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Chapter =01

Biology 9th - Detailed Question Answers

➔ INTRODUCTION TO BIOLOGY

Q.1: Name and define the main divisions of Biology.

Ans: **Division of Biology**: There are three major divisions of biology:

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(i) **Zoology:** The word Zoology is derived from Greek language, "Zoon" meaning animals and "Logos" meaning "study of knowledge". It deals with the study of animals.

(ii) **Botany:** The word Botany is taken from Greek language, "Butane" meaning plants and "Logos" meaning "study or knowledge". It deals with the study of plants.

(iii) **Microbiology:** It deals with the study of microscopic organisms such as bacteria etc. which can be seen only with the help of microscope.

Q.2: Name and define the branches of Biology.

Ans: **Branches of Biology:** Modern biology deals with the structure, function and many other descriptions of living things. Advance research during the 20th century has led to the division of biology into specialized branches. Some important branches are defined below:

(i) **Morphology:** It is the study of external form and structure of organisms.

(ii) **Anatomy:** It is the study of internal parts of body of living organisms.

(iii) **Cell Biology:** It is the study of cell and its organelle.

(iv) **Histology:** It is the study about structure of tissues of plant and animals.

(v) **Physiology:** It is the study about functions of different parts of living organisms.

(vi) **Taxonomy:** It is the study of the rules, principles, grouping and naming the living organisms.

(vii) **Genetics:** It is the study of heredity that is transferring of characters from parents to offspring.

(viii) **Developmental Biology:** It is the study of formation and development of embryo.

(ix) **Environmental Biology:** It is the study of relationship between living organisms an nonliving factors of environment and their effects on each other.

(x) **Paleontology:** It is the study of remote past organic life, with the help of fossils.

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(xi) **Biotechnology:** The study about techniques for manipulation of gene to bring the changes in structure and location of genes to achieve desirable characters is called biotechnology.

(xii) **Socio-biology:** It is the study of social behavior of living organisms. i.e. interaction between themselves.

(xiii) **Parasitology:** It is the study of parasites.

(xiv) **Pharmacology:** It is the study of action and effects of drugs.

(xv) **Molecular Biology:** It is the study of organic molecules which constitute cell and its organelles.

Q.3 : Describe the relationships of biology to other sciences.

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Ans: **Relationship of Biology with Other Sciences**: Biology is a multidimensional subject and linked with other sciences. Biology is considered as interdisciplinary science, which is related with other sciences. Some of these are mentioned below:

Biophysics: It is a branch of physics, in which laws and techniques of physics are applied to explain the processes of life.

Examples:

(i) In radio-physics branch radioactive isotopes are used to trace the translocation of different materials within the organisms.

(ii) Radio-labeling and, carbon-dating also show some uses of radioactive isotopes in determining the age of fossils.

(iii) Uses of sound waves as ultrasound and laser technology show relation of physics with biology.

• **Biomathematics / Biometry**: The branch of mathematics which collects data of living organisms. It plays very important role in research.

• **Biochemistry**: It is branch of biology which deals with the study of molecules which form living organisms or cell and requires authentic knowledge about biology and chemistry to explain the synthesis of bio-molecules and function of different molecules in the body of an organism.

• **Biogeography**: It deals with the distribution of different living organisms in different geographical regions of the world. Many living organisms are restricted to particular geographical regions due to environmental conditions.

• **Bio-economics:** This deals with the economically important organisms involved in production, e.g. meat production, etc. are calculated for cost value and profit value.

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Q.4: Describe the careers that the students, who have chosen biology, can plan to adopt.

Ans: **Careers in Biology:** The students, who have chosen the biology, can plan to adopt some as a career in following fields:

(i) **Medicine and Surgery:** Medicine deals with diagnosis and treatment of diseases and surgery deals with repair, replacement or removal the affected organ.

(ii) **Agriculture:** This deals with production of varieties of crops, fruit, vegetables, dairy products, etc. Pakistan being an agricultural country, it can play very important role.

(iii) **Horticulture:** This is also part of agriculture, in which work is carried out for the development of new varieties of plants and their products.

(iv) **Forestry:** Forests are the source of biodiversity of plants and animals of many kinds which live there. It is important in development of new forests as well as preservation of existing ones.

