JULY-2014 : PAPER SOLUTION

PART-B : JULY 2014

Time : 2 Hours] *[Total Marks : 50*

Instructions : As per Question Paper-1

SECTION-A

Answer the following in short in 30 words. Each question of 2 marks.

1. "Carbon forms backbone of biology of life on earth". Justify. 2

Ans. Carbon forms backbone of biology of life on earth :

→ Carbon atom can bond with many different types of atoms including other carbon atoms by forming covalent bonds at a time. This helps to form long chains of atoms. This characteristic results in varieties of carbon allotropes; namely diamond, graphite, graphene, amorphous and glassy carbon and fullerenes, all showing different properties.

→ Carbon atom bonds as strongly to other carbon atoms, and also by sharing different number of electrons. In fact, this strong cohesion is responsible for most stable bio-chemical compounds necessary for life. This is the reason why carbon is considered as a basis for the chemistry of life.

OR

1. Name important areas related to Nanotechnology.

Ans. Following are important areas related to Nano-technology.

→ Nanotubes and Bucky-Balls

→ Synthesis and characterization

→ Nano composite

→ Metallic nanotubes

→ Bio and carbonic nano-sensors

→ Nano energy storage devices

2. How much work is to be done to take 2C electric charge from the potential of 6V to the potential of 12V ? 2

Ans. $Q = 2C$

Electric Potential difference $V = 12V - 6V = 6V$

Now, $V = \frac{W}{Q}$

$\therefore$ Work $W = VQ$

$\therefore W = 6 \times 2$

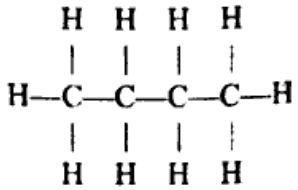
$\therefore$ Work $= 12J$

3. What is isomerism ? Write isomers of butane. 2

Ans. Compounds having same molecular formula but different structural formula molecular and physical properties are called isomers and the phenomenon is known as isomerism.

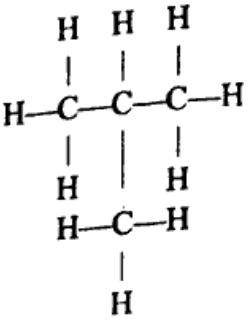
→ Two isomers of C_4H_{10} (butane) are as follows :

(i)



n-Butane

(ii)



2-Methyl propane (Isobutane)

OR

3. Explain occurrence of methane and its preparation.

→ Methane gas is the chief constituent in Marsh gas available from the mines of mineral coal and gas collected over petroleum in the sedimentary rocks in the crust of the earth.

→ Methane is a chief constituent in dung, excretion of animals, and gobar gas, sewage gas and biogas obtained from decomposition of plant and animal waste.

Preparation of Methane :

→ Methane gas is obtained by heating sodium acetate and soda lime (3:1 proportion mixture of sodium hydroxide and calcium oxide).

$$\underset{\text{Sodium acetate}}{CH_3COONa} + \underset{\text{Sodalime}}{(CaO + NaOH)} \xrightarrow{\Delta} \underset{\text{Methane}}{CH_4} + \underset{\text{Sodium Carbonate}}{Na_2CO_3}$$

→ Methane gas collected by downward displacement of water.

→ It is insoluble in water. It is colourless and odourless gas. It is lighter than air.

→ Observe by dropping a burning piece of paper into a test tube filled with methane gas. It is a combustible gas.

→ It burns with blue flame when burnt in air and gives carbon dioxide and water.

$$\underset{\text{Methane}}{CH_4} + \underset{\text{Di-oxygen}}{2O_2} \rightarrow \underset{\text{Carbon dioxide}}{CO_2} + \underset{\text{water}}{2H_2O} + \text{Heat}$$

4. Give two points of difference between arteries and veins. 1

Ans. Arteries	Veins
1. The blood vessel that carries blood from the heart to different organs is called an artery.	1. The blood vessel that carries blood from any organ towards the heart is called a vein.
2. In artery, the blood flows under higher pressure.	2. In vein, the blood flows under somewhat low pressure.
3. The wall of the artery is relatively thick and elastic.	3. The wall of the vein is relatively thin and less elastic.
4. The artery divides into several arterioles and numerous fine blood capillaries in the organs and tissues.	4. In the organs and tissues, the veins are formed by the union of numerous blood capillaries and several venules.
5. Arteries carry oxygenated blood (exception-Pulmonary artery).	5. Veins carry deoxygenated blood (exception-Pulmonary vein).

