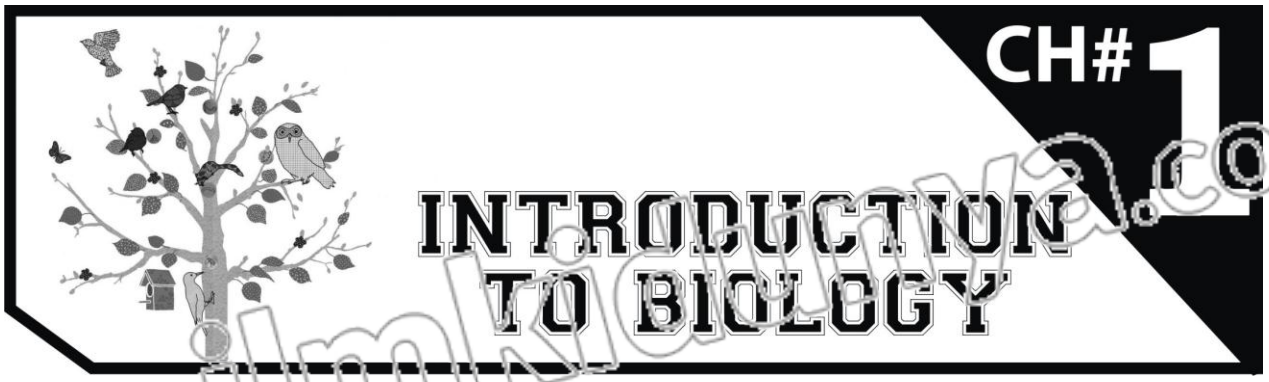


1.1 INTRODUCTION TO BIOLOGY

LONG QUESTIONS

Q.1 Describe divisions of Biology. *(Knowledge Based)* **(SWL 2014, FSD 2015)**

Ans:

DIVISIONS OF BIOLOGY

There are **three** major divisions of biology which study the different aspects of the lives of these groups.

Zoology:

The division of biology that deals with the **study of animals** is called Zoology.

Examples:

- Fishes
- Birds
- Mammals

Botany:

The division of biology that deals with the **study of plants** is called Botany.

Examples:

- Bryophytes
- Angiosperms

Microbiology:

The division of biology that deals with the **study of microorganisms** is called Microbiology.

Example:

- Bacteria
- Viruses

Q.2 Describe different branches of Biology. *(Knowledge Based)* **(LHR 2014, 16, DGK 2015, BWP 2015, SGD 2014, RWP 2015) (Ex Q. No. 3)**

Ans:

BRANCHES OF BIOLOGY

In order to study all aspects of life, Biology is divided in following branches.

Morphology:

The branch of Biology that deals with the **study of form and structures** of living organisms is called morphology.

Anatomy:

The branch of Biology that deals with the **study of internal structure** of living organisms is called anatomy.

Histology:

The branch of Biology that deals with microscopic **study of tissues** is called histology.

Cell Biology:

The branch of Biology that deals with the **study of structures and functions** of cells and cell organelles is called cell biology.

- This branch also deals with the **study of cell division**.

Physiology:

The branch of Biology that deals with the **study of the functions** of different parts of living organisms is called physiology.

Molecular Biology (Biochemistry):

The branch of Biology that deals with the **study of the molecules of life** is called molecular biology.

Examples:

- Water
- Proteins
- Carbohydrates
- Lipids
- Nucleic acids

Genetics:

The branch of Biology that deals with the **study of genes** and their role in **inheritance** is called genetics

Inheritance: The **transmission of characters** from one generation to the other is called inheritance.

Embryology:

The branch of Biology that deals with the **study of development** of an embryo to new individual is called embryology.

Taxonomy:

The branch of Biology that deals with the **study of naming and classification** of organisms into groups and subgroups is called taxonomy.

Palaeontology:

The branch of Biology that deals with the **study of fossils** is called palaeontology.

Fossils: Fossils are the remains of extinct organisms.

Environmental Biology:

The branch of Biology that deals with the **study of the interactions** that exist between the organisms and their environment is called environmental biology.

Parasitology:

The branch of Biology that deals with the **study of parasites** is called parasitology.

Parasites: Parasites are the organisms that take food and shelter from living hosts and, in return, harm them.

Socio-biology:

The branch of Biology that deals with the **study of social behaviour** of the animals that make societies is called socio-biology.

Biotechnology:

The branch of Biology that deals with the **study of the practical application** of living organisms to make substances for the welfare of mankind is called biotechnology.

Immunology:

The branch of Biology that deals with the **study of the immune system of animals**, which defends the body against invading microbes is called immunology.

Entomology:

The branch of Biology that deals with the **study of insects** is called entomology.

Pharmacology:

The branch of Biology that deals with the **study of drugs** and **their effects** on the systems of **human body** is called pharmacology.

Q.3 Describe relationship of Biology to other sciences. *(Knowledge Based)*
(LHR 2014, DGK 2014, MTN 2015, SGD 2015) (Ex Q No. 4)

Ans: **RELATIONSHIP OF BIOLOGY TO OTHER SCIENCES**

Biology includes information on various aspects of living things but these information relate to the other branches of science as well.

Interdisciplinary Sciences:

Each branch of science has **relationships with all other branches**. This forms the basis of interdisciplinary sciences.

Example:

- When studying the process of movement in animals, the biologists have to refer to the laws of motion in physics.

Biophysics:

It deals with the **study of the principles of physics**, which are applicable to biological phenomena.

Example:

- There is a similarity between the working principles of lever in physics and limbs of animals in biology.

Biochemistry:

It deals with the **study of the chemistry of different compounds** and **processes** occurring in living organisms.

Example:

- The study of basic metabolism of **photosynthesis** and **respiration** involves the knowledge of chemistry.

Biomathematics / Biometry:

It deals with the study of biological processes using **mathematical techniques and tools.**

Example:

- To analyze the data gathered after experimental work, biologists have to apply the rules of mathematics.

Biogeography:

It deals with the **study of the occurrence** and **distribution of different species** of living organisms in different geographical regions of the world.

It applies the knowledge of the characteristics of particular geographical regions to determine the characteristics of living organisms found there.

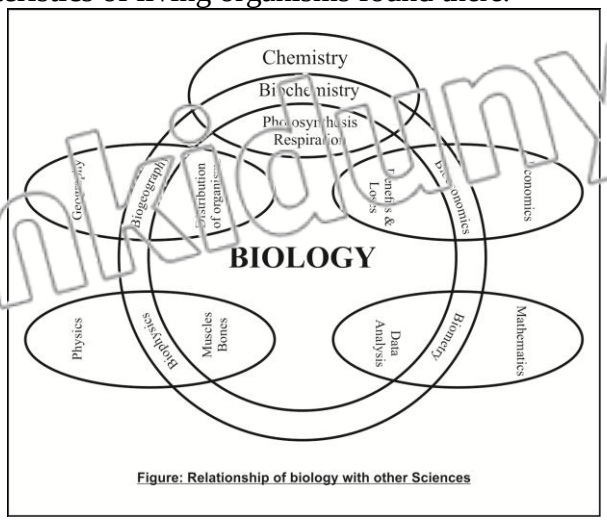


Figure: Relationship of biology with other Sciences

Bioeconomics:
It deals with the **study of the organisms from economical** point of view
Example:
- The cost value and profit value of the yield of wheat can be calculated through bioeconomics and benefits or losses can be determined.

Q.4 Write a note on careers in Biology. ***(Knowledge Based)***
(LHR 2015, MTN 2014, DGK 2014, RWP 2014)

Ans: **CAREERS IN BIOLOGY**

It is essential that students of today, who will occupy positions of leadership tomorrow, have the background of the modern and forward-looking branches of science.
Advantage:
An accurate and modern knowledge of biology, would promote a comprehension of both science and scientific research projects, which would benefit the learners in diverse list of careers.
The following are the careers that a student of biology can plan to adopt.
Medicine / Surgery:
The profession of medicine **deals with the diagnosis** and **treatment of diseases** in human. In surgery, the parts of the body may be repaired, replaced or removed.
Examples:
- The removal of stones through renal surgery
- Transplantation of kidney, liver etc.

