



## INTRODUCTION TO BIOLOGY

### Q1. Define biology.

The scientific study of living things is called biology.

The word biology is formed by combining the Greek words 'bios' meaning "life", and the 'logos' meaning "knowledge of or "study of".

“Biology deals with the living part of nature and with the non-living things which affect the living things in any way”.

### Q2. Write down any four characters of living organisms.

A living thing:

- Has highly organized body
- Is composed of cell (s)
- Has genetic program
- Carry out many chemical reactions
- Can get and use energy
- Can grow in size
- Can produce offspring
- Maintains internal environment
- Respond to changes in environment
- Any object which has all these characteristics is called a living thing.
- A set of these characteristics is called life.

### Q3. Define biotechnology and microbiology.

#### **Biotechnology:**

Use of organisms/cells/biological processes in manufacturing and service industries is called biotechnology.

#### **Microbiology:**

It is the study of microorganisms. Viruses, bacteria, protozoans, microscopic fungi and microscopic algae are studied under this branch.

### Q4. Differentiate between molecular biology and biochemistry.

**Biochemistry:** It is the study of chemical compound and the chemical processes in living organisms. e.g. study of photosynthesis, respiration, digestion, muscle contraction etc.

**Molecular biology:** It is the study of organisms/cells or organelles at molecular level in organisms. eg. study of genes and regulation of gene expression etc.

### Q5. How marine biology differs from freshwater biology?

**Marine biology:** It is the study of life in seas and oceans, i.e. marine water

**Freshwater biology:** It is the study of life in rivers and lakes, i.e. freshwater

### Q6. How will you distinguish between human biology and social biology?

**Human biology:** It is the study of structure, function, histology, anatomy, evolution, genetics, cell biology and ecology of human being.

**Social Biology** It deals with the behavioral study of the human beings and other living organisms.

### Q7. What are bioelements? What are their features? Give their properties in body

The chemical elements which are found in the bodies of living organisms are called bioelements.

The bioelements have special properties which make them particularly appropriate for life e.g. Carbon has catenation ability and most commonly found in living body.

Oxygen (O)	Potassium (K)	Manganese (Mn)
Carbon (C)	Sulphur (S)	Zinc (Zn)
Hydrogen (H)	Chlorine (Cl)	Copper (Cu)

Nitrogen (N)

Sodium (Na)

Iodine (I)

Calcium (Ca)

Magnesium (Mg)

Phosphorus (P)

Iron (Fe)

**Q8. Name the bioelements which occur in traces in human body.**

Some the bioelements which occur in traces in human body.

Manganese (Mn)

Zinc (Zn)

Copper (Cu)

Iodine (I)

**Q9. Name the bioelements that form 99% of the total mass of the body.**

These six elements are following:

- |                  |     |
|------------------|-----|
| ➤ Oxygen (O)     | 65% |
| ➤ Carbon (C)     | 18% |
| ➤ Hydrogen (H)   | 10% |
| ➤ Nitrogen (N)   | 3%  |
| ➤ Calcium (Ca)   | 2%  |
| ➤ Phosphorus (P) | 1%  |

**Q10. Define biosphere.**

The part of earth involved by living organisms is called biosphere. It includes both living and non living things. It is a thin layer around the earth in which all the living organisms exist.

**Q11. Define Protoplasm.**

All the living organisms of the cell which are enclosed by the cell membrane are collectively called as protoplasm.

Protoplasm of a eukaryotic cell consists of cytoplasm and nucleus.

**Q13. Differentiate between micromolecule and macromolecule.****Micromolecule:**

Molecules having relatively low molecular weight are called micromolecules. Most of the macromolecules are polymers of small repeating units, e.g. Starch, Haemoglobin, DNA etc.

**Macromolecule:**

Molecules having relatively high molecular weight are called macromolecules.

Micromolecules are not polymers. e.g. CO<sub>2</sub>, H<sub>2</sub>O etc.

**Q14. Compare an organelle with an organ.****Organelle:**

These are specific structures found in cell for particular functions. Different micromolecules and macromolecules arrange to form an organelle. e.g. Mitochondria, Ribosomes etc.

**Organ:**

These are parts of organ system and perform specific functions. Different tissues assemble to form an organ. e.g. Stomach, Liver etc.

**Q15. Differentiate between population and community.****Population:**

A group of living organisms of same species located in the same place at the same time is called a population. It is a group of individuals of same species sharing a common geographical area. e.g. The number of rats in a rice field, the number of students in biology class.

**Community**

A group of different populations living and interacting in the same area is called Community. It is a group of different populations in an area. e.g. A group of different organisms living in a lake etc.

**Q16. What is biome? Give examples.**

A large regional community that is primarily determined by the climate is called biome. In a biome, the major type of plant determines the other kind of plants and animals.

e.g Grassland biome, Desert biome, Forest biome etc.

**Q17. How are rocks aged or dated? How is this helpful in finding relative age of fossils?**

Rocks are aged/ dated by comparing the amounts of certain radioactive elements (especially carbon 'C') they contain. The older sediment layers have less of these specific radioactive isotopes than the younger layers. A comparison of layers in which fossils are found gives an indication of their relative age.

