JULY-2015 : PAPER SOLUTION

PART-B : JULY 2015

Time : 2 Hours] **011 (E) July 2015** **[Maximum Marks : 50**

Instructions : As per Question Paper-1.

SECTION-A

Answer the questions 1 to 5 in approximately 30 words. (2 marks each) 10

1. Explain the meaning of the words 'nano' and 'technology'.

Ans. → The word 'Nanotechnology' comprises of two words : Nano and Technology. 'Nano' is a Greek word meaning dwarf or small. In mathematical notation, nanometer means one billionth of a meter, i.e.,

$$1 \text{ nanometer (nm)} = \frac{1}{1{,}000{,}000{,}000} = 10^{-9} \text{ meter (m)}$$

® In the present context, 'technology' means the technique to convert scientific principles to design or synthesis new materials, devices for prosperity, comforts and betterment of human life. It is in turn also useful to explore and understand the basic ideas underlying any scientific happenings.

OR

1. Explain importance of nano technology in the area of health sector.

Ans. Importance of nano technology in the area of health sector :

→ Higher functional efficiency of nano-devices results into better, cheaper and faster diagnostics and drug applications.

→ Accurate and precise diagnosis improves medical treatment.

→ It is possible to design a nano-drug which act only at the infected site in our body.

→ Thus, by reducing the side effect to other metabolic functioning.

→ For instance, anticancer nano-drug can be transported to cancerous cells, and upon excitation through laser beam, these nanodrugs are heated to destroy cancerous cells.

→ Carbon nanotubes and their polymer nano-composites are suitable scaffold materials for bone cell proliferation and bone formation.

2. Define Electric current and define its unit.

Ans. The net quantity of an electric charge flowing through any cross section of conductor is defined as electric current.

$$\text{Electric current} = \frac{\text{Quantity of electric charge}}{\text{Time}}$$

→ If Q is the amount of electric charge passing through any cross section of conductor in time t, $I = \frac{Q}{t}$.

→ If the quantity of electric charge equals to one coulomb passing through the conductor in one second, the electric current of one ampere (1A) is said to flow through the conductor.

In SI system, the unit of electric current is coulomb/second (C/s). It is also represented in ampere (A) in memory of scientist Ampere.

The small units of electric current are milliampere mA and microampere (μA).

$1\ mA = 10^{-3}\ A$

$1\ \mu A = 10^{-6}\ A$

3. Give atleast two differences between LPG and CNG.

Ans. LPG and CNG

LPG	CNG
(1) Butane is the main constituent of LPG	(1) Methane is the main constituent of CNG
(2) Butane is liquefied under pressure to form LPG	(2) Natural gas is converted into CNG under high pressure.
(3) It is used as a domestic fuel (for cooking).	(3) It is used as a fuel in vehicles or trucks.
(4) Full form : Liquefied Petroleum Gas	(4) Full form : Compressed Natural Gas