5. What are the global problems ? 2

Ans. Global problems are those problems that affect the whole planet and potentially all the people who live on it.

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

1. Global warming and depletion of the ozone layer.
2. Biodiversity and ecosystem losses.
3. Fisheries
4. Depletion
5. Deforestation
6. Water deficits
7. Waste disposal
8. Maritime safety
9. Pollution

SECTION-B

◆ **Answer the following short questions in the limit of 30 words. Each question of 2 marks.**

6. How are artificial satellites useful in communication ? 2

Ans. Artificial Satellites useful for communication :

→ In the field of communication, we use satellites for telecommunication, television, transmission, radio networks and computer networks.

→ Country-wide classroom and teleconferencing has enabled us to spread education in remote villages of the country.

→ For this purpose India has launched INSAT series. So far we have launched INSAT 1, 2, 3 series for these purposes.

7. Define : (a) Arrhenius Acid (b) Arrhenius base 2

Ans. According to Swedish Scientist Svante Arrhenius, "Acid is a substance containing hydrogen which produces hydrogen ion (H^+) in its aqueous solution, and base is a substance containing hydroxide which produces hydroxide ion(OH^-) in its aqueous solution."

→ It can be said that acid ionises in water and produces H^+ and base ionises in water and produces OH^- ion.

$$\underset{\text{Nitric acid}}{HNO_{3(l)}} \xrightarrow{H_2O} H^+_{(aq)} + \underset{\text{Nitrate ion}}{NO_{3(aq)}}$$ Arrhenius acid

$$\underset{\text{Sodium hydroxide}}{NaOH(s)} \xrightarrow{H_2O} Na^+_{(aq)} + \underset{\text{Hydroxide ion}}{OH^-_{(aq)}}$$ Arrhenius base

8. Write the characteristics of hormonal secretions. 2

Ans. Characteristics / Properties of Hormonal Secretions :

→ Each hormone is produced by a specific kind of cells.

→ Hormones are not effective at their site of synthesis.

→ Hormones are poured directly into blood.

→ They are transported through blood to a specific organ and influence specific processes occurring there. This influence may be stimulatory or inhibitory. Thus, hormones are "regulator chemicals".

→ Hormones are used up in producing their regulatory effect.

→ Chemically hormones are peptides and steroids. Some are biogenic amines.

9. Define sex determination. How is sex determined in human beings ? 2

Ans. Sex Determination :

→ "In human beings, the sex of the individual is genetically determined. Thus, the mechanism to determine the sex of an individual is known as sex determination.

Sex Determination in Human Beings :

→ In human beings, the sex will be determined by the genes, located on the chromosomes, which are inherited from parents to offsprings.

→ In humans, 23 pairs of chromosomes occur. Of these, 22 pairs are of autosomes

→ They are similar in male and female. In female 23rd pair consists of two similar X sex chromosomes.

→ In male one chromosome in 23rd pair is like X chromosome in women.

→ Its homologous chromosome is smaller in size and is called Y chromosome.

→ All eggs of a female are similar. Each egg contains 22 autosomes and one X sex chromosome.