(v) **Farming:** In this profession, the development of different kinds of farms takes place, such as fish farm, cattle farm, poultry farm, etc. New technologies are used for the production of animals as source of meat and milk, leather, wool, etc.

(vi) **Animal Husbandry:** This profession is part of agriculture sciences. It deals with the care and breeding of animals which are beneficial for man.

(vii) **Fisheries:** This profession deals with the increased quantity and quality of fish production. Fish is one of the best sources of protein.

(viii) **Biotechnology:** This is very important and sensitive profession. It deals with manipulation of gene to produce valuable chemical products, such as insulin, growth hormones, interferon, etc. from bacteria as well as others.

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Q.5: Write translation of Quranic verses which points the Islamic view about the origin of life.

Ans: The Almighty Allah has conveyed a great knowledge about the Origin and characteristics of animals and plants through our Holy Book, the Quran. Allah Says;

"We made every living thing from water" **(Surah: Ambia, Verse: 30)**

"And Allah has created every animal from water of them there are some that creep on their bellies, some that walk on two legs; and some that walk on four. Allah creates what He will Lo! Allah is able to do all things". **(Surah: Al-Nur, Verse: 45)**

Here water is symbolized with the protoplasm as the basis of life and the vital Power of protoplasm seems to depend on the constant presence of water.

Q.6 Write the translation of Quranic verse which is about plant growth and development.

Ans: "And in the earth are neighboring tracks, vineyards and ploughed lands, and date-palms, like and unlike which are watered with one water. And we have made some of them to excel others in fruit. Lo! Here in verily are portents for people who have sense". **(Surah: Al-Ra'd, Verse: 4)**

Here Allah has revealed some facts about plant growth and development.

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Q.7 Describe the role of Muslim scientists in the field of biology.

Ans: Contribution of Muslim Scientists: The Muslim scientists have played great role in the development of biological science. They began experiments and observations from the first century of Hijra. Following are some details about the important Muslim scientists, who made significant contribution towards the development of biology.

(i) **Jabir Bin Hayan (722-817 A.D):** He was born in Iran. He worked in the field of chemistry but he also wrote a number of books on plants and animals. "Al-Nabatiat" and "Al-Haywan" are his two famous books on plants and animals, respectively.

(ii) **Abdul Malik Asmai (741-828 A.D):** He was great zoologist and wrote many books on animals "Al-Kheil" on horses, "Al-Ibil" on camels, "Al-Shat" on sheep, "Al-Wahoosh" on wild animals and "Khalqul Insan" on the different parts of human body and their functions.

(iii) **Bu Ali Sina (980-1037 A.D):** He was greatest of all the Muslim scientists and considered as the founder of medicine. He is called as Avicenna in the west. He identified many diseases like tuberculosis, meningitis and other such inflammations. He also worked in the field of mathematics, astronomy, physics, paleontology and music. He wrote books like "Al-Qanoon" and "Fil Tib Al-Shafa".

Q.8: Describe the level of organization.

Ans: **The Level of Organization**: The levels of organization in living world are based on chemical foundation. All the living organisms are made up of cells and the protoplasm of cell is the physical as well as chemical basis of life. These levels are as follow:

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Atom

↓ Oxygen (O)

Molecule

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↓ Dioxide (O_2)

Macromolecule

↓ Phospholipid

Cell

↓ Clara Cell

Tissue

↓ Epithelial tissue

Organ

↓ Lung

Organ system

↓ Respiratory System

Organism

↓ Panthera leo (Lion)

Population

↓ Pride of Lions

Community

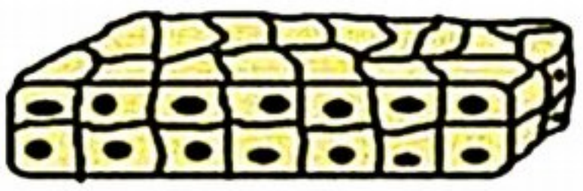
↓ Lions and Zebras

Eco System

↓ Lions, Zebras, and the Environment

Biosphere

↓ Life on Earth



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1. **Atomic Level of Organization:** All the matter is made up of elements, which is composed of atom. Each atom is made up of sub-atomic particles, such as electrons, protons and neutrons. In nature, there are more than 100 kinds of elements and among these 16 elements are called as bio-elements, which are vital for life. Only six elements such as C, H, O, N, S and Pare called basic elements of life.