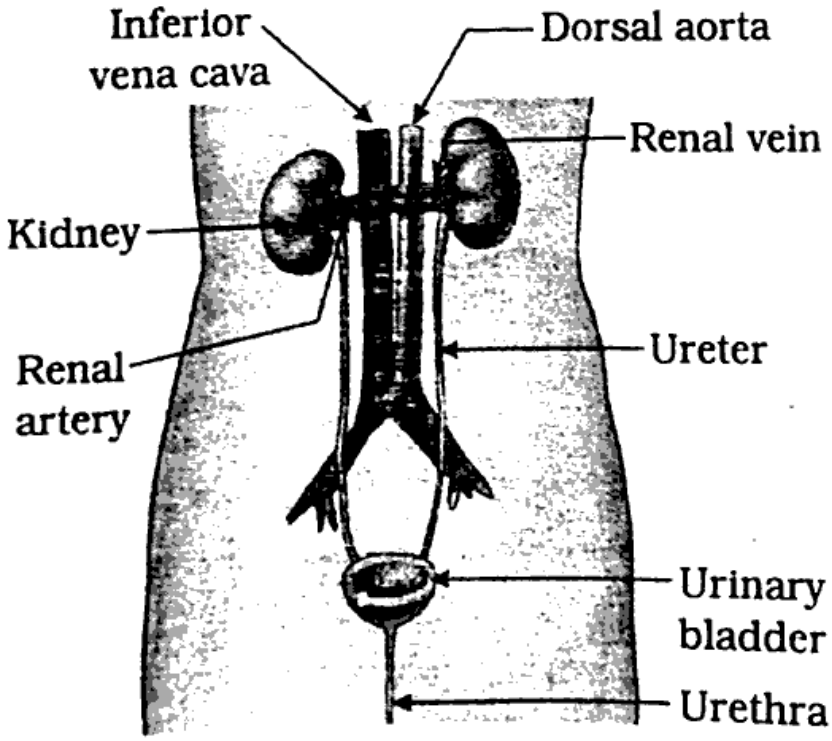
OR

3. Give scientific reason for "The use of anthracite coal is more than bituminous coal".

Ans. The percentage of carbon in anthracite coal is more than in bituminous coal. Bituminous coal contains about 78% to 86% carbon whereas anthracite coal contain about 94% to 98% carbon. Heat energy of bituminous coal is about 30 KJ/g. Whereas heat energy of anthracite coal is about 33 kJ/g. Thus, the Thermal energy of anthracite is about 3 kJ/g more than that of bituminous coal. When pure anthracite is burnt, it does not produce smoke or smell and the amount of residue is very less as compared to bituminous coal.

4. Explain the excretory system of human beings with a labelled diagram.

Ans.



5. What do you mean by global problems ? List out different global problems faced by living organisms.

Ans. Global Problems :

→ Global problems are those problems that affect the whole planet and potentially all the people who live on it, but they are not just important problems that affect directly to individual man.

→ Climate change is one of the best examples. It is a result of human generated change.

→ They are depletion of the ozone layer and disposal.

Some of the global problems faced by the living organisms are :

(i) Global warming and depletion of the ozone layer.

(ii) Biodiversity and ecosystem losses

(iii) Fisheries

(iv) Depletion

(v) Deforestation

(vi) Water deficits

(vii) Waste disposal

(viii) Maritime safety

(ix) Pollution

SECTION-B

Answer the questions 6 to 10 in approximately 30 words. (2 marks each) is

6. What are Stars and what are they made up of ?

Ans. The celestial self luminous objects which produce energy on their own in the form of radiation due to thermo-nuclear fusion process are calleds stars.

→ Star are hot spheres of gases like hydrogen and helium.

→ They are numerous stars of various sizes.

→ Stars have carbon-nitrogen thermo-nuclear fusion process in their cores.

→ The sun is also a star.

7. Write two points of difference between Reflex action and Involuntary action.

Ans.

Reflex action	Involuntary action
1. It takes place without the knowledge of the voluntary centres of the brain and under the control of central nervous system.	1. It takes place under the control of auto-nomous nervous system.
2. It occurs unconsciously and involuntarily.	2. It is a continuous process going on under the conscious or unconscious state of the body.
3. It occurs involuntary as well as voluntary organs.	3. It occurs in involuntary organs.
4. It occurs accidentally and for the benefit of the body.	4. It occurs normally to maintain the living state of the body.
5. As compared to involuntary action, it is a very rapid action.	5. As compared to reflex action, it is a very slow action.

8. **For the following reaction, mention the formulas, names and physical states of the products.**

$3Fe_{(s)} + 4H_2O_{(g)} \rightarrow$

$P_{4(s)} + + 6Cl_{2(g)} \rightarrow$

Ans.

(1)	$3Fe_{(s)}$ Iron	+	$4H_2O(g)$ Water vapour	$\rightarrow$	$Fe_3O_{4(s)}$ Iron oxide	+ $4H_{2(g)}$ Dihydrogen gas
(2)	$P_{4(s)}$ Phosphorus	+	$6Cl_{2(g)}$ Chloride	$\rightarrow$	$4PCl_{3(g)}$ Phosphorus trichloride	

9. **Define Heredity and give appropriate examples.**

Ans. **Define Heredity :** Heredity means continuity of features from one generation to another. "The transmission of characters from parents to the offspring" or the tendency of every individual to resemble their parents.