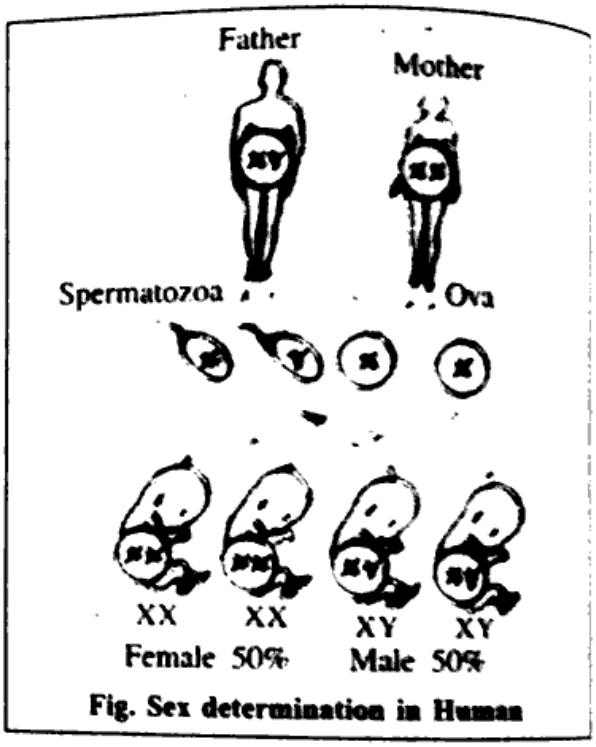


Fig. Sex determination in Human

→ Male produces two types of sperms. 50% sperms carry X sex chromosome while other 50% carry Y sex chromosome.

→ When a sperm carrying X chromosome fertilizes an egg, the zygote develops into a female, while a sperm carrying Y chromosome fertilizes an egg, the zygote develops into a male.

→ In human, presence of Y chromosome is obligatory for maleness. When the zygote is formed and embryo development occurs, the gonads which are formed are undifferentiated.

→ They can develop either into testes or into ovaries. If the zygote contains the Y sex chromosome, the gonads differentiate into testes. Testes produce male sex hormones and stimulate development of a male individual.

OR

9 Name four varieties of vegetables which have been produced from 'wild cabbage' by the process of artificial selection.

Ans. "Wild Cabbage" : (i) Cabbage (ii) Broccoli (iii) Kohlrabi (iv) Kale and (v) Cauliflower are the vegetables which have been produced from 'wild cabbage' by the process of artificial selection.

10. What are the consequences of loss of forest cover ? 3

Ans. Forest cover of the world is rapidly depleting. It is more rapid in developing countries.

(i) The reasons are rapidly increasing population industrialization and urbanization.

(ii) Destruction of the forest is very rapid, particularly in the tropical region.

(iii) Deforestation has serious effects. Deforestation induces changes in the regional and global climate.

(iv) Due to the destruction of forests, the rainfall decreases.

(v) Loss of forest cover causes increase in soil erosion, decrease in the fertility of land, increase in the amount of CO_2 and temperature in the atmosphere. This leads to green house effects.

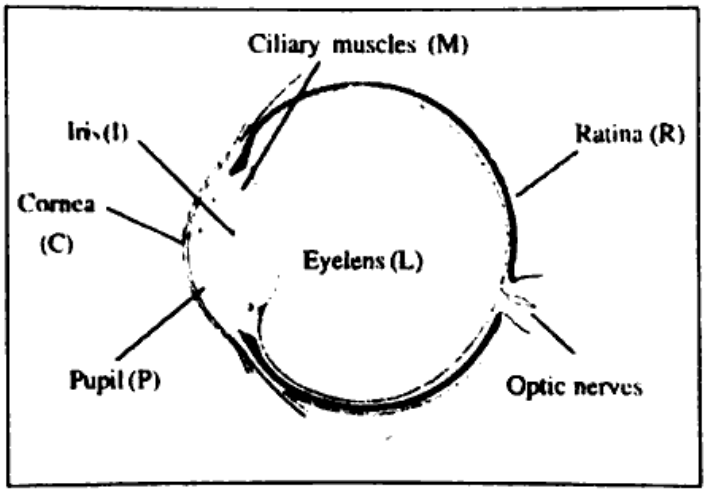
(vi) In our country the rate of deforestation is very high. If deforestation continues at the same rate, the day is not far off when we may be deprived of all these things which we get from forest.

SECTION-C

♦ **Answer the following short questions in limit of 50 words. Each question of 3 marks.**

11. Explain the function of main parts of a human eye by drawing a simple sketch of it. 3

Ans. The human eye is the best natural optical instrument whose construction can be compared with the camera. We can view the wonderful world around us through the eyes.



