

# Maharashtra State Board Class X

## Science and Technology Board Paper 2016

**Time: 2 Hours**

**Max. Marks: 40**

Note:

- (i) Draw well-labelled diagrams wherever necessary.
- (ii) All questions are compulsory.
- (iii) Students should write the answers of questions in sequence.

**Q1. (A) Answer the following sub-questions:**

**5**

i. Fill in the blank and rewrite the completed statement:

\_\_\_\_\_ is the largest gland in the body.

**Solution:**

Liver

ii. Find the odd one out and write it:

vagina, uterus, vas deferens, ovary

**Solution:**

Vas deferens

Vas deferens is part of a male reproductive system, while vagina, uterus and ovary are all part of women's reproductive systems.

iii. State whether the statement is true or false:

Aquatic animals breathe at a slower rate than the terrestrial animals.

**Solution:** False

Breathing of aquatic animals is faster than that of terrestrial animals.

iv. Considering the relationship in the first pair, complete the second pair:

rr: Homozygous: : Rr : \_\_\_\_\_ .

**Solution:**

Heterozygous

v. Name the following:

Main ore of aluminium

**Solution:**

Bauxite ( $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$ ) is the main ore of aluminium

**(B) Choose the correct alternative and rewrite the following:**

5

i. \_\_\_\_\_ is liberated when acetic acid reacts with sodium metal.

- (A) Hydrogen
- (B) Chlorine
- (C) Oxygen
- (D) Nitrogen

**Solution:**

(A) Hydrogen

ii. For binary fission, Amoeba requires \_\_\_\_\_ parent cells.

- (A) Three
- (B) Two
- (C) One
- (D) Zero

**Solution:**

(C) One

In Amoeba, asexual reproduction occurs with the help of binary fission. During this, one parent cell divides into two equal or nearly equal parts, each of which grows into an individual.

iii. A solution of  $\text{CuSO}_4$  in water is \_\_\_\_\_ in colour.

- (A) Pink
- (B) Blue
- (C) Colourless
- (D) Green

**Solution:**

(B) Blue

iv. Raisins are formed by drying grapes. The process that takes place during formation of raisins from grapes is \_\_\_\_\_.

- (A) Absorption
- (B) Osmosis
- (C) Diffusion
- (D) Dehydration

**Solution:**

(D) Dehydration

v. Ethanoic acid has a \_\_\_\_\_ odour.

- (A) rotten eggs
- (B) pungent
- (C) vinegar-like
- (D) mild

**Solution:**

(B) pungent

**Q2. Answer the following questions (any five):**

**10**

i. Differentiate between voluntary and involuntary movements.

**Solution:**

- Voluntary movements are controlled by the brain and occur with conscious effort, e.g., walking and writing.
- Involuntary movements occur automatically without conscious control, e.g., heartbeat and digestion.

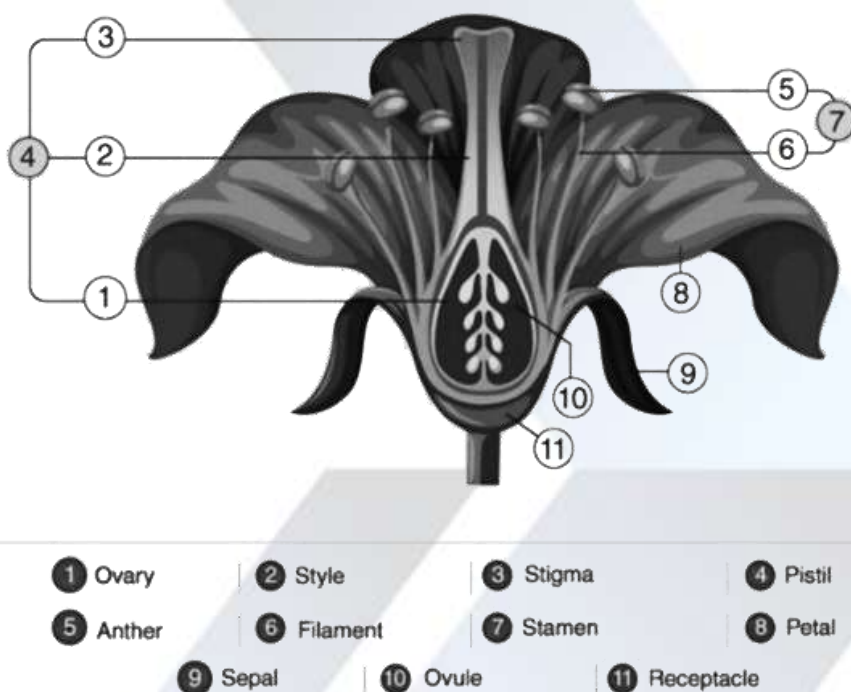
ii. What is the peculiarity of the 'DNA' structure?