→ **Appropriate examples :** Eggs laid by a sparrow hatch into a sparrows only. A dog gives birth to pups only.

→ Hereditary information is present in the fertilized egg or zygote.

→ The zygote develops into an organism of a particular type only.

→ Heredity is one of the important aspects of science, which is studied under Genetics.

OR

9. **In what way, homologous organs give evidence for evolution?**

Ans. **Homologous organs :**

→ The organs which have the same internal structure but different functions are called homologous organs.

Forelimb of Human

Forelimb of Lizzard

Forelimb of Frog

→ For example the basic design of benes of forelimbs of a frog, a lizard, a bird, a bat and a man is similar in their internal structures but they perform different types of functions. These indicate that all these forelimbs have evolved from a common ancestral animal which had a same basic internal structure.

10. **What steps should be taken to conserve energy resources ?**

Ans. **Following steps can be taken to conservation of energy resources :**

(i) Switch off the lights, fans, television and other electrical appliances when not needed.

(ii) Make use of stairs instead of lift at least upto two to three floors in building.

(iii) Pressure cookers should be used to save the fuels.

(iv) Public transport system (local buses and trains) in the cities should be made available to people, do not use their own vehicles to commute.

(v) Bicycles can be used to cover short distances.

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SECTION-C

Answer the questions 11 to 15 in approximately 50 words. (3 marks each) 15

11. What is Scattering of light ? On what factors does it depend ?

Ans. Scattering of Light :

→ The deflection of light by minute particles and molecules in all the directions is known as scattering of light.

→ The colour of scattering light depends upon size of scattering particles.

→ Due to the small size, minute particles scatter the light of small wave length such as blue colour.

→ The particles with bigger size scatter the light of larger wavelength.

→ If the size of scattering particle is much bigger the scattering light appears white.

12. What is Short circuit ? Discuss the hazards faced due to short circuit. Also explain the importance of fuse in the electrical circuit.

Ans. Short Circuit : Short circuit means when positive and negative wires are connected with each other accidentally.

→ Hazards faced due to short circuit.

→ If the insulating layer of wires or appliance in the circuit is defective, then short circuit may occur.

→ In this circumstances, the total resistance of circuit suddenly decreases and an excessive electric current flows according to Ohm's law, which results in lots of heat and a spark is produced at a point of short circuit.

→ Therefore, there is a possibility of a fire. (Sometimes overloading may also lead to the increase in current).

→ To prevent this a fuse is constructed. You have learnt some what about a fuse in the earlier chapter while studying heating effect of an electric current.

→ A conducting wire having a low melting point is connected with the metallic contacts on an insulator base.

→ Such small fuses are used in the domestic appliances such as T.V., refrigerator.

→ Due to some reason if current increases in the circuit, the fuse wire burn off immediately due to the heat produced.

→ The electric current stops to flow, and major damage can be prevented.

→ Many types of fuse wires are available. The fuse wires are prepared from a pure tin or an alloy of lead and tin.

→ Apart from this, while using appliances with large power consumption, a three-pin plug is employed.

→ The third pin indicates earthing with the help of which we can prevent an electric shock.

OR

12. Write a short note on Direct current (DC) and Alternating current (AC).

Ans. Direct Current (DC) :

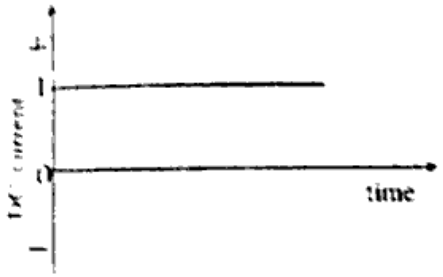
We use two types of appliances for domestic purpose. In some appliances, we use battery e.g. radio, cell phone, watch, laptop, etc.