Professional Courses:
Both these professions are **studied in the same basic course** (MBBS) and then students go for specializations.
Fisheries:
The professional **study of fish production** is called fisheries.
Departments in Pakistan:
There are departments in Pakistan where professionals of fisheries are employed. They **serve for enhancing the quality** and **quantity of fish production.**
Adoptation of Profession:
In Pakistan, this profession can be adopted after the bachelor or masters level **study of zoology and fisheries.**
Agriculture:
This profession **deals with the food crops** and **animals** which are the source of food.
Scope of Agriculture:
An agriculturist works for the **betterment of crops like wheat, rice, corn etc** and animals, like buffalo, cow etc. from which we get food.
Professional Courses:
In Pakistan, there are many universities which offer professional courses on agriculture **after the higher secondary education in biology.**
Animal Husbandry:
It is the branch of agriculture concerned with the **care** and **breeding** of domestic animals (livestock) e.g. cattle, sheep etc.
Professional Courses:
Professional courses in animal husbandry can be adopted after the higher secondary education in biology.
Horticulture:
This profession includes the **art of gardening**.

Role of Horticulturist:

A horticulturist works for the **betterment of existing varieties** and for the production of **new varieties** of ornamental plants and fruit plants.

Biology students can adopt this profession after their higher secondary education.

Farming:

It deals with the development and maintenance of different types of farms.

Examples:

- In some farms, animal breeding technologies are used for the production of animals which are better protein and milk source.
- In poultry farms, chicken and eggs are produced.
- In fruit farms, different fruit yielding plants are grown.

Adoptation of Profession:

A student who has gone through the professional course of agriculture, animal husbandry or fisheries etc can adopt this profession.

Forestry:

In forestry, professionals **look after natural forests** and advise to the government for planting and growing artificial forests.

Professional Courses:

Many universities offer professional courses in forestry after the higher secondary education in biology or after bachelor level study of zoology and botany.

Biotechnology:

It is the latest profession in the field of biology. Biotechnologists **study and work for the production of useful products** through **microorganisms.**

Professional Courses:

Many universities offer courses in biotechnology after the higher secondary education in biology and after the bachelor level study of botany and zoology.

Q.5 Write Quranic Verses and their translation about the origin and characteristics of living organisms. ***(Understanding Based)***

Ans:

QURAN AND BIOLOGY

At many places in Holy Quran, Allah hints about the **origin and characteristics** of **living organisms.** In the same verses human beings have been instructed to expose the unknown aspects of life, after getting the hints.

Here are few examples of such guidelines.

Verse:

وَجَعَلْنَا مِنَ الْمَآءِ كُلَّ شَيْءٍ حَيٍّ

Translation:

"We made every living thing from water."

(Sura: Ambia, Verse: 30)

Verse:

خَلَقَ الْإِنْسَانَ مِنْ صَلْصَالٍ كَالْفَخَّارِ

Translation:

"He made man from clay like the potter."

(Sura: Rehman, Verse: 14)

Verse:

ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ عِظٰمًا فَكَسَوْنَا الْعِظٰمَ لَحْمًا

Translation:

"Then fashioned We the drop a clot, then fashioned, We the clot a little lump, then fashioned We the little lump bones, then clothed the bones with flesh."

(Sura: Al-Momineon, Verse: 14)

Verse:

وَاللّٰهُ خَلَقَ كُلَّ دَآبَّةٍ مِّنْ مَّآءٍ ۚ فَمِنْهُمْ مَّنْ يَّمْشِيْ عَلٰي بَطْنِهٖ ۚ وَمِنْهُمْ مَّنْ يَّمْشِيْ عَلٰي رِجْلَيْنِ ۚ وَمِنْهُمْ مَّنْ يَّمْشِيْ عَلٰي اَرْبَعٍ ۭ يَخْلُقُ اللّٰهُ مَا يَشَآءُ ۭ اِنَّ اللّٰهَ عَلٰي كُلِّ شَيْءٍ قَدِيْرٌ ـــ

Translation:

"Allah hath created every animal from water. Then some of them creep up over their bellies, others walk on two legs, and others on four. Allah creates what He pleases."

(Sura: Al-Nur, Verse: 45)

Conclusion:

Quran hints not only at the origin and development of life but also at many characteristics of living organisms. Scientists reveal such mechanisms.

Q.6 Describe contribution of Muslim scientists in the field of Biology. ***(Knowledge Based)***

(GRW 2015, LHR 2016, SWL 2014, SGD 2014)

Ans:

MUSLIM SCIENTISTS

Muslim scientists have made great contributions to the study of science and we are aware of their success in different fields of science. The work of Jabir Bin Hayan, Abdul Malik Asmai and Bu Ali Sina in the development of the present day knowledge of plants and animals is as follow.

JABIR BIN HAYAN

Period:

He was born in **721 AD** and died in **815 AD.**

Birth Place:

He was born in Iran.

Practice:

He practiced medicine in Iraq.

Contribution:

He introduced experimental research in chemistry

Famous Books:

He also wrote a number of books on plants and animals. His famous books are:

- "Al-Nabatat"
- "Al-Haywan".

ABDUL MALIK ASMAI

Period:

He was born in **740 AD** and died in **828 AD.**

Contribution:

He is considered the first Muslim scientist who studied animals in detail.

Famous Books:

His famous writings include:

- "Al-Abil (camel)"
- "Al-Khail (horse)"
- "Al-Wahoosh (animal)"
- "Kalq al-ansan"

BU ALI SINA

Period:

He was born in 930 AD and died in 1037 AD.

Founder of Medicine:

He is honoured as the founder of medicine and **called as Avicenna** in the West.

Specializations:

He was a physician, philosopher, astronomer and poet.

Famous Book:

One of his books "AI-Qanun-fi al-Tib" is known as the **canon of medicine** in West.

SHORT QUESTIONS (Topic 1.1)

Q.1 What is Science? ***(K.B)*** **(RWP 2014)**

Ans: **SCIENCE**

"Science is the study in which observations are made, experiments are done and logical conclusions are drawn in order to understand principles of nature."

Q.2 What are the thoughts of Dr. Abdus Salam about science? ***(K.B)***

Ans: **THOUGHTS OF DR. ABDUS SALAM ABOUT SCIENCE**

According to Dr. Abdus Salam,

"Scientific Knowledge is common heritage of mankind."

Q.3 Define Biology and write also its meaning and derivation. ***(K.B)*** **(BWP 2015)**

Ans: Biology

Definition

"Biology is the scientific study of life"

The word biology has been derived from two Greek words

"Bios" meaning "Life"

"Logos" meaning "Thought or reasoning"

Q.4 What is the benefit of the study of living things? ***(A.L)***

Ans: **BENEFIT OF THE STUDY OF LIVING THINGS**

To understand and appreciate nature, it is essential to study the structures, functions and related aspects of living organisms. The study of living organisms provides information and remedies to human problems regarding:

- Health
- Food
- Environment

Q.5 What is difference between zoology and botany? ***(K.B)*** **(BWP2013, LHR 2013, 2015, DGK 2014)**

Ans: **DIFFERENTIATION**

The differences between zoology and botany are as follow:

Zoology	Botany
Definition	
• The division of Biology that deals with the study of animals is called zoology.	• The division of Biology that deals with the study of plants is called botany.
Examples	
• All invertebrates • Fishes • Birds • Mammals	• Bryophytes • Ferns • Gymnosperms • Angiosperms

Q.6 How would you differentiate between morphology and anatomy? ***(U.B)*** **(LHR 2015, DGK 2015)**

Ans: **DIFFERENTIATION**

The difference between morphology and anatomy is as follows:

Morphology	Anatomy
• The branch of Biology that deals with the study of form and structures of living organisms is called morphology.	• The branch of Biology that deals with study of internal structure of living organisms is called anatomy.

Q.7 Define molecular biology. ***(K.B)*** **(SGD 2014)**

Ans: Page no 2.