**Q18. Define biodiversity.**

The number and variety of species in a place is called biodiversity. There are nearly 2,500,000 species of organisms currently known to science

**Q19. Define phyletic lineage.**

A series of species arranged in ancestor to descendant sequence is called a phyletic lineage. Every phyletic lineage extends back in time to the common origin of all early life.

**Q20. What is deduction? Differentiate between deductive and inductive reasoning.**

**Deductive reasoning:**

It moves from general to specific.

Specific conclusion is drawn from general assumption.

It is also called deduction.

e.g. If we accept that all birds have wings, then sparrow being a bird also sparrow has wings.

**Inductive Reasoning:**

It moves from specific to general.

General assumption is made from specific observation.

It is also called induction.

e.g. If we observe that sparrow has wings and is bird, then all the birds have wings.

**Q21. Compare theory with law.**

**Theory:**

When a hypothesis is proved true by the results of many tests, it is called a theory. Theory is predictive and has explanatory power. e.g. Darwin's theory of natural selection, Cohesion-Tension theory

**Law:**

When a theory is repeatedly supported after experimentation by many scientists, it becomes a scientific law. It is a uniform and constant fact of nature. e.g. Hardy-Weinberg law and Mendel's, laws of inheritance

**Q22. Define productive theory.**

A theory that suggests new and different hypotheses is called a productive theory. Such a theory is predictive and has explanatory power.

**Q23. How and when a hypothesis becomes a theory?**

Repeated exposure of a hypothesis to possible falsification increase scientists confidence in the hypothesis when it is not falsified. Any hypothesis that is tested again and again without ever being falsified is considered well supported and is generally accepted. This may be used as the basis for formulating further hypothesis. So there is soon a series of hypotheses supported by the results of many tests which is then called a theory.

**Q24. What are hypothesis?**

The tentative explanation of the observation is called hypothesis.

Scientists make hypothesis on the basis of experience and background knowledge of the event.

**Q25. What is genetic engineering?**

Manipulation of genes for human welfare is called genetic engineering. Genes for disease resistance and other desirable characters are being introduced in plants and animals by this technique.

**Q26. What are transgenic plants?**

Plants having foreign DNA incorporated into their cells, are called transgenic plants. Transgenic plants and animals are being produced by introducing the genes for disease resistance and other desirable characters.

**Q27. What is tissue culture technique?**

The growth of a tissue or a cell in artificial culture media is called tissue culture technique. Plants are usually cloned by this technique.

**Q28. What is hydroponic culture technique?**

It is a technique used to test whether a certain nutrient is essential for a plant or not. In this technique the plants are grown in aerated water to which nutrient mineral salts have been added.

Astronauts may use this technique for growing vegetables.

**Q29. What is meant by biological control?**

It is a method in which pests are killed by using some living organism that either competes with the pests or eats them up.

e.g. An aphid that attacks walnut tree is being controlled biologically by a wasp which is parasite of aphid.

**Q30. What are biopesticides?**

A technique in which living organism are used to destroy the pests biologically, termed as biopesticides, e.g. some bacteria are also used as biopesticides.

**Q31. Differentiate between radiotherapy and chemotherapy.****Radiotherapy:**

A method of treatment of cancer in which cancerous parts are exposed to short wave radiations repeatedly at regular intervals. The radiations are obtained from some radioactive material.

**Chemotherapy:**

A method of treatment of cancer in which certain anticancer chemicals are given to the patients at regular intervals. These chemicals may kill both cancerous and normal cells.

**Q32. What is gene therapy?**

Inserting a normal gene into the patient's body for the treatment of a genetic disorder is called gene therapy. The gene is usually introduced through bone marrow.

**Q33. How will you define vaccination?**

The injection of weakened pathogens in the body to produce immunity is called vaccination. It is used to make the people immune from many viral and bacterial epidemics such as polio, whooping cough, measles, mumps etc.

The word "vaccine" comes from Latin "vacca" meaning cow because cowpox virus was earlier used for preventing people against smallpox

**Q34. What is cloning? Write its two advantages.**

Production of genetically identical copies of organisms/cells by asexual reproduction is called cloning.

**Advantages:**

cloning is done to:

- Make multiple copies of desired genotypes of plants and animals e.g. commercial production of valuable animals of known pedigree such as horses.
- Produce identical cattle or other farm animals

Scientists are trying to clone human embryo so that it may act as transplant donor.

**Q35. What important biological work was done in 1997?**

In 1997, Scientists in Scotland succeeded in cloning a sheep. Other mammalian species (mice and cows) have since been cloned.

**Q36. What is meant by integrated disease management?**

Combating a disease using all possible methods of disease control is called integrated disease management, It involves the active participation of community.

**Q37. Define bioremediation.**

Removal of environmental pollutants or toxic materials by living organisms is called bioremediation. Example: Some algae (e.g. Spirogyra) reduces pollution of heavy metals by bioabsorption.

**Q38. What are endangered species? Give an example.**

The species of plants and animals which if not protected would soon become extinct are called endangered species.

In Pakistan, Asian lion and Tiger have been declared endangered species.

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