→ A simple sketch of human eye along with the labelling of its main parts is shown in the Figure.

→ The light rays coming from the object first enter the eye through cornea.

→ A muscular diaphragm behind the cornea is known as an iris which can control the amount of light that enters the eye.

→ An aperture of an eye behind the cornea at the center is known as pupil whose size can be controlled by Iris. After passing through the pupil, the light rays are incident on a jelly like elastic material known as an eyelens.

→ The muscular structures which hold the eyelens in its position are known as ciliary muscules.

→ They change the focal length of an eyelens by changing its thickness.

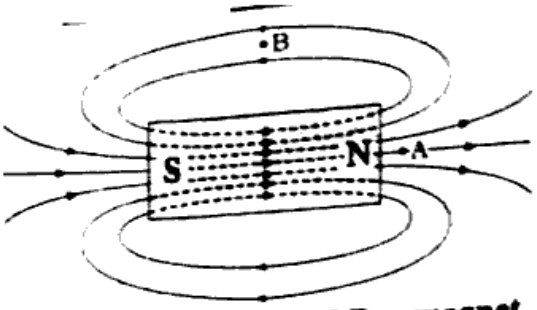
→ Position of image where image formed due to refraction by eyelens is called retina.

→ When the light rays fall on retina, the light sensitive cells generate electrical signals.

→ The signals are sent to the brain through the optic nerves where the image of an object is interpreted.

12. What is a magnetic field ? Give the characteristics of magnetic field lines. 3

Ans. The region around a magnet in which effect of magnetic force is experienced is called magnetic field of a magnet.



Magnetic field lines of Bar magnet

The characteristics of magnetic field lines :

(1) The magnetic field lines of a magnet starts from the north pole (N) and reach to the south pole (S) and these lines are in the direction from south pole (S) to the north pole (N) inside the magnet. Thus, they form close loops.

(2) The region in which the field lines are at close distance to each other has a strong magnetic field and if the field lines are at far distance from each other, the region has a weak magnetic field.

(3) The magnetic field is a vector quantity. So, it has a magnitude and a direction both. The tangent drawn at any point of a magnetic field line shows the direction of magnetic field at that point.

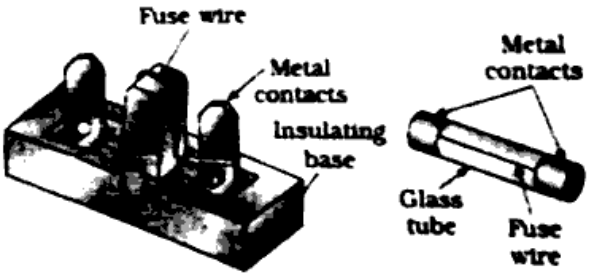
(4) Magnetic field lines do not intersect each other.

OR

12. Write a short note on fuse.

Ans. Fuse :

→ There is a danger of fire breaking out due to a short circuit. By connecting too many electrical appliances with the AC mains, there is a possibility of increase in the current. In order to protect from above mentioned situations, fuses are used.



(a) Fuse used in AC mains (b) Fuse used in

Construction of fuse .

→ Figure (a) shows the construction of a mains fuse. On an insulating base a conducting wire haying low melting point is connected with the metallic contacts. As shown in figure (b), a fuse wire is placed inside a small glass tube in contact with metal.

→ Whenever the current in the circuit increases due to some reason the heat generated due to excess flow of current melts the fuse. This stops the further flow of current in the circuit. The fuse ensures that a large scale damage is avoided.