Q.8 Define morphology. ***(K.B)*** **(GRW 2012)**

Ans: Page no 2.

Q.9 What is difference between genetics and inheritance? ***(K.B)***

Ans: **DIFFERENTIATION**

The difference between genetics and inheritance is as follows:

Genetics	Inheritance
• The study of genes and their role in inheritance is called genetics.	• The transmission of characters from one generation to another is called inheritance.

Q.10 What is cell Biology? ***(K.B)*** **(GRW 2013)**

Ans: Page no 2.

Q.11 Define embryology. ***(K.B)*** **(GRW 2013)**

Ans: Page no 3.

Q.12 What are fossils? ***(U.B)*** **(GRW 2013, SGD 2014)**

Ans: Page no 3.

Q.13 What are parasites? Give examples. ***(U.B)*** **(LHR 2013, RWP 2015, FSD 2014)**

Ans: Page no 3.

Q.14 Define biotechnology. ***(K.B)*** **(LHR 2013, 2014, 2015, 2016, SWL 2015)**

Ans: Page no 3.

Q.15 What do you know about pharmacology? ***(U.B)***

Ans: Page no 3.

Q.16 What are the major biological issues of today? *(A.B)*
(RWP 2014, SWL 2014, GRW 2014, MTN 2015)

Ans: **MAJOR BIOLOGICAL ISSUES**

The major biological issues of today are as follow:

- Human population growth
- Infectious diseases
- Addictive drugs
- Environmental pollution

Q.17 What is interdisciplinary sciences? *(K.B)*
Ans: Page no 4.
Q.18 Describe relationship of Biology to other sciences. *(K.B)* **(LHR 2014, DGK 2014, MTN 2015, SGD 2015)**
Ans: Page no 4.
Q.19 What is meant by biophysics? *(K.B)* **(GRW 2012, BWP 2015, SGD 2015)**
Ans: Page no 4.
Q.20 Define biochemistry. *(K.B)* **(LHR 2014, SGD 2015)**
Ans: Page no 4
Q.21 What is meant by biogeography? *(K.B)* **(GRW 2015)**
Ans: Page no 4.
Q.22 Define biometry. *(K.B)*
Ans: Page no 4.
Q.23 Define bioeconomics. *(K.B)*
Ans: Page no 5.
Q.24 Define agriculture and discuss role of an agriculturist. *(A.B)*
Ans: Page no 5.
Q.25 What do you know about horticulture? *(K.B)* **(LHR 2013, SWL 2014, RWP 2015)**
Ans: Page no 6.
Q.26 Name the professions that can be adopted after bachelor levels of zoology. *(U.B)*
Ans: Page no 5.
Q.27 What is farming? Give examples of different farms. *(A.B)*
Ans: Page no 6.
Q.28 Name any four careers in biology. *(K.B)*
Ans: Page no 6.
Q.29 Quote a verse from Holy Quran that hints at common origin of all living things. *(K.B)*
Ans: Page no 6.
Q.30 Organisam are created in which fashion? *(K.B)*
Ans: Page no 7.
Q.31 In which Surah Quran Versties about the diversity of life? *(K.B)*
Ans: Page no 7.
Q.32 What are the contributions of Abdul Malik Asmai in field of science? *(A.B)*
(LHR 2012, SGD 2014)
Ans: Page no 7.
Q.33 Describe the services of Jabir Bin Hayan. Also give names of his two famous books. *(A.B)*
(GRW 2013, MTN 2014, BWP 2014, MTN 2015, DGK 2015)
Ans: Page no 7.

Q.34 Name the books written by following scientists. *(K.B)* **(LHR 2012)**

(a) Jabir Bin Hayan
(b) Abdul Malik Asmai
(c) Bu Ali Sina

Ans: Page no 7.

Q.35 What is role of Bu Ali Sina in Biology? *(K.B)* **(SGD 2015, FSD 2015, SGD 2014, LHR 2016)**

Ans: Page no 7.

MULTIPLE CHOICE QUESTIONS

1. Science is the study that includes: *(K.B)*

(A) Observation (B) Experiments
(C) Both A and B (D) None of these

2. Scientific study of living organisms is called: *(K.B)* **(DGK 2015, LHR 2016)**

(A) Biotechnology (B) Chemistry
(C) Biology (D) Geology

3. Word "Biology" has been derived from: *(K.B)* **(FSD 2014, RWP 2015)**

(A) English (B) Greek
(C) Italian (D) French

4. The word "Logos" means: *(K.B)*

(A) Thought (B) Reasoning
(C) Both A and B (D) None of these

5. The division of Biology that deals with study of plants is called: *(K.B)*

(A) Botany (B) Microbiology
(C) Anatomy (D) Zoology

6. The division of Biology that deals with study of animals is called: *(K.B)*

(A) Botany (B) Microbiology
(C) Anatomy (D) Zoology

7. The branch of Biology that deals with the study of form and structures of living organism is called: *(K.B)*

(A) Morphology (B) Anatomy
(C) Histology (D) Cell biology

8. The microscopic study of tissues: *(K.B)* **(DGK 2014, MTN 2014, BWP 2015, LHR 2016)**

(A) Palaeontology (B) Pharmacology
(C) Entomology (D) Histology

9. Histology is the scientific study of: *(K.B)* **(LHR 2015)**

(A) Tissues (B) Muscles
(C) Cells (D) Organs

10. The study of the functions of different parts of living organisms is called: *(A.B)* **(MTN 2015)**

(A) Morphology (B) Anatomy`
(C) Histology (D) Physiology

11. The study of structure and functions of cells and cell organelles is: *(K.B)*

(A) Histology (B) Anatomy
(C) Cell Biology (D) Palaeontology

12. The study of internal structure is called: *(A.B)* **(RWP 2014, 2015, SWL 2014, GRW 2014)**
(A) Morphology (B) Physiology
(C) Anatomy (D) Cell Biology

13. The study of inheritance is called: *(K.B)*
(A) Embryology (B) Genetics
(C) Zoology (D) Physiology

14. The study of genes and their roles in inheritance is called: *(K.B)* **(SGD 2014)**
(A) Histology (B) Anatomy
(C) Genetics (D) Inheritance

15. The study of remains of extinct organisms: *(K.B)*
(A) Taxonomy (B) Palaeontology
(C) Biotechnology (D) Entomology

16. The study of fossils is called: *(A.B)* **(SGD 2015, GRW 2015, LHR 2014, BWP 2014)**
(A) Immunology (B) Pharmacology
(C) Palaeontolgy (D) Parasitology

17. Molecular biology is also known as: *(U.B)*
(A) Biometry (B) Bioeconomics
(C) Biochemistry (D) Biogeography

18. The branch of Biology that deals with the study of social behaviour of the animals that make societies: *(U.B)*
(A) Socio-biology (B) Parasitology
(C) Entomology (D) Immunology

19. Study of insects is called: *(K.B)* **(MTN 2015, SWL 2015, LHR 2012)**
(A) Immunology (B) Embryology
(C) Histology (D) Entomology

20. Study of occurrence and distribution of living organisms in different regions of world: *(K.B)*
(A) Biochemistry (B) Biogeography
(C) Biometry (D) Entomology

21. Take food and shelter from living host and harm them: *(U.B)*
(A) Plants (B) Insects
(C) Worms (D) Bacteria

22. The cost and profit value of yield of wheat crop can be calculated through. *(A.B)*
(A) Biogeography (B) Bioeconomics
(C) Biophysics (D) Biometry

23. The chemical reaction occurring in living organisms are studied under: *(K.B)*
(A) Biogeography (B) Biochemisty
(C) Biophysics (D) Biometry

24. The branch of biology that deals with process of movement of muscles in animals: *(A.B)*
(A) Biogeography (B) Biochemisty
(C) Biophysics (D) Biometry

25. Agriculture deals with all except *(K.B)*
(A) Food crops (B) Crow
(C) Fish (D) buffalo

26. The art of gardening: *(A.B)*
(A) Agriculture (B) Forestry
(C) Horticulture (D) Animal Husbandry

27. The care and breeding of livestock is dealt in: *(A.B)*
(A) Agriculture (B) Forestry
(C) Horticulture (D) Animal Husbandry