→ The current obtained from the battery is direct current in which the current flows from the positive terminal to negative terminal of battery through an appliance.

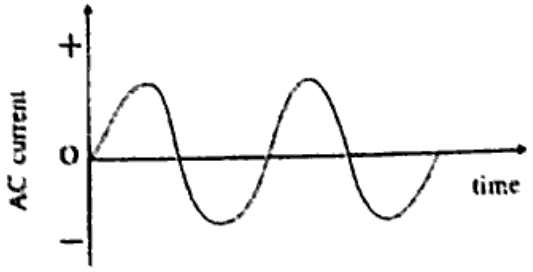
- That means it flows only in one direction.
- The magnitude of this current remains constant with time and its direction also does not change.
- DC current is also produced by DC generator.

Alternating Current (AC) :

- Another type of appliances such as refrigerator, mixer, electric iron, fan, etc. work on AC current.
- In order to obtain the AC current, AC generator is used.
- AC voltages and currents are changed from positive to negative and negative to positive with time.
- In a house the electricity which we use, the direction of an AC voltage current changes 100 times in one second.. So its frequency is 50 Hz.
- The main advantage of using AC voltage or current is that it can be transmitted over long distance without much loss of electrical energy. While the generation of DC voltage is comparatively more costly.



(a) DC current



(b) AC current

13. Explain contact process for production of Sulphuric Acid.

Ans. Contact process for production of Sulphuric Acid :

- Sulphuric acid is produced by contact process.
- In this process sulphur is burnt in air so that sulphur dioxide gas is formed.
- Sulphur dioxide gas with excess air is passed over solid vanadium pentoxide (V_2O_5) catalyst at 723 K so that sulphur trioxide gas is formed.
- For this reaction platinum catalyst was used but it became useless due to catalytic poisoning. In its place vanadium pentoxide is used.

$$S_{(s)} + O_{2(g)} \rightarrow SO_{2(g)}$$

$$2SO_{2(g)} + O_{2(g)} \xrightarrow[723\,K]{[V_2O_5]} 2SO_{3(g)}$$

- When sulphur trioxide is dissolved in water it forms sulphuric acid with very corrosive fumes but if sulphur trioxide gas is absorbed in concentrated sulphuric acid, fuming viscous liquid is formed.
- It is called fuming sulphuric acid or oleum ($H_2S_2O_7$).
- Oleum is diluted with water and sulphuric acid of desired concentration can be obtained.

$$SO_{3(g)} + H_2O_{(l)} \rightarrow H_2SO_{4(aq)}$$

$$SO_{3(g)} + H_2SO_{4(l)} \rightarrow H_2S_2O_{7(l)}$$

Oleum

$$H_2S_2O_{7(l)} + H_2O_{(l)} \rightarrow 2H_2SO_{4(aq)}$$

14. Explain the statement "Alcohol is harmful as drink". Also name and explain the working of medicine used to get rid of addiction of alcohol.

Ans. Ethanol is known as toxic amongst alcohols. Those who drink ethanol containing adulterant substances like methanol known as "lathha" lose their eye sight and become blind.

→ They lose sensitivity and lose the balance of the body.

→ It affects the liver and causes death due to a diseases called scirrohsis of liver. Hence, the drinking of alcohol is harmful for the health.

→ In alcohol containing drinks, ethanol is the main constituent and so it has got toxic effect on the body.

→ If it is taken in small amount, it works as stimulant.

→ If alcohol containing drinks are taken, then ethanol is absorbed through mucosa of stomach and ethanol mixes with the flow of blood through the layers of liver.

→ If an adult drinks alcohol, then it becomes 0.3% in the blood.

→ If more concentration of alcohol is there in the blood, it is harmful and in this condition, he becomes unconscious and the heart fails also.

→ If alcohol is absorbed in the cells, then 90% of ethanol is slowly converted into acetaldehyde by oxidation.

→ Acetic acid is formed by oxidation of acetaldehyde and finally carbon dioxide and water are formed by oxidation.