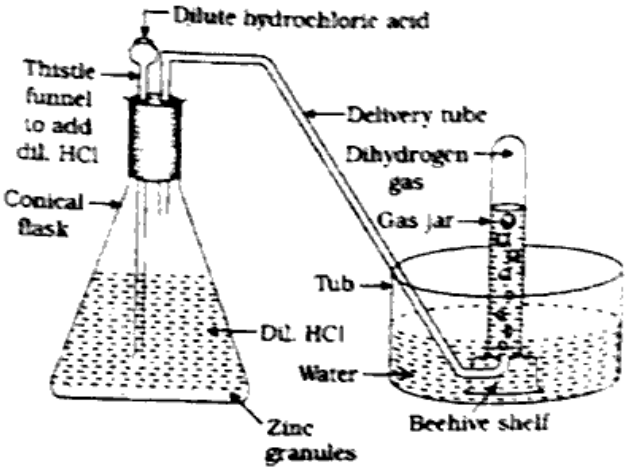
→ A smaller fuse is used in all electrical appliances used in home such as TV, radio, etc.

→ Fuse is connected in series with AC mains.

→ Fuse wire is made up of pure tin or an alloy made up of mixing of copper and tin.

13. **Explain with diagram the method for preparation of dihydrogen gas in laboratory.** 3

Ans. Hydrogen gas is prepared in the laboratory by taking zinc granules in a conical flask. The arrangement of the apparatus is carried out as shown in the figure. Add dilute hydrochloric acid (or sulphuric acid) through the thistle funnel. The reaction between zinc granules and dilute hydrochloric acid evolves hydrogen gas which is collected by the downward displacement of water in an inverted gas jar.



Chemical reaction :

$$Zn_{(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)}$$

$$Zn_{(s)} + H2SO_{4(aq)} \longrightarrow ZnSO_{4(aq)} + H_{2(g)}$$

14. **Write a short note on detergents.** 3

Ans. Please Refer to July 2015 Q. 14 OR.

OR

14. **Write the preparation, properties and two uses of Propanone.**

Ans. Propanone (Acetone) (CH_3COCH_3) :

→ The simplest compound of ketone group is propanone. Its common name is acetone which is one of the compounds of the solution to remove nail polish.

Preparation of propanone :

→ **Fisher - Tropsch Process :** When a mixture of ethene obtained during cracking of petroleum and water gas is passed over a catalyst cobalt oxide (CoO) at 150 bar pressure and 453 K temperature, acetone is obtained.

$$\underset{\text{Ethene}}{CH_2 = CH_2} + \underset{\text{Water gas}}{H_2 + CO} \xrightarrow[453\,K : 150\ bar]{[CoO]} \underset{\text{Propanone}}{CH_3COCH_3}$$

Properties of Propanone :

(1) **Propanone (acetone)** is a colourless liquid and possesses fragrant smell. Its boiling point is 329 K and it is very much soluble in water.

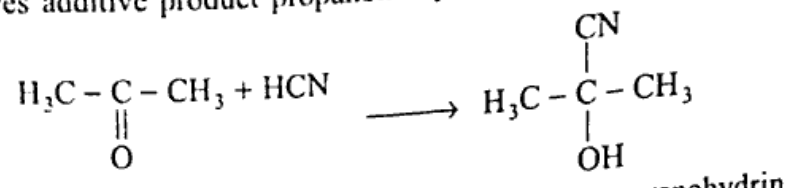
(2) **Reduction of propanone :** Propanone gives propan-2-ol on reduction with reducing agent like sodium borohydride ($NaBH_4$) or Lithium aluminium hydride $LiAlH_4$)

$$\underset{\text{Propanone}}{CH_3COCH_3} \xrightarrow[\text{or } LiAlH_4]{NaBH_4} \underset{\text{Propan - 2 - ol}}{CH_3 - \underset{\underset{OH}{|}}{CH} - CH_3}$$

(3) **Oxidation of propanone :** Ethanoic acid is acid obtained by oxidation of propanone, with alkaline potassium permanganate. ($KMnO_4$)

$$\underset{\text{Propanone}}{CH_3COCH_3} \xrightarrow[\text{Alkaline}]{[O]\,KMnO_4} \underset{\text{Ethanoic acid or Acetic acid}}{CH_3COOH} + CO_2 + H_2O$$

(4) **Addition reaction of propanone :** Like methanal propanone contains $>C=O$ double bound. As a result of this it reacts with hydrogen cyanide (HCN) and gives additive product propanone cyanohydrin.