28. Professional look after natural forest and advises to the government for planting and growing artificial forest is regarded to: *(A.B)*
(A) Farming (B) Forestry
(C) Biotechnology (D) Biometry

29. Profession dealing with production of useful products through micro-organisms: *(A.B)* **(GRW 2013)**
(A) Microbiology (B) Animal Husbandry
(C) Biotechnology (D) Biochemistry

30. "He made man from clay like the potter". The verse is taken from: *(K.B)*
(A) Sura Ambia (B) Sura Rehman
(C) Sura Al-Mominoon (D) Sura Al-Nur

31. The Surah of Quran which verifies classification is: *(K.B)* **(GRW 2014)**
(A) Baqra (B) Al-Nur
(C) Quresh (D) Yasin

32. Date of birth of Jaber Bin Hayan: *(K.B)* **(LHR 2014)**
(A) 740 AD (B) 980 AD
(C) 721 AD (D) 815 AD

33. Book written by Bu Ali Sina: *(K.B)* **(SGD 2015)**
(A) Al-Nabatat (B) Al-Wahoosh
(C) Al-Qanun-fi al-Tib (D) Origin of Species

34. By what name Bu Ali Sina is famous in Europe? *(K.B)*
(A) Botanist (B) Poet
(C) Avicenna (D) Philosopher

35. The name of writer of "Al-Qanun-fi al-Tib" is: *(K.B)* **(GRW 2015, BWP 2015)**
(A) Bu Ali Sina (B) Al-Jahiz
(C) Abu Usman (D) Aristotle

36. Al-Nabatat and Al-Haywan are written by: *(K.B)*
(A) Bu Ali Sina (B) Abdul Malik Asmai
(C) Jaber Bin Hayan (D) Al-Khwarzimi

37. Date of death of Bu Ali Sina: *(K.B)*
(A) 815 AD (B) 828 AD
(C) 740 AD (D) 1037 AD

38. The famous book "Al-Abi" is written by: *(K.B)* **(LHR 2014)**
(A) Jabir Bin Hayan (B) Abdul Malik Asmai
(C) Darwin (D) Bu Ali Sina

39. The founder of medicine is: *(K.B)* **(SGD 2014, LHR 2016)**
(A) Jabir bin Hayan (B) Abdul Malik
(C) Bu Ali Sina (D) Al-Beruni

40. Birth place of Jabir Bin Hayan: *(K.B)* **(RWP 2015, FSD 2014, LHR 2016)**
(A) Iran (B) Iraq
(C) Nepal (D) Syria

1.2 THE LEVELS OF ORGANIZATION

LONG QUESTIONS

Q.1 Write a note on subatomic and atomic level. *(Knowledge Based)*

Ans: **SUBAT Review Questions**

OMIC AND ATOMIC LEVEL

Elements:

All types of matter are made up of elements.

Atom:

Each element contains a single kind of atoms.

Meaning of Atom:

The word atom means: ('a': not, 'tom': cut)

Subatomic Particles:

These atoms are actually made up of many subatomic particles.

The most stable subatomic particles are:

- Electrons
- Protons
- Neutrons

Bioelements:

The elements which take part in the **formation of body mass** of living organisms are called bioelements.

Number:

Out of the **92 kinds** of elements that occur in nature, **16 are called bioelements**.

Out of these bioelements;

- Only six (O, C, H, N, Ca and P) make 99% of the total mass.
- Other ten (K, S, CI, Na, Mg, Fe, Cu, Mn, Zn and I) collectively make 01% of the total mass.

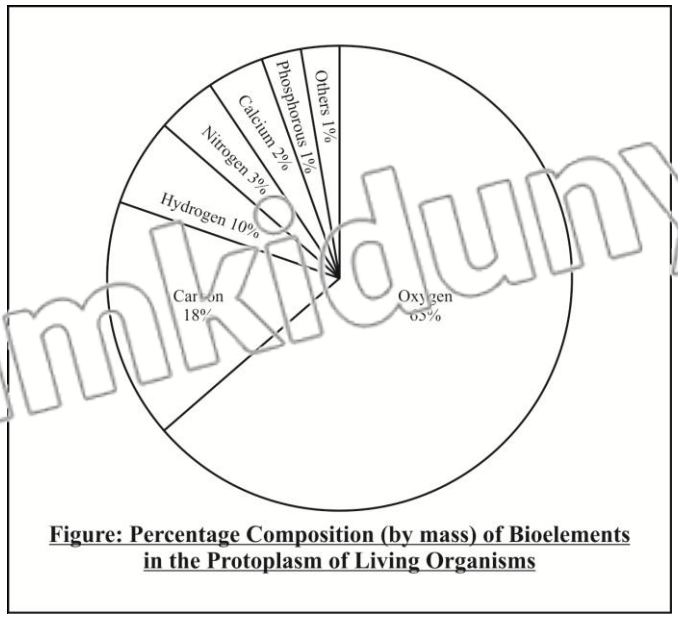


Figure: Percentage Composition (by mass) of Bioelements in the Protoplasm of Living Organisms

Q.2 Write a note on molecular level. *(Knowledge Based)* **(Ex Q. No. 5)**

Ans:

MOLECULAR LEVEL

Molecule:

"The **smallest part** of a **compound** that **retains the properties** of that compound is called a molecule."

Biomolecule:

In organisms, bioelements usually do not occur in isolated forms rather they combine through ionic or covalent bonding. **The stable particle formed by such bonding is called as biomolecule.**

Building Materials:

An organism is **formed by enormous number of biomolecules of hundreds of different types**. These molecules are the building material and are themselves constructed in great **variety and complexity due to specific bonding arrangements.**

Types of Biomolecules:

Biomolecules are **classified as micromolecules and macromolecules.**

Micromolecules:

Micromolecules are with **low molecular weight**.

Examples:

- **Glucose**
- **Water**

Macromolecules:

Macromolecules are **with high molecular weights.**

Examples:

- **Starch**
- **Proteins**
- **Lipids**

Q.3 Write a note on organelle and cell level. *(Knowledge Based)* **(GRW 2014, FSD 2014) (Ex Q. No. 6)**

Ans:

ORGANELLE AND CELL LEVEL

Organelles:

Biomolecules **assemble** in a **particular way** and form organelles.

Cell:

The organelles are actually **sub-cellular** structures and when they **assemble together** units of life i.e. cells are formed.

Division of Labour:

Each type of organelle is specialized to perform a specific function.

Examples:

- Mitochondria are specialized for cellular respiration.
- Ribosomes are specialized for protein synthesis.

Functions of the cell are accomplished by these specialized structures. It is an example of the division of labour within the cell.

Prokaryotes and Protists:

In the case of prokaryotes and most protists, the entire organism consists of a single cell.

Eukaryotes:
In the case of most fungi, all animals and all plants, the organism consists of up to trillions of cells.

Q.4 Write a note on tissue level. *(Knowledge Based)* **(BWP 2014) (Ex Q. No. 6)**

Ans: **TISSUE LEVEL**

Definition:
"A group of **similar cells** specialized for the performance of a **common function** is called as tissue."

Formation:
In multicellular organisms, similar cells performing similar functions are organized into groups to form tissue.

Functions:
Each cell in a tissue carries on its own life processes, like:

- Cellular respiration
- Protein synthesis

It also carries on some special processes related to the function of the tissue.

Examples:

- **Plant Tissues:** Epidermal tissue and ground tissue
- **Animal Tissues:** Nervous tissue and muscular tissue

Q.5 Write a note on organ and organ system level. *(Knowledge Based)* **(BWP 2015, SGD 2015)**

Ans: **ORGAN LEVEL**

Organ:
In higher multicellular organisms, particularly in animals, **more than one type of tissues** having **related functions** are organized together and make a unit, called organ.

Function:
Different tissues of an organ perform their specific functions and these functions collectively become the functions of that organ.