→ All the cells are able to carry out this oxidation, even then the oxidation reaction occurs mainly in the liver.

→ The toxic effect of alcohol is due to this acetaldehyde and so the person feels vomiting or loses balance or becomes unconscious.

→ In the liver of the alcohol-drinker (alcohol addict) the amount of enzyme P-450 increases very high and so one who drinks alcohol gets tempted to drink more alcohol

→ One who is habituated to drinking alcohol, is given medicine called disulfiram.

→ By this medicine alcohol is oxidised only upto acetaldehyde and so by drinking acetaldehyde containing alcohol, one feels vomiting and naustia and as a result the alcohol drinker (alcohol addict) develops hatred towards alcohol.

→ Thus, alcohol is harmful as drink.

OR

14. Write short note on Detergents.

Ans. Detergents : The chemical substance used to remove the dirt stuck on to the surface and does not harm the surface of a thing is called detergent.

→ Chemically, detergents are the sodium salts of organic sulphonic acids.

→ In soap - COONa functional group is attached to hydrocarbon while detergents are sulphonate ($-SO_3Na$) functional group possessing hydrocarbon chains.

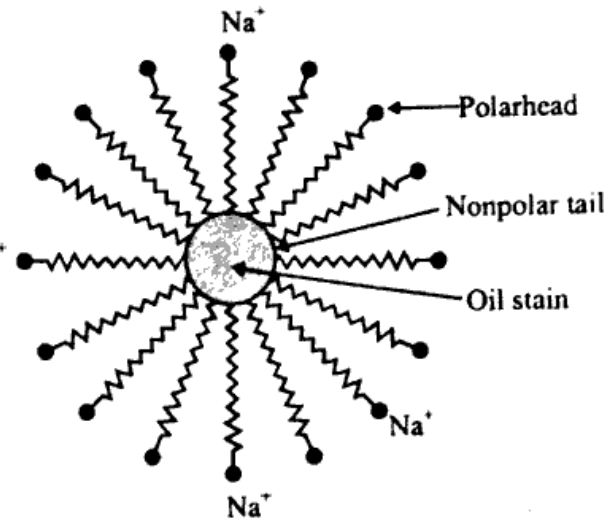
→ The cleansing effect of the detergent is more effective because Ca^{2+} and Mg^{2+} ions

present in hard water do not give precipitates with ions which are in the soluble form.

→ They remain in the solution and so detergent in more quantity is not used.

→ Hence, the use of detergent has increased. The cleansing process of soap and detergent is same.

→ There are two parts in the structure of soap and detergent; one part of a long hydrocarbon chain is known as nonpolar tail. It does not possess attraction towards water but possesses attraction towards dirt or stain.



→ While the other negatively charged part (–COONa or $-SO_3Na$) is known as head.

→ It possesses attraction towards water molecules.

→ Concentrated solution of soap or detergent is applied on the dirty or oily stained surface.

→ The nonpolar part possessing attraction towards dirt is attracted by oily stain or dirt.

→ When polar part remains in water, it possesses attraction towards water. The spherical structure formed around the stain is called micelle.

→ The hydrocarbon part remains attached with the surface containing dirt or oil while polar part remains in water.

→ The part on which detergent is applied, is being dragged by water so that the water gets dirty and the surface becomes clean.

15. What do you mean by Teen-age ? State the sexual changes seen during teen-age in both boy and girl.

Ans. Teen-age :

→ Human have a sexual mode of reproduction. All of us known that our body changes as we become older. Our height and weight also increase as we grow further. First we acquire milk teeth then permanent teeth. Some of these changes are common to girls and boys.

→ In small child, it is difficult to know from the appearance whether he is boy or girl because small girls and boys have same body shape. In the early teenage, rapid growth starts and body changes. Some of these changes are common in both girls and boys.

→ We begin to notice thick hairs growing in armpits and the genital area between the thighs. Hair can also appear on legs, arms and face.

→ The skin some time becomes oily and pimples begin to develop. The ovary in girl and testis in boy produce different hormones, and thus girl and boy become sexually mature.