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2. **Molecular Level of Organization:** Molecules are formed by the binding of atoms. These organic molecules of cells are called as bio-molecules. These are constructed in great variety and complexity. They are classified as micro-molecules and macro-molecules. Glucose, amino acid and fatty acids are micro-molecules, whereas carbohydrates, proteins and lipids are macro-molecules. The units of micro-molecules combine together to form macro-molecules.

3. **Cellular Level of Organization:** The biomolecules when work together in the form of suspension, it is called Protoplasm. Protoplasm is the combination of organic and specific inorganic substances. When protoplasm works in the form of a unit, this is called cell. Cell is the basic unit of living organisms. When similar types of cells organize together in group, they are called tissues. The different types of tissues arranged in a particular manner to work together are called organs.

Organs of different types work in a coordinated manner to perform a function which is called organ-system. When different organ-systems function in co-ordination as a unit, they form a body or Multicellular Organism.

4. **Taxonomic Level:** There is another level of organization which is related with living organisms. The species is the smallest unit of taxonomic level of organization, which includes morphologically similar living organisms which inter-breed and produce fertile offspring.

5. **Population Level:** All the members of a species, living in specific habitat are called Population. A group of parrots living on tree, is called parrot population.

6. **Community Level:** The members of different species living in specific habitat are called as Community. A group of different kinds of birds, living on tree, is called as birds, living on tree, is called as bird community.

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7. **Ecological System:** Communities always depends upon their non-living environment is a reciprocal interaction for their survival. For example oxygen for respiration is obtained environment and in turn for respiration is obtained from environment and in turn given out CO_2. This interaction is called Ecosystem or Ecological system.

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8. **Biosphere Level:** The part of earth where life exists is called biosphere. It consists of different kinds of eco systems.

Q.9 : Define the following :

(i) Unicellular Organization

(ii) Colonial Organization

(iii) Multi-cellular Organization

(i) **Unicellular Organization** : All single cell organisms carry out all activities of life. They digest the food, respire, excrete, move etc. on the cellular base by simple methods. Bacteria, Amoeba, Paramecium and Euglena are common examples of unicellular organisms.

(ii) **Colonial Organization :** Many unicellular organisms live together by forming colonies but do not have any division of labor among them. In colonial type of cellular organization, each unicellular organism lives its own life, they are not dependent on each other and never form any multicellular structure, Volvox is a green alga is an example of colonial form of organization.

(iii) **Multi-cellular Organization :** The organism formed by many cells is called as multicellular organism. Frog and mustard plant are examples of multicellular organization.

Q.10: Write a short note on Mustard plant.

Ans: **Mustard plant:** Brassica campestris is commonly known as mustard plant and locally it is called "Sarsoon". It is multicellular and cultivated in winter season. The leaves of this plant are used as vegetable while seeds are used for oil extraction. The length of this plant is 1 to 1.5 meter.