Example:

- Stomach is an organ specialized for the digestion of proteins and for storing food.

Types of Tissue:
Two major types of tissues are present in its structure.

(i) Epithelial (Glandular) Tissue:
The glandular tissue secretes the gastric juice for the digestion of proteins.

(ii) Muscular Tissue:

- Performs contractions of stomach walls for grinding of food
- Moving food to posterior end.

These two tissues perform their specific functions, which collectively become the function of stomach.

ORGAN SYSTEM LEVEL

Formation:

Different **organs performing related functions** are organized together in the form of an organ system.

Function:

In an organ system, each organ carries out its specific function and the functions of all organs appear as one process of the organ system.

Example:

- Digestive system is an organ system that carries out the process of digestion.

Major Organs:

Major organs in its framework are:

- Oral cavity
- Stomach
- Small intestine
- Large intestine
- Liver
- Pancreas

Organ System in Plants:

The organ system level is less complex in plants as compared to animals.

Reason:

The less complexity of organ system level in plants is due to a greater range of functions and activities in animals than in plants.

Q.6 Write a note on following.

(a) Individual Level (b) Population Level

(c) Community Level (d) Biosphere Level

Ans:

(a) INDIVIDUAL LEVEL

Formation:

Different **organs and organ systems are organized together** to form an individual or organism.

Coordination:

In organism, the functions, processes and activities of various organs and organ systems are coordinated.

Example:

- When a man is engaged in continuous and hard exercise, not only his muscles are working but also there is an increase in the rate of respiration and heart beat. This accelerated rate of respiration and heart beat supplies more oxygen and food to the muscles which they need for continuous work.

(b) POPULATION LEVEL

Biologists extend their studies to the population level where they study interactions among members of the same species living in the same habitat.

Definition:

"A group of organisms of the **same species located at the same place** in the **same time** is called population."

Example:

- According to Ministry of Population Welfare, Government of Pakistan, human population in Pakistan in 2010 comprises of 173.5 million individuals.

(c) COMMUNITY LEVEL **(LHR 2013)**

Definition:

"An **assemblage of different populations,** interacting with one another within the same environment is called community."

Example:

- A forest may be considered as a community. It includes different plants, microorganisms, fungi and animal species.

Change in Population:

Communities are collections of organisms, in which one population may increase and others may decrease.

Effect of Change:

Any change in biotic or abiotic factors may have drastic and long lasting effects.

Types of Community:

Following are the types of community:

(i) Complex Community:

Some communities are complex

Examples:

- A forest community
- A pond community

(ii) Simple Community:

In a simple community **number and size** of populations is **limited**. Some communities may be simple.

Example:

- A fallen log with various populations under it.

(d) BIOSPHERE LEVEL

Definition:

"The **part of the earth inhabited by organisms'** communities is known as biosphere."

- It constitutes all ecosystems.

Zone of Life:

Biosphere is called zone of life on earth.

Ecosystem

"The area where the **living organisms interact with the nonliving components** of environment is called as ecosystem."

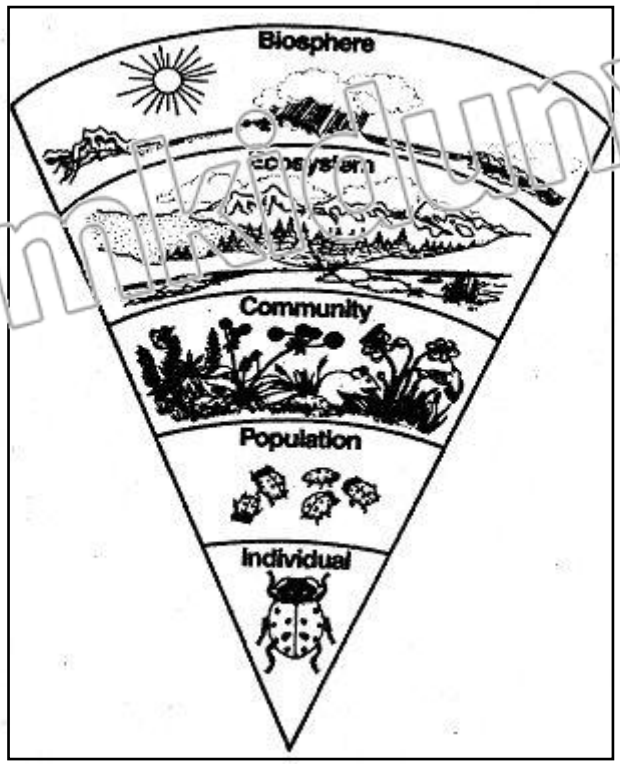


Figure: Levels of Organization

Q.7 Write a note on cellular organizations. *(Knowledge Based)*

Ans: **CELLULAR ORGANIZATIONS**

Major Groups of Organisms:

All organisms have been divided into five major groups:

- Prokaryotes
- Protists
- Fungi
- Plants
- Animals

Types of Cells:

All organisms are made up of cells. There are two basic types of cells:

- Prokaryotic cells
- Eukaryotic cells

Types of Cellular Organization:

In living organisms the cells organize in three ways to make the bodies of organisms.

i. Unicellular organization
ii. Colonial organization
iii. Multicellular organization

i. Unicellular Organization:

The organisms formed through unicellular organization are called as unicellular organisms. In unicellular organisms, **only one cell makes the life of an organism**. All the life activities are carried out by the only cell.

Examples:

- *Amoeba*
- *Paramecium*
- *Euglena*

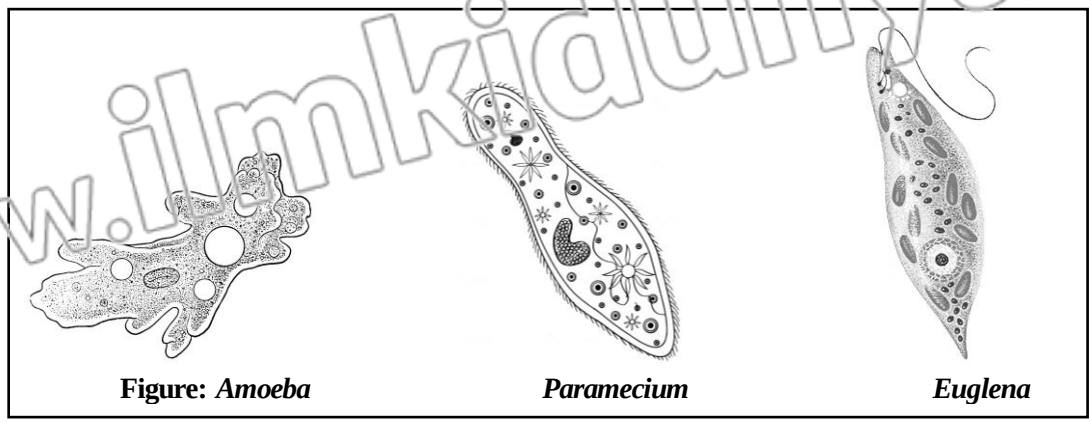


Figure: ***Amoeba*** ***Paramecium*** ***Euglena***

ii. Colonial Organization:

No Division of Labour:

In colonial type of cellular organization many unicellular organisms live together but do not have any division of labour among them.

Independent Life:

Each unicellular organism in a colony lives its own life and does not depend on other cells for its vital requirements.

Example:

- *Volvox* is a green alga found in water that shows colonial organization. Hundreds of *Volvox* cells make a colony

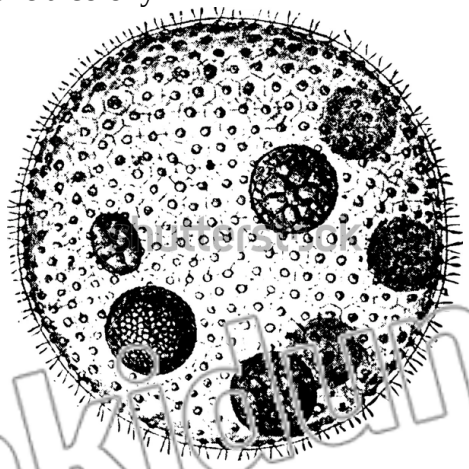


Figure: ***Volvox*** **colony**

iii. Multicellular Organization:

In multicellular organization **cells are organized in the form of** tissues, organs and organ systems

Examples:

- Mustard plant
- Frog

MUSTARD PLANT

Botanical Name:

The botanical name of mustard plant is *Brassica campestris.*

Cultivation Time:

Mustard plant is **sown in winter** and it produces seeds at the end of winter.