**Solution:**

DNA has a double-helix structure, where two strands are twisted around each other. The strands are made of sugar-phosphate backbone and nitrogenous bases (Adenine pairs with Thymine, and Cytosine pairs with Guanine). The strands run in opposite directions (antiparallel) and store genetic information. DNA also has the ability to self-replicate, ensuring genetic traits are passed from one generation to the next.

iii. Draw a well-labelled diagram of the longitudinal section of a flower.

**Solution:**



iv. Give scientific reason: Roots of plants grow away from light

**Solution:**

In response to the stimulus of gravity and water, the root system of the plants always grows downwards, thus ensuring that the roots find the soil and water. This confirms that the roots of plants grow away from the light.

v. Write any two measures to conserve water.

**Solution:**

Given here are some measures to conserve water:

- Close the taps when not in use.
- Fix the tap and pipe leakages.

- Harvest rainwater and recycle used water.
- Make people aware about the importance of water conservation.
- Restrain the use of equipments that use up more water.

vi. What are fossils?

**Solution:**

The preserved remains and traces of plants, animals and other organisms from the remote past are known as fossils. These are collected from different levels or depths of the soil structure. Study of fossils reveals the structure, age, evolutionary process as well as the significance of other organisms. So, we can say that fossils can actually serve as paleontological evidence.

**Q3. Answer the following questions (any five):**

**15**

i. What is an alloy? Give two examples with their chemical composition.

**Solution:**

A homogeneous mixture of two or more metals or even of one or more metal with certain nonmetallic elements is called Alloy. Some of the examples of alloys include Duralumin, which is a mixture of Aluminium, Copper, Magnesium and Manganese. Brass is another example which consists of Copper and Zinc.

ii. How is sex determined in human beings?

**Solution:**

Human diploid cell consists of 23 pairs (46) of chromosomes, out of which 22 pairs are autosomes and one pair is the sex chromosomes. These are the X and Y chromosomes. Every child or human being gets one set of chromosomes from each parent. Human male, thus will have 44 + XY chromosome, while the human female will have the 44 + XX chromosome. So, females can be said to be homogametic while males are heterogametic. However, during gamete formation, meiosis or reduction process occurs, so that the gamete gets only one set of chromosomes and so it is haploid. Here, the female gamete (ovum) will be 22 + X, while the male gamete (sperm) is 22 + X or 22 + Y. Then, when the male and female gametes unite forming a zygote, the chromosomes again become diploid. This is how the offspring gets the same number of chromosomes as its parents. The sex of the baby, in the meantime is determined by the nature of the sperm

(X or Y) that fertilizes the ovum. Hence, for human beings the sex of a baby is determined by the father.

iii. State the different types of neurons. Explain their functions.

**Solution:**

Neurons are of three kinds, sensory neuron, motor neuron and association neuron, all three with different functions. However, the brain must effectively communicate this to the rest of the body and vice versa.

Sensory neurons oversee changing external stimuli from the environment to the corresponding internal stimuli, activated by sensory input. They send out projections to other elements of the nervous system, thus conveying or carrying sensory information to the brain or the spinal cord. However, unlike the motor neurons of the central nervous system (CNS), whose inputs are from other neurons, sensory neurons are activated by physical modalities including visible sound, heat, light, physical contact or via chemical signals like smell, taste and so on.