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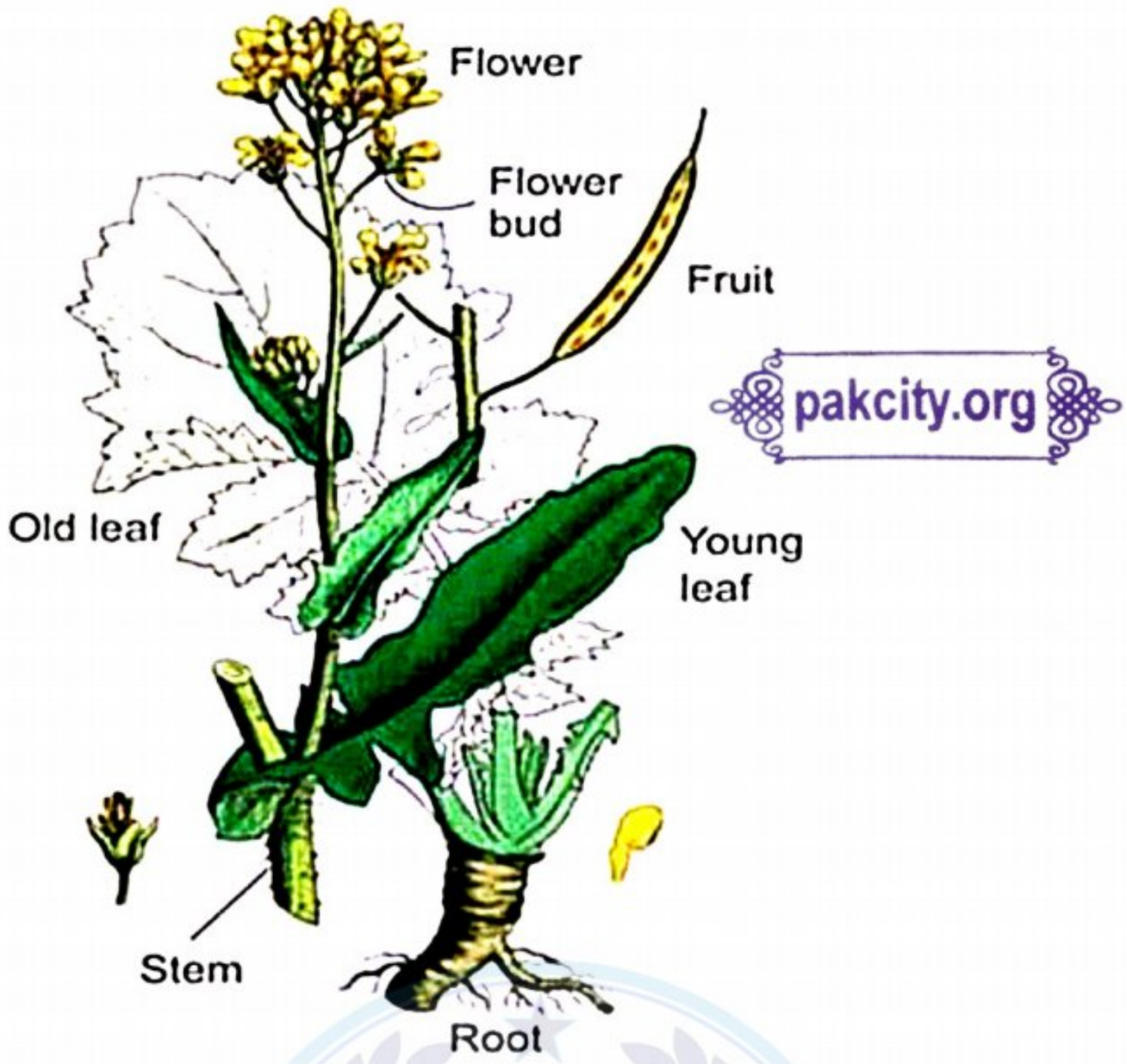
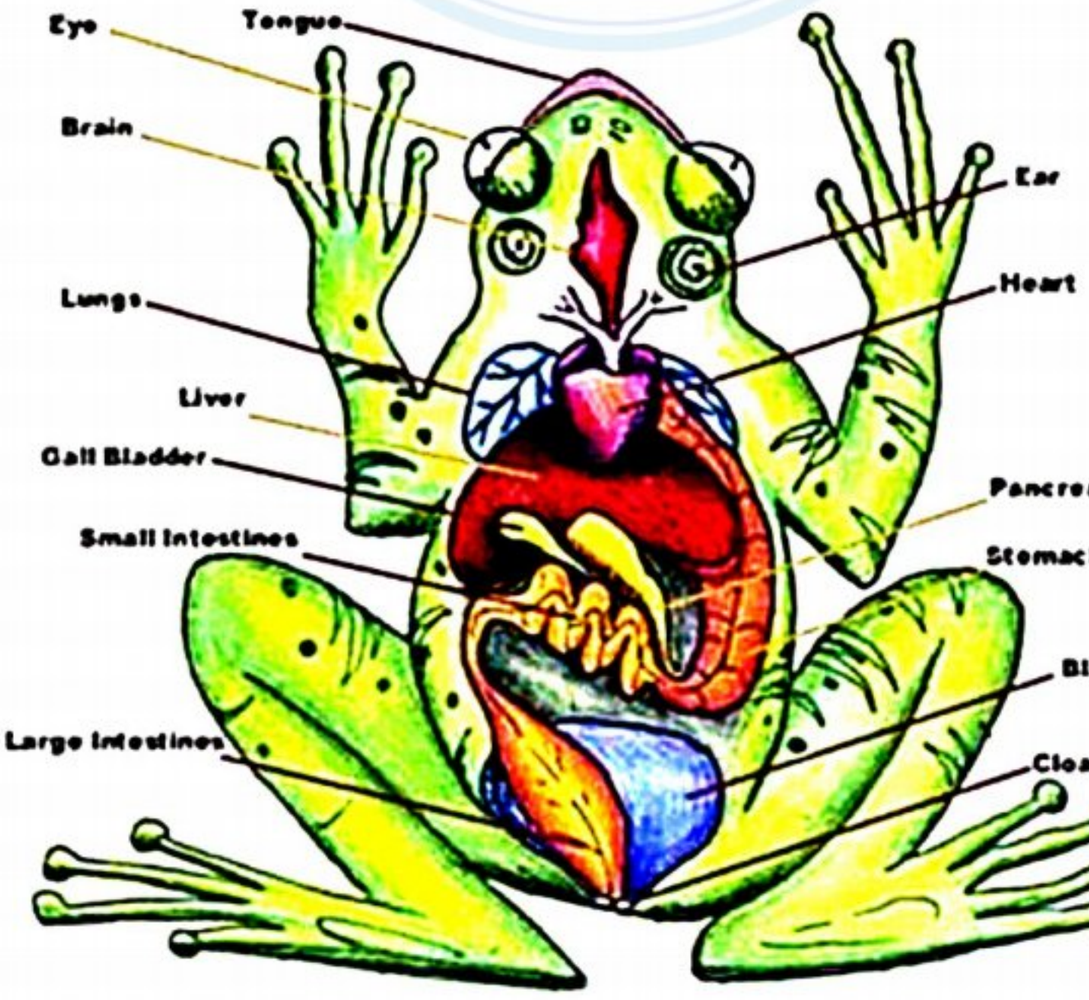