Uses:

- The plant body is used as vegetable.
- Its seeds are used for extracting oil.

Types of Organs:

The organs of the body can be divided into two groups on the basis of their functions.

Vegetative Organs:

"The organs which do not take part in the sexual reproduction of the plant are called vegetative organs."

Examples:

- Root
- Stem
- Branches
- Leaves

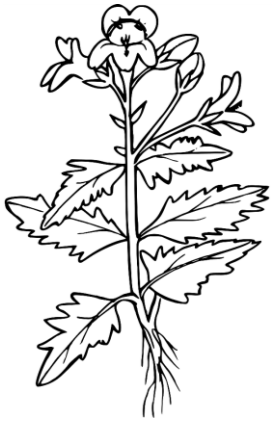


Figure: Mustard Plant

Reproductive Organs:

"The organs which take part in sexual reproduction and produce fruits and seeds are called reproductive organs."

Example:

- Flowers

FROG

Zoological Name:

The zoological name of frog is *Rana tigrina.*

Organization:

Frog shows the multicellular organization.

Organ Systems:

The body is made of organ systems and each organ system consists of related organs. All the organs are made of specific tissues:

- Epithelial
- Glandular

- Muscular
- Nervous

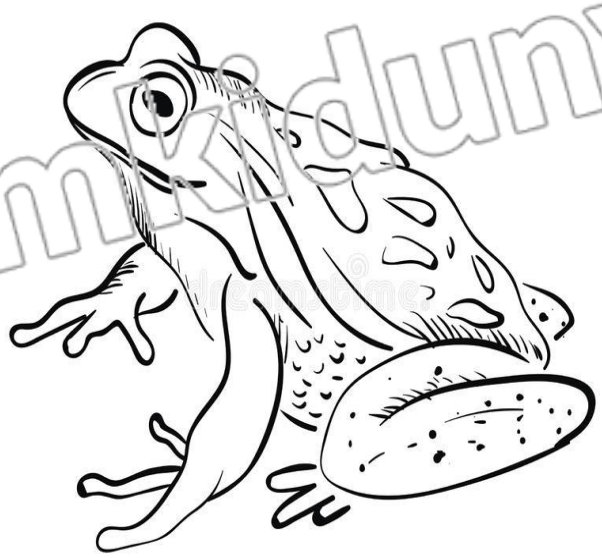


Figure: Frog

SHORT QUESTIONS (Topic 1.2)

Q.1 Define an atom and also tell its meaning. ***(K.B)***

Ans:

ATOM

Definition:

"The simplest form of matter which cannot be further sub divided is called as an atom".

Meaning:

'a' means not and **'tom'**means cut

Composition:

It is composed of three fundamental particles:

- Electrons
- Protons
- Neutrons

Q.2 Define bioelements and enlist them. ***(K.B)*** **(DGK 2014, SWL 2015, GRW 2015)**

Ans: Page no 14.

Q.3 What is a biomolecule? ***(K.B)***

Ans: Page no 15.

Q.4 Write down names of biomolecules groups. ***(K.B)*** **(LHR 2016)**

Ans: Page no 15.

Q.5 Differentiate between micromolecule and macromolecule. ***(K.B)*** **(RWP 2015, SGD 2015)**

Ans:

DIFFERENTIATION

The differences between micromolecule and macromoleucle are as follow:

Micromolecule	Macromolecule
Definition	
• The biomolecule with low molecular weight is called micromolecule.	• The biomolecule with high molecular weight is called macromolecule
Examples	
• Glucose • Water	• Starch • Proteins • Lipids

Q.6 Explain macromolecules with example. ***(K.B)*** **(SGD 2014, LHR 2014)**

Ans: Page no 15.

Q.7 What is the difference between organelle and cell? ***(K.B)***

Ans: **DIFFERENTIATION**

The difference between organelle and cell are as follows:

Organelle	Cell
Definition	
Biomolecules assemble in a particular way and form organelles	The organelles are actually sub-cellular structures and when they assemble together, cells are formed.
Examples	
• Mitochondria • Ribosomes	• Animal cell • Plant cell

Q.8 Define tissue and give examples. ***(K.B)*** **(BWP 2015)**

Ans: Page no 16.

Q.9 What is meant by organ system? ***(K.B)*** **(LHR 2014)**

Ans: Page no 16.

Q.10 What is the difference between organ system level of animals and plants? ***(K.B)***

Ans: **DIFFERENTIATION**

The differences between organ system level of are as follow:

Animals	Plants
Complexity	
In animals, the organ system level is more complex.	In plants, the organ system level is less complex.
Functions	
Greater range of functions and activities.	Lesser range of functions and activities.

Q.11 Define Population. ***(K.B)***

Ans: Page no 17.

Q.12 Define Community. ***(K.B)***

Ans: Page no 18.

Q.13 Differentiate between Complex and Simple community. ***(U.B)***

Ans: Page no 18.

Q.14 Define Zone of life. ***(U.B)***

Ans: Page no 18.

Q.15 Name the types of cellular organizations. ***(K.B)***

Ans: Page no 19.

Q.16 Name any four unicellular organisms ***(K.B)*** **(GRW 2014, FSD 2015)**

Ans: **NAMES OF UNICELLULAR ORGANISMS**

The names of unicellular organisms are given below:

- *Amoeba*
- *Paramecium*
- *Euglena*
- Bacterium

Q.17 Describe colonial type of cellular organization with example. ***(K.B)*** **(LHR 2013, GRW 2014)**

Ans: Page no 20.

Q.18 What is multicellular organization? Explain with an example. *(K.B)* **(GRW 2013)**

Ans: Page no 20.

Q.19 Write down scientific names of mustard plant and frog. *(K.B)*

(LHR 2012, SWL 2014, SGD 2014, BRW 2015)

Ans: Page no 21.

Q.20 Write the importance of mustard plant. *(A.B)* **(DGK 2015, MTN 2015)**

Ans: Page no 21.

Q.21 Write the uses of mustard plant? *(A.B)*

Ans: Page no 21.

Q.22 What is difference between vegetative and reproductive organs of plants? *(U.B)*

(RWP 2015)

Ans:

DIFFERENTIATION

The differences between vegetative and reproductive organs of plants are as follow:

Vegetative Organs	Reproductive Organs
Definition	
The organs which do not take part in the sexual reproduction of the plant are called vegetative organs.	The organs which take part in the sexual reproduction of the plant and produce fruits and seeds are called reproductive organs.
Examples	
• Root • Stem • Branches • Leaves	• Flowers

Q.23 Name the levels of organization in correct order. *(K.B)*

Ans:

LEVELS OF ORGANIZATION

The levels of organization in correct order are as follow:

- Subatomic and atomic level
- Molecular level
- Organelle and cell level
- Tissue level
- Organ and organ system level
- Individual level
- Population level
- Community level
- Biosphere level

Q.24 What is biosphere level? *(K.B)* **(BWP2014, DGK 2014, SWL 2015, RWP 2015)**

Ans: Page no 20.