→ The age at which gametes start to be produced and girl and boy able to reproduce is known as puberty.

→ Generally girls attain puberty at the age of 12 years, while boys reach puberty at the age of 13 to 14 years. On attaining puberty, testes start producing sperm and ovaries start producing eggs. In addition to these sex hormones also start secreting with the onset of puberty.

→ Thus the time between childhood and adulthood is known as 'adolescence.'

→ Many changes take place during puberty, such as new hair growth, body becomes mor muscular, the voice deepens, shoulders and chest broaden.

→ The penis becomes larger and it is capable of becoming erect. In humans, the baby carried in mother's body for a long period and will be breast fed after birth.

→ The female breast and reproductive organs develop to accommodate these possibilitie

→ Let us look at the reproductive system which is involved in the process of sexu reproduction.

SECTION-D

Answer the questions 16 to 18 in approximately 100 words. (5 marks each) 1

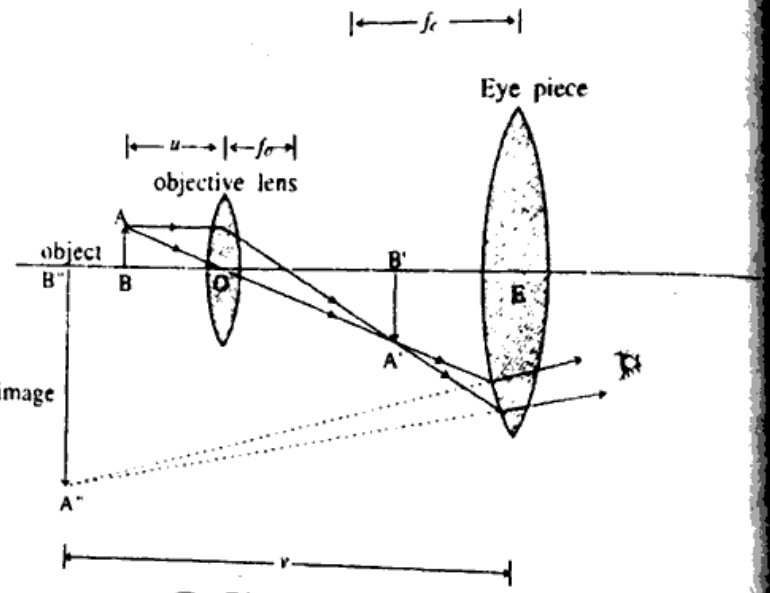
16. Explain the construction and working of a Compound microscope with a ne ray diagram.

Ans. Compound Microscope :

→ The simple microscope cannot form clear magnified image beyound certain limit. The compound microscope can form the magnified image of the object with better clarity as it uses two lenses.

→ The ray diagram for the compound microscope is shown in Figure.

→ The lens toward the object is called objective lens and the lens near the eye is called eye piece. The focal length of objective lens is small compared to the eye piece.



(RayDiagram of compound Microscope)

Working :

→ The object AB to be observed is placed at a distance slightly more than focal length (f_o) of objective lens so that its real, inverted and magnified image A'B' is obtained beyond the centre of curvature (C) of objective lens. The image A'B' becomes an object for the eye piece.

→ The position of an image A'B' is adjusted such that it will be within the focal length (f_e) of eye piece.

→ The eye piece forms virtual, erect and magnified image A"B" of the object.

→ Thus, the final image formed by compound microscope is virtual, inverted and magnified behind the object.

17. What is an Alloy ? Mention the advantages of alloy. Also mention the constituent properties and uses of any three alloys.

Ans. Alloy : Iron is the metal that is maximum used, but it is not in its pure form.

→ The reason for this is that when it is hot, it is soft and gets easily pressed. But if very small amount of carbon (about 0.05%) is added, it becomes hard and strong

If nickel and chromium are added to iron, stainless steel is obtained. It is strong and does not get corroded. Thus, when any other substance is added to iron, its properties are changed. The substances added to it may be metal or non-metal. Thus, **homogeneous mixture of two or more metals or metal and non-metal is called an alloy**.