Brassica campestris

This plant has two parts, the vegetative part, which consists of root, stem and leaves and reproductive part which consists of flowers. Each flowers is yellowish in color and produce seeds.

Q.11: Draw a labeled diagram of dissected frog.

Ans :



Dissected Frog

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Q.12: Write a short note on frog.

Ans: **Frog:** Rana tigrina is the scientific name of spotted frog found commonly in our region. It is multicellular animal. It lives in both water as well as on land. Its body is divided into head and trunk. There is no neck. Its body is made of organ system with different organs. All organs are made of different tissues such as epithelial, glandular, muscular, nervous etc. Frog lives near ditches, pools, ponds, stagnant stream and slow moving rivers. It feeds on small insects.

Activity: Identification of organs and organ-system in dissected frog.

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Material Required:

- Preserved frog
- dissecting tray
- dissection
- box pins

Procedure : Place the preserved frog on a dissecting tray on its back, as all vertebrates are dissected ventrally, pin down the fore limbs and hind limbs. Take scissors to cut the abdomen ventrally, from cloaca to the mouth. Again cut down the skin of limbs from each side and pin down. Expose the visceral organs clearly and make observation with the help of diagram. Locate the organs and identify them as below:-

Table showing different organs with the relative organ system

Organs	Organ System
Mouth, buccal cavity, pharynx, esophagus, stomach, small intestine, large intestine, cloaca, liver, gall, bladder, pancreas.	Digestive System
Heart, atria ventricle, Aortae, Vena cavae	Circulatory system
Lungs, trachea, nostrils	Respiratory System
Kidneys, Ureter, Urinary Bladder	Excretory System
Testes, vasa efferentia, Ovaries, Oviduct, Ovisac	Reproductive System
Brain, Spinal Cord, Nerves	Nervous System