MULTIPLE CHOICE QUESTIONS

1. Total number of elements that occur in nature: *(K.B)* **(SGD 2014, DGK 2014, 2015)**

(A) 90 (B) 92

(C) 80 (D) 83

2. Elements that take part in making body mass of a living organisms: *(K.B)*

(A) 15 (B) 18

(C) 16 (D) 17

3. Percentage composition of water in protoplasm of all living things: *(K.B)*

(A) 50-60% (B) 60-70%

(C) 70-80% (D) 80-90%

4. The highest percentage of element present in human body: *(K.B)*

(A) Nitrogen (B) Carbon

(C) Oxygen (D) Hydrogen

5. Percentage composition of oxygen in the protoplasm of living organisms: *(K.B)*

(A) 31% (B) 65%

(C) 77% (D) 43%

6. Percentage composition of hydrogen in the protoplasm of living organisms: *(K.B)*

(A) 10% (B) 20%

(C) 30% (D) 40%

7. Protons and neutrons are included in_____ level. *(U.B)*

(A) Atomic (B) Molecular

(C) Organelle (D) Subatomic

8. Which one of the following is a macromolecule? *(U.B)* **(SGD 2015, SWL 2015)**

(A) Glucose (B) Water

(C) Hydrogen (D) Starch

9. Which of the following is a micromolecule? *(U.B)*

(A) Starch (B) Protein

(C) Lipid (D) Glucose

10. In how many groups biomolecules are divided? *(K.B)* **(DGK 2015)**

(A) Two (B) Three

(C) Four (D) Five

11. Biomolecules assemble in a particular way and form: *(U.B)*

(A) Cell (B) Organ

(C) Tissue (D) Organelle

12. Which level of organization is not visible in plants? *(U.B)* **(RWP 2015)**

(A) Individual Level (B) Organ system level

(C) Organ (D) Tissue

13. An example of plant tissue: ***(K.B)***

(A) Ground tissue (B) Muscular tissue

(C) Nervous tissue (D) Connective tissue

14. Similar cells organized into groups and performing same function are known as: ***(K.B)***

(MTN 2015, LHR 2012)

(A) Organelle (B) Tissue

(C) Organ system (D) Organ

15. Stomach consists of: ***(K.B)***

(A) Epithelial Tissue (B) Muscular tissue

(C) Both A and B (D) Connective tissue

16. Members of the same species living in same place are called: ***(K.B)***

(SWL 2014, GRW 2014, LHR 2015)

(A) Habitat (B) Biosphere

(C) Community (D) Population

17. Human population in Pakistan in 2010 comprised of: ***(K.B)***

(A) 163.5 Million (B) 173.5 Million

(C) 183.5 Million (D) 178.5 Million

18. The area of the environment in which organism lives: ***(K.B)***

(A) Ecosystem (B) Habitat

(C) Niche (D) Biosphere

19. Which one is not a complex community? ***(K.B)***

(A) Forest (B) Pond

(C) A fallen log (D) Ocean

20. Zone of life on earth: ***(K.B)***

(A) Community (B) Ecosystem

(C) Biosphere (D) Hydrosphere

21. Number of major groups in which all the organisms have been divided: ***(K.B)***

(A) 2 (B) 3

(C) 4 (D) 5

22. What is true about *Amoeba*? ***(K.B)***

(A) Unicellular prokaryote (B) Multicellular eukaryote

(C) Unicellular eukaryote (D) Simple multicellular

23. *Amoeba* is: ***(K.B)*** **(LHR 2014)**

(A) Autotrophic (B) Heterotrophic

(C) Endoparasite (D) Ectoparasite

24. Which one organism has colonial mode of life? ***(K.B)*** **(BWP 2014)**

(A) *Amoeba* (B) *Paramecium*

(C) *Volvox* (D) *Euglena*

25. What is true about *Volvox*? *(K.B)* **(SWL 2014)**

(A) Unicellular eukaryote (B) Multicellular eukaryote

(C) Unicellular prokaryote (D) Colonial eukaryote

26. The scientific name '*Brassica campestris*' is for the plant: *(K.B)* **(DGK 2015)**

(A) Mango (B) Mustard

(C) Apple (D) Melon

27. Mustard plant is sown in: *(K.B)* **(BWP 2015)**

(A) Summer (B) Winter

(C) Spring (D) Autumn

28. Organ of plant that takes part in sexual reproduction: *(U.B)* **(GRW 2015)**

(A) Stem (B) Root

(C) Leaf (D) Flower

29. Types of tissues present in frog: *(K.B)*

(A) Epithelial (B) Glandular

(C) Muscular (D) All of these

ANSWER KEYS

MULTIPLE CHOICE QUESTIONS

INTRODUCTION TO BIOLOGY

1	C	**8**	D	**15**	B	**22**	B	**29**	C	**36**	C
2	C	**9**	A	**16**	C	**23**	B	**30**	A	**37**	D
3	B	**10**	D	**17**	C	**24**	C	**31**	B	**38**	B
4	C	**11**	C	**18**	A	**25**	C	**32**	D	**39**	C
5	A	**12**	C	**19**	D	**26**	C	**33**	C	**40**	A
6	D	**13**	B	**20**	B	**27**	D	**34**	C		
7	A	**14**	D	**21**	D	**28**	B	**35**	A		

LEVELS OF ORGANIZATION

1	B	**8**	D	**15**	C	**22**	C	**29**	D
2	C	**9**	D	**16**	D	**23**	B		
3	B	**10**	A	**17**	B	**24**	C		
4	C	**11**	D	**18**	B	**25**	D		
5	B	**12**	B	**19**	C	**26**	B		
6	A	**13**	A	**20**	C	**27**	B		
7	D	**14**	B	**21**	D	**28**	D		

REVIEW QUESTIONS

MULTIPLE CHOICE QUESTIONS

1. Members of the same species living in the same place at the same time make a: *(K.B)*
(a) Habitat (b) Biosphere
(c) Community (d) Population

2. If a scientist is studying the methods of inserting human insulin gene in bacteria, which branch of biology may this be? *(U.B)*
(a) Anatomy (b) Physiology
(c) Biotechnology (d) Pharmacology

3. Which one will be the correct sequence of the levels of organization in life? *(K.B)*
(a) Cell, organelle, molecule, organ, tissue, organ system, individual
(b) Molecule, tissue, organelle, cell, organ system, organ, individual
(c) Molecule, organelle, cell, tissue, organ, organ system, individual
(d) Organ system, organ, tissue, cell, molecule, organelle, individual

4. Which of these bioelements is in the highest percentage in protoplasm? *(K.B)*
(a) Carbon (b) Hydrogen
(c) Oxygen (d) Nitrogen

5. Which of the following group includes organisms all of which are absorptive in their nutrition? *(K.B)*
(a) Protists (b) Animals
(c) Bacteria (d) Fungi

6. Similar cells organized into groups and performing same functions are known as: *(K.B)*
(a) Organelle (b) Tissue
(c) Organ (d) Organ system

7. Which of these tissues also makes glandular tissue in animals? *(K.B)*
(a) Epithelial tissue (b) Muscular tissue
(c) Connective tissue (d) Nervous tissue

8. The level of organization that is less definite in plants is: *(U.B)*
(a) Tissue level (b) Organ level
(c) Organ system level (d) Individual level

9. What is TRUE about *Volvox*? *(K.B)*
(a) Unicellular prokaryote (b) Unicellular eukaryote
(c) Colonial eukaryote (d) Multicellular eukaryote

10. When we study the feeding relations among different animal species of a forest, at what level of organization we are studying? *(U.B)*
(a) Individual (b) Population
(c) Community (d) Biosphere

ANSWERS KEY

1	d	2	c	3	c	4	c	5	d
6	b	7	a	8	c	9	c	10	c

UNDERSTANDING THE CONCEPTS

1. Arrange these structures in order of lower level of organization to upper level and write the level against each structure:
Neuron, nervous system, electron, man, mass of neurons, carbon, mitochondria, brain, protein

Ans:

STRUCTURE	LEVEL
Electron	Subatomic level
Carbon	Atomic level
Protein	Molecular level
Mitochondria	Organelle level
Neuron	Cell level
Mass of neurons	Tissue level
Brain	Organ level
Nervous system	Organ system level
Man	Individual level

2. How would you define Biology and relate it with its major divisions?

Ans: See the SQ.4 of **(Topic 1.1)**
See the LQ.1 of **(Topic 1.1)**

3. Give points to advocate that biology is linked with physics, chemistry, mathematics, geography and economics.

Ans: See the LQ.3 of **(Topic 1.1)**

4. How would you distinguish the biomolecules from other molecules? What is the criterion for classifying a biomolecule as micromolecule or macromolecule?

