper does. Stainless steel does not get rusted whereas iron does. Bronze is harder than copper and tin

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

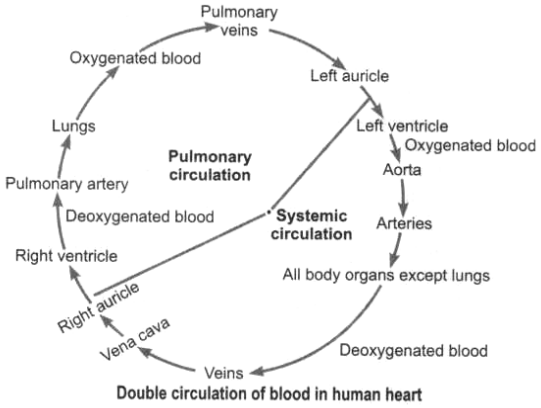
(iii) Amalgam are alloys of mercury with other metals, e.g., Sodium amalgam, Zinc amalgam.

21. The blood passes through the heart twice through separate pathways for completing one cycle. This type of circulation is called double circulation.
The double circulation of blood includes:
(i)Systemic circulation
(ii)Pulmonary circulation

(i) Systemic circulation: It supplies oxygenated blood from left auricle to left ventricle, which is pumped to aorta to distribute blood to various body parts. The deoxygenated blood is collected from the various body organs by the veins to pour into vena cava and finally into the right atrium (auricle). Right atrium transfers this blood into the right ventricle.

(ii) Pulmonary circulation: The deoxygenated blood is pushed by the right ventricle into the lungs for oxygenation through pulmonary artery. The oxygenated blood is brought back to left atrium of the human heart through pulmonary vein. From left atrium, the oxygenated blood is pushed into the left ventricle. The left ventricle pumps oxygenated blood into aorta for systemic circulation.

These two types of circulation taken together is called **double circulation.**



Double circulation of blood in human heart

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) The work done by a source of electricity to maintain current in a circuit is known as electrical energy. Its S.I. unit is joule.

(b) (i) Electricity consumed by refrigerator in one day = power × time

= 400W ×10h

= 4000Wh

= 4kwh

(ii) Electricity consumed by 2 electric fans in 1 day = power ×Time

= 2× 80W× 12h

= 1920Wh = 1.92kwh

(iii) Electricity consumed by 6 electric tubes in 1 day = 6×18W× 6h

= 648 wh

= 0.648 kwh

Total energy consumed in one day

= 4+1.92+0.648

= 6.548kwh

Total energy consumed in one month

= 6.568×30

= 197.04 kwh

Cost of 1 unit (kwh) = Rs 3.00

Cost of 197.04 kwh = 197.04×3

Electricity bill = Rs 591.12

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.

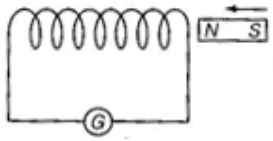
(b) If one appliance is switched off or gets damaged than all other appliances will also stop working because their electricity supply will be cut-off.

(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.

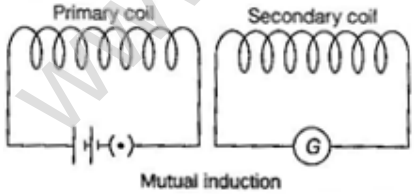
The direction of induced current can be reversed by reversing the direction of magnetic field. If the coil as well as the magnet are stationary, no current is induced in the coil.



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.

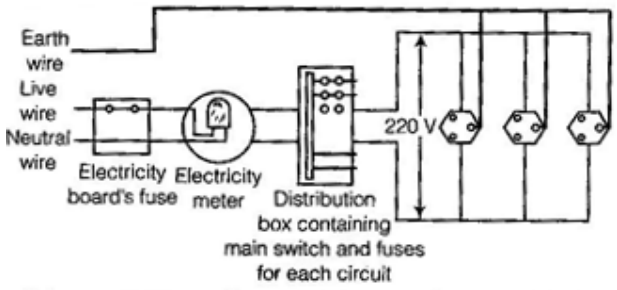
Mutual Induction: Another way to induce current in a coil is by the process of mutual induction. A current carrying coil called primary coil is placed close to a secondary coil as shown in figure.



Mutual induction

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).

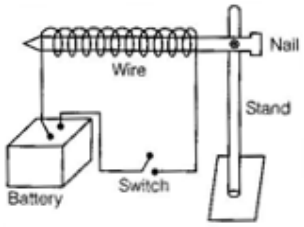
One end of the metal wire is buried in the earth. The appliances is connected to the earth by using he top pin of a 3-pin plug which connects to earth. Earthing saves us from electrical shocks.

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.

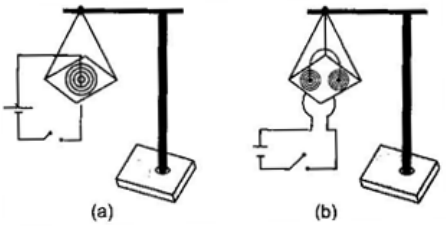
Uses: Electromagnets are used in electric bell, cranes etc.

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.

Section B

25. The colour of litmus paper will be changed into blue because limewater is a base which turns red litmus blue. The chemical formula of limewater is $Ca(OH)_2$.
26. (a) Only A and B portions remained colourless and the rest of the leaf turned blue-black.
    (b) Portion of leaf covered with opaque paper does not get sunlight.
27. The respectively parts are s milliammeter, a resistor and a voltmeter because Ammeter (X) in series and voltmeter (Z) in parallel to the resistor (Y).

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