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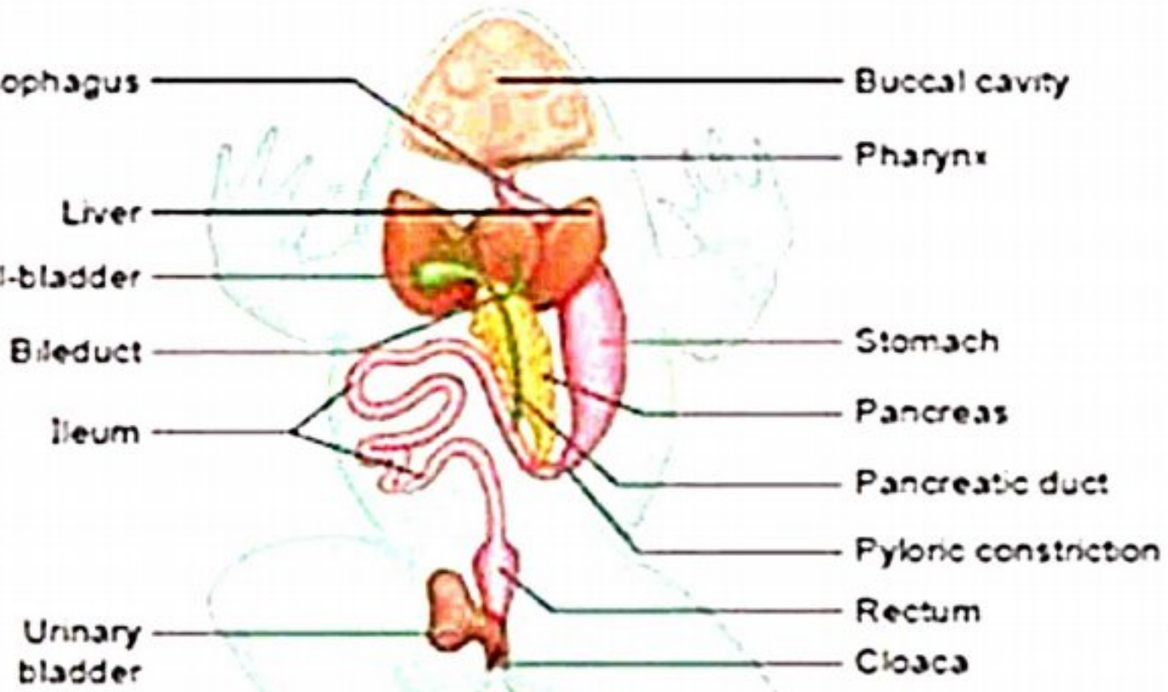
Q.13: Draw a labeled diagram of frog's digestive system.

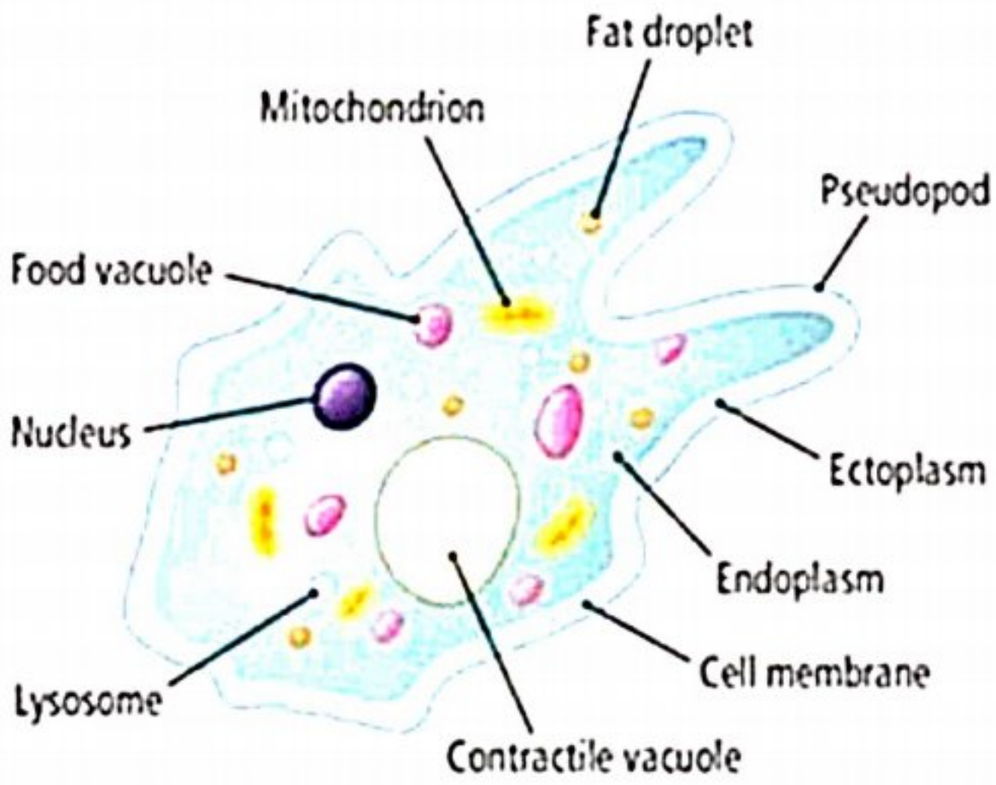
Ans :