Ans:

DIFFERENTIATION

The differences molecule and biomolecule are as follow:

Molecule	Biomolecule
Definition	
• A Molecule is the smallest part of any compound that retains all the properties of that compound.	• In organisms, elements usually do not occur in isolated forms, rather they combine through ionic and covalent bonding. The stable particle formed by such bonding is called biomolecule.
Example	
• Ammonia	• Protein

Note:

- All molecules cannot be biomolecules since biomolecules occur in living individuals only.

Classification of Biomolecule:

A biomolecule can be of two types, based on its molecular weight:

Micromolecule	Macromolecule
Definition	
The biomolecules with low molecular weight are called macromolecules.	The biomolecules with high molecular weight are called micromolecules.
Examples	
• Glucose • Water	• Starch • Proteins • Lipids

5. Describe the levels of organization of life.

Ans: **LEVELS OF ORGANIZATION**

(i) Subatomic and Atomic Level
See the LQ.1 of **(Topic 1.2)**

(ii) Molecular Level
See the LQ.2 of **(Topic 1.2)**

(iii) Organelle and Cell Level
See the LQ.3 of **(Topic 1.2)**

(iv) Tissue Level
See the LQ.4 of **(Topic 1.2)**

(v) Organ and Organ System Level
See the LQ.5 of **(Topic 1.2)**

(vi) Individual Level
See the LQ.6 of **(Topic 1.2)**

(vii) Population Level
See the LQ.6 of **(Topic 1.2)**

(viii) Community Level
See the LQ.6 of **(Topic 1.2)**

(ix) Biosphere level
See the LQ.6 of **(Topic 1.2)**

6. Is their any division of labour among the cells of a colony? If you find division of labour among the cells and tissues what level of cellular organization is it?

Ans: **COLONIAL MODES OF LIFE**

In a colony, every member has an independent existence. Every member lives its own life, and there is no division of labour among them.

Example:

A colony of *Volvox*, which is a freshwater alga, is formed by thousands of unicellular *Volvox* cells, but each cell is responsible for its own survival.

Multicellular Mode of Life:

If division of labour occurs between different types of cells, they get organized into various structural assemblies, such as tissues and organs, with cells performing similar functions. This happens in multicellular organisms, where cells make up a whole well-coordinated individual.

SHORT QUESTIONS

1. Define biotechnology. ***(K.B)***

Ans: See the SQ.15 of **(Topic 1.1)**

2. What do you mean by horticulture and how is it related to agriculture? ***(K.B)***

Ans: **HORTICULTURE**

It deals with the art of gardening. In horticulture, the work is for the betterment of existing varieties and for the production of ornamental plants and fruit plants.

Agriculture:

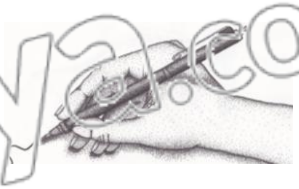
It deals with food crops and animals which are sources of food. In agriculture, the work is for the betterment of crops like wheat, rice, corn, etc and animals like buffalo, cow, etc from which we get food.

Relationship:

Both these fields deal with the production and betterments of different organisms existing in nature. The difference lies in the types of organisms they deal with. Horticulture deals with ornamental and environmental beautification varieties of plants while agriculture deals with food producing varieties of plants and animals.

KIPS ASSIGNMENT

LET'S DRAW AND LABEL



(A) Relationship of Biology with other Sciences

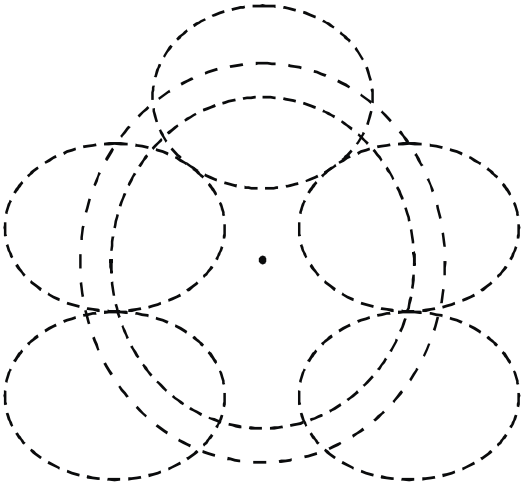
Instructions:

- Use compass to draw two circles.
- Now, draw the ovals using free hand skills.
- Mention the labels with clarity.

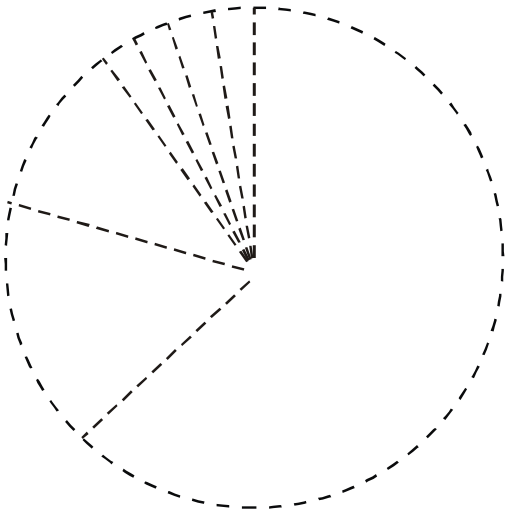
(B) Percentage Composition (by mass) of Bioelements in the Protoplasm of Living Organisms

Instructions:

- Use compass to draw a circle.
- Now, draw the lines using scale.
- Mention the labels with clarity.



(A)

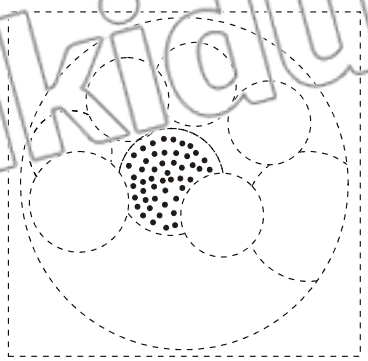


(B)

(C) *Volvox* Colony

Instructions:

- Use compass to draw a circle.
- Now, draw the circles using over lapping free hand skills.
- Fill the dots in the circles showing colony of *Volvox*.



(C)

SELF TEST

Time: 40 min **Marks: 25**

Q.1 Four possible answers A, B, C and D to each question are given, mark the correct answer. (6×1=6)

1. The other name of molecular biology is: ***(K.B)***

(A) Morphology **(B)** Anatomy
(C) Physiology **(D)** Biochemistry

2. The study of internal structures of living organism: ***(K.B)***

(A) Histology **(B)** Anatomy
(C) Cell biology **(D)** Parasitology

3. The working principles of levers and limbs of animals are studied in: ***(A.B)***

(A) Biogeography **(B)** Bioeconomics
(C) Biometry **(D)** Biophysics

4. Date of death of Abdul Malik Asmai: ***(K.B)***

(A) 740 AD **(B)** 980 AD
(C) 721 AD **(D)** 828 AD

5. Total percentage composition of oxygen and hydrogen in the protoplasm of living organisms: ***(K.B)***

(A) 31% **(B)** 65%
(C) 10% **(D)** 75%

6. *Amoeba* is: ***(K.B)***

(A) Unicellular eukaryote **(B)** Multicellular eukaryote
(C) Unicellular prokaryote **(D)** Multicellular prokaryote

Q.2 Give short answers to following questions. (5×2=10)

(i) Define molecular biology. ***(K.B)***

(ii) Define biometry. ***(K.B)***

(iii) What is farming? Give examples of different farms. ***(K.B)***

(iv) Differentiate between micromolecule and macromolecule. ***(K.B)***

(v) Describe colonial type of cellular organization with an example. ***(K.B)***

Q.3 Answer the following questions in detail. (5+4=9)

(a) Describe different branches of Biology (any eight) ***(K.B)*** **(5)**

(b) What do you know about agriculture and horticulture? ***(K.B)*** **(4)**

Note:

Parents or guardians can conduct this test in their supervision in order to check the skill of students.