→ In preparation of alloy, firstly the chief metal is meted and the substance which is to be mixed is added in definite proportion and then melted again.

→ Then this molten mixture is cooled.

→ The alloy prepared by adding zinc metal to copper is known as brass. Cooking vessels, parts of machines, instruments of music are prepared from it. If one of the metals in an alloy is mercury, then it is called amalgam.

→ The electrical conductivity of an alloy is less than that of pure metal. e.g If impurity is there in copper, its electrical conductivity is less than that of pure copper. The melting point of an alloy is less than those of component elements. e.g. The meting point of the alloy prepared from lead and tin, is less and so it is used in soldering the electric wires. Components of some alloys, their properties and uses are shown in Table.

Alloy	Components	Properties	Uses
Steel	Iron, carbon	Hard and strong	In construction of building and bridge, manufacture of ships, and manufacture of spare parts of motorcycles.
Stainless steel	Iron, nickel chromium	Air, water and alkali do not affect and do not get corroded.	In preparation of utensils, blades, surgical instruments.
Brass	Copper, zinc	Malleable, strong, corrosion resistant and can be easily shaped.	In preparation of cooking utensils, parts of machines and instruments of music.
Bronze	Copper, tin	Stronger and more corrosion resistant.	In preparation of statues, coins and medals.
Magnalium	Aluminium, magnesium	Very light and hard.	In preparation of scientific balance and light instruments.
Duralumin	Aluminium, copper and magnesium in trace proportions	Light, strong and corrosion resistant.	In preparation of aircraft and pressure cookers.

Note : Write three the constituents, properties and uses of alloys according to this question.

OR

17. What do you mean by concentration of ore. Explain the method with neat and labelled diagram for the concentration of sulphide ores

Ans. Concentration of ore : The ores are concentrated on the basis of type of impurities and their percentage proportions. This process is called concentration of ore.

Froth Flotation method :

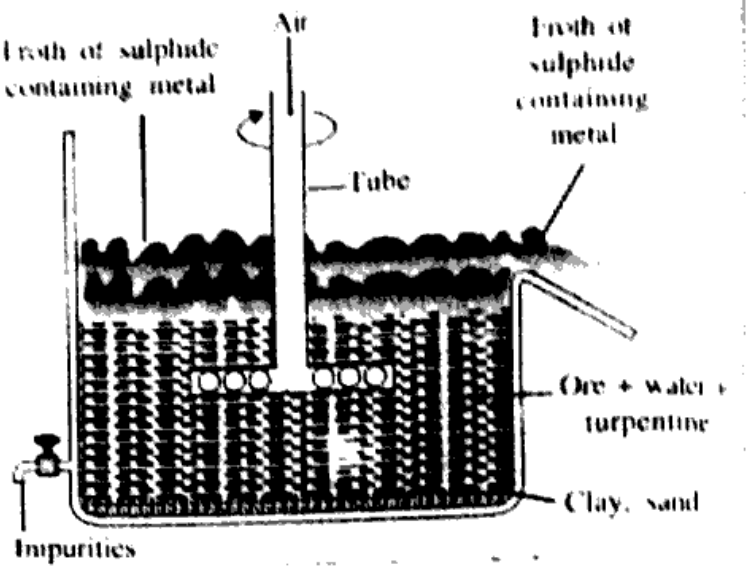
→ Froth flotation method is used for concentration of the ores of the metals whose ores are in sulphide form.

→ The concentration of sulphide ores of copper, lead and zinc metal are carried out by this method.

→ In this method, the fine powder of the ore, and water are filled in a big vessel. The substances like pine, or turpentine oil are added to it.

→ The sulphide particles of metals get wet and stick to it, while clay, particles of sand, do not get wetted.

→ In this liquid mixture, air is passed with messure through a tube as shown Fig.



→ Hence, the froth is produced around the light particles of the sulphide ore and comes on the surface of the liquid mixture.

→ Heavy particles like clay, sand etc, become wet by water and settled down at the bottom.