Propanone Hydrogen cyanide Propanone cyanohydrin

Uses of Propanone :

(1) As a solvent in laboratory and in paint industry.

(2) In preparation of artificial leather and synthetic fibres.

(3) It is used as nail paint remover.

15. Explain vegetative propagation with the help of two example. 3

Ans. Vegetative Propagation :

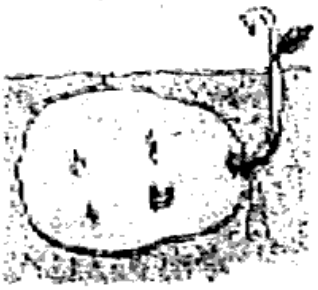
→ Vegetative propagation is an asexual method of reproduction, which occurs only in plants. In vegetative propagation, new plants are obtained from the plant parts like roots, stem and leaves of old plants, without taking help of any reproductive organs.

→ Vegetative propagation involves the development and growth of dormant state of buds present in old part of the plant.

→ When suitable moisture and temperature are provided to dormant state of bud then these buds grow to form new plants.

→ Buds are found on the leaves of Bryophyllum.

→ A potato tuber has a number of buds on its body, which act as organs for vegetative reproduction. When a potato tuber is planted in the ground, then buds start growing and form new plants.



Potato tuber

Leaf buds of Bryophyllum

SECTION-D

❖ **Answer the following questions in the limit of 100 words. Each question of 5 marks.**

16. Derive the lens formula $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$. 5

Ans. Please Refer to March 2016 Q. 16.

17. Explain the method of concentration of sulphide ore. 5

Ans. Please Refer to July 2015 Q. OR 17.

OR

17. **Explain the Half–Heroult method to obtain aluminium from alumina by electro chemical reduction.**

Ans. Please Refer to March 2015 Q. 17.

18. **Describe the process of nutrition in Amoeba. Draw labelled diagram to show various steps of nutrition in Amoeba.** **5**

Ans. **Nutrition :**

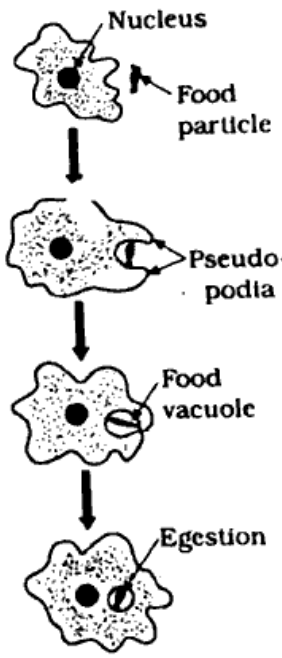
→ The phenomenon of utilizing nutrients of food for obtaining functional energy and maintaining growth, and other vital activities such as transportation, movements reproduction etc. is called nutrition.

Nutrition in Amoeba :

→ Amoeba is unicellular animal. The mode of nutrition in Amoeba in holozoic. In amoeba the process of obtaining food is called phagocytosis (means cell feeding). The various processes involved in nutrition are ingestion, digestion, absorption, assimilation and egestion. Amoeba ingests food particles by forming temporary finger like projections known as pseudopodia around them so the food is encaptured along with lysosomes into a bag called food vacuole.

Various steps involved in nutrition in amoeba :

1. **Ingestion :** Amoeba ingets food particles by forming temporary finger like projections known as pseudopodia around them so the food particle is encaptured and form food vacuole in the cytoplasm.
2. **Digestion :** In amoeba holozoic nutrition is observed. The food is digested in food vaculoes by digestive enzyme present in lysosome of the cell.
3. **Absorption :** The digested food present in food vacuole is absorbed directly into cytoplasm by diffision.
4. **Assimilation :** A part of the food absorbed in cell is used to obtain energy through respiration. The remaining part is used in the growth of amoeba.
5. **Egestion :** The undigested food rem-aining in the food vacuole and is thrown out of the body by rupturing cell membrane.



(Nutrition in Amoeba)

OR

18. **What is respiration ? Mention its types and explain each with equation.**

Ans. Please Refer to March 2015 Q. 18.

❑❑❑