Frog Digestive System

Q.14: What do you know about amoeba?

Ans: **Amoeba :** Amoeba is a unicellular organism found in the mud of shallow pond, pools and at any stagnant water. Its size is about 0.25mm. Amoeba has an irregular shape. It has a cell membrane which helps in movement of molecules and protects cytoplasm. The outer part of cytoplasm is clear and transparent, called ectoplasm (gel) and inner part is called endoplasm (sol). The cytoplasm contains nucleus, food vacuoles, mitochondria etc. Amoeba moves by false food, called pseudopodia.



Amoeba

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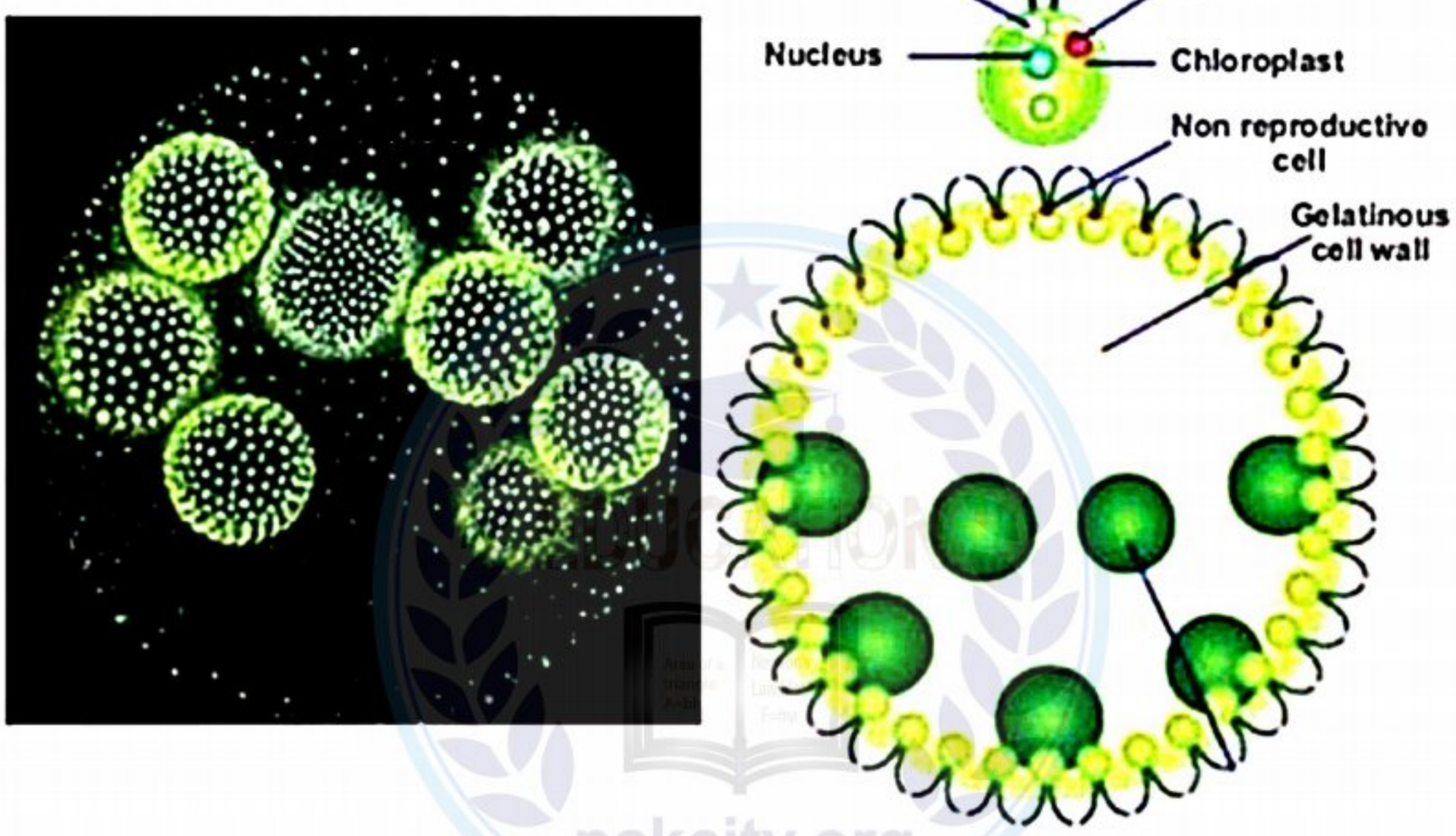
Q.15: Write a short note on volvox.