→ The sulphide ore of metal is removed with sieves in a second vessel and washed with water. By this method ores like copper pyrites are concentrated and clay, sand etc. are removed.

18. What do you mean by life processes? Explain the general life processes in a living organism.

What are Life Processes :

→ All the organisms perform certain main functions to keep themselves alive.

→ The main fundamental functions, performed by living organisms to maintain their life are called life processes.

→ They are nutrition, growth, respiration, circulation, excretion, control and coordination, movement and reproduction.

→ The nutrition means taking of food and converting it into smaller absorbable unit by our body.

→ The process of respiration releases energy from the absorbed food. Transport is the process through which absorbed substance are transported to various parts of the body.

→ Waste materials produced in various cells of the body are removed from the body by process of excretion.

→ Control and coordination keep the living organisms to survive in the changing environment surrounding them.

→ The process of growth involves the change in size of the living organism (small to big). In the process of movement the living organisms move from one place to another or make movement of smaller to larger parts of the body.

→ The process of reproduction involves multiplication of existing organisms, so they can make existence of their species on the earth.

OR

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18. What is mode of Nutrition ? Explain in detail two main modes of nutrition giving examples.

Ans. Nutrition : Nutrition can be defined as the process of intake of nutrients from which organisms derive energy to work.

→ A substance which supply nutrients to the body is called diet or food. The food taken by an organism contains carbohydrates, proteins, fats, vitamins, water and minerals. In organisms there are different ways for obtaining food. Hence in various organisms different modes of nutrition can be seen.

Modes of Nutrition : The modes of nutrition means methods of obtaining food by organisms.

→ All the organisms do not obtain their food in the same way.

→ So organisms have following methods for obtaining food :
(i) Autotrophic (Holotrophic) Nutrition (ii) Heterotrophic Nutrition

(i) Autotrophic Nutrition : The word 'auto' means self and 'trophe' means nutrition. Autotrophic means 'self nutrition'.

→ In Autotrophic nutrition organisms synthesize their own food, like carbohydrate, from water and carbon dioxide with the help of chlorophyll in presence of sun light. This process is known as photosynthesis.

→ e.g. green plants, Euglena, Volvox and Bacteria.

→ Carbohydrates are used for providing energy to them. The carbohydrates which are not used are stored in the form of starch.

→ We derived energy from the food which is stored in our body in the form of glycogen.

→ The following events are involved in the process of photosynthesis :
(i) Absorption of light energy by chlorophyll.
(ii) Conversion of light energy into chemical energy.
(iii) Reduction of carbon dioxide in to carbohydrates.

(ii) Heterotrophic Nutrition : All organisms are adapted to their environment. The heterotrophic nutrition differs depending on the availability and also how it is obtained by the organism.

→ In heterotrophic nutrition the organisms cannot synthesize their own food by using carbon dioxide, sunlight and water.

→ In heterotrophic nutrition energy is derived by digestion of organic substances obtained from plant and animal.

→ In this type of nutrition, after intake, the food is digested into simple forms and then organisms utilize it.

→ All animals, bacteria and fungi are heterotrophic organisms.

→ Heterotrophic nutrition is of the following types :

(i) Saprophitic nutrition : Here the dead and decaying organic materials are absorbed through the body wall of the organisms. The organisms depend entirely on the non-living substances. E.g. Bacteria and Fungi.

(ii) Parasitic nutrition : When organisms depend on another living organisms for their nutrition, then this mode of nutrition is called parasitic nutrition and the organism from which they obtain food is called 'host'. The parasite has close association with the host and obtains food from it. The host is not benefited but harmed. Several bacteria, fungi, plant like cuscuta and animal like tapeworm, ascaris, etc. live as parasites.

(iii) Holozoic nutrition : In this type of nutrition parts of plants or animals or whole organisms are taken in as food which then digested with the help of digestive enzymes into simple substance and then absorbed by body cells of the animals. The undigested food is thrown out of the body of animal through the process of egestion.

❑ ❑ ❑