Meanwhile, motor neurons located in the central nervous system project their axons outside of the CNS to directly or indirectly control muscles. Alternatively, the association or interneurons (also called mixed neurons) are neither sensory nor motor and rather act like the middleman connecting these two types of neurons. Located in the central nervous system, they function only locally, meaning their axons connect only with nearby sensory or motor neurons. Interneurons can save time and prevent injury as well by sending out a message to the spinal cord and back instead all the way to the brain.

iv. What is the '3 R' mantra? Write its significance.

**Solution:**

The '3 R' mantra is to reduce, reuse and recycle, an effective approach to eliminating waste, while also conserving the resources. It is said to be a hierarchy of waste management strategies with the aim to minimize waste. The aim of this mantra is to extract the maximum practical benefits from products and to generate the minimum amount of waste. Many of the things we currently throw away could be reused again with just a little thought and imagination.

- Reduce: Use lesser resources and reduce their consumption, i.e use less paper, less plastic and so on.
- Reuse: Use and use items again instead of throwing them away. i.e reuse plastic jars to store food grains or salt

- **Recycle:** This is the process in which the items that were used before and put back into the process to create new items. Used and discarded plastics, glass, paper, and metal are sent back to respective industries, where they get converted to other useful products such as lampshades or handbags and more. Meanwhile, all three cut down on the consumption of energy required to create new products. They also reduce pollution, and resources are also conserved well.

v. Metal *A* has electronic configuration (2,8,1) and metal *B* has (2,8,8,2). Which is more reactive? Why? Identify these metals.

**Solution:**

It is seen that Metal *A* with electronic configuration (2,8,1) is more reactive as compared to metal *B*, which has (2,8,8,2) electronic configuration. This is because Metal *A* with 1 electron will find it easier to lose it than the metal *B* with 2 electrons. Metal *A* is Sodium, while Metal *B* is Calcium.

vi. Explain the disadvantages of a large family size.

**Solution:**

It is believed that a large family generally affects individual and community life. Given below are some of the disadvantages of having a large family:

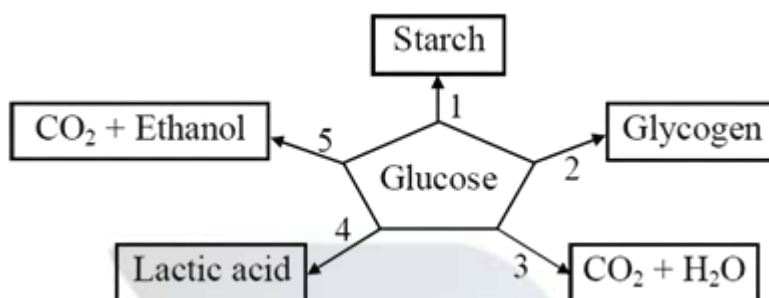
- Economic pressure ensues
- Elders in the family may be suffering from ill health
- Lack of space to accommodate everyone in the family
- When there are too many children, they may be neglected at home
- Lack of food could cause malnutrition
- Lack of better educational facilities
- Insufficient medical care

**Q4. Attempt any one of the following:**

**5**

i. Given below are the end products of different reactions involving glucose.





Write the reaction number in front of the following:

- Anaerobic reaction =
- Reaction in the human muscles =
- Aerobic respiration =
- Reaction in the plant cells =
- Reaction in the liver =

**Solution:**

- The reaction number is Anaerobic reaction is 5
- Reaction number in the human muscles is 4
- Reaction number is Aerobic respiration is 3
- Reaction in the plant cells is 1
- Reaction in the liver is 2

ii. What is a homologous series? State any four characteristics of a homologous series.

**Solution:**

A series of carbon compounds that consist of the same functional groups but have different numbers of carbon atoms are known as homologous series. Meanwhile, check out the characteristics of the homologous series, here. Also, know more about homologous series here.