Ans: **Volvox :** Volvox is a polyphyletic (many ancestors) genus of chlorophyte green algae in the family Volvocaceae. It forms spherical colonies of upto 50,000 cells. They live in a variety of fresh water habitats and were first reported by Antonie Van Leeuwen Hoek in 1700. Volvoxonce once called algae that live together in a colony. Each Volvox cell has two flagella. The flagella beat together to roll the body in water. Volvex cells have chlorophyll and make their own food by photosynthesis. These photosynthesis organisms are an important part of many aquatic eco-system. Volvox are not harmful to humans because they do not produce any toxic substance.



Volvox colony

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Chapter = 01

Biology 9th - Short Question Answers

➔ INTRODUCTION TO BIOLOGY

Q.1: What is Biology?

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Ans: Biology is a branch of natural sciences which deals with the study of living beings. It provides the knowledge about living organisms. The word biology comes from Greek language "Bios" meaning "live" and "Logos" meaning "thought or reasoning". Thus biology means study of Life.

Q.2: What is Life?

Ans: Life cannot be defined properly, but on the basis of life processes, it can be identified through following functions of living organisms.

(i) Digestion	(ii) Respiration	(iii) Metabolism
(iv) Movement	(v) Growth	(vi) Development
(vii) Excretion	(viii) Irritability	(ix) Reproduction

Q.3 : Why subject biology is named as multidimensional subject?

Ans: Biology is a multidimensional subject and linked with other sciences. For example, the movement of animals follows the laws of motion in physics. Biology is considered as interdisciplinary science, which is related with other sciences.

Q.4: How farming profession helps mankind?

Ans: Farming is the science of developing and maintaining farm. With the advancement of farming techniques, man improves the quality and yield of the existing varieties and produces certain new varieties of crops. This helps to overcome the problem of food shortage, incidence of famine declines and economic conditions of mankind are improving.

Q.5: How new varieties of plant are produced?

Ans: The new plant varieties are produced by selection and hybridization. Selection is a non-random process which leads to individuals of different genotypes being represented unequally in their progeny in later generations of a population of self-propagating units. Selection can be natural or artificial. Hybridization is the crossing of two varieties, species or genera having desired genes by bringing together the useful characters of these into one progeny. Both these processes produce new plant varieties.

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Q.6: Why species is called as smallest taxonomic level?

Ans: Species is called as smallest taxonomic level because it is the smallest and basic unit of classification. Taxonomic studies consider a group of individual organisms with fundamental similarities as a species. Thus all the individual members belonging to particular species show all similar characters and can breed among themselves to produce a similar type of organism.

Q.7 : How population is different from community?

Ans:

Population	Community
All the members of a species, living in specific habitat are called Population.	The members of different species living in specific habitat are called as Community.
A group of parrots living on tree, is called parrot population.	A group of different kinds of birds, living on tree, is called as birds, living on tree, is called as bird community.

Q.8: Differentiate between Colonial organization and multicellular organization:

Ans:

Colonial Organization	Multicellular Organization
The individual organisms that form a colony can, if separated, survive on their own	Cells from a multicellular organism (e.g., liver cells), if separated, cannot survive on their own.
If all members of an aggregation can perform all the basic functions of life for themselves, so none of them depends on others to do things they cannot, then the aggregation is a colony.	If some members of the aggregation carry out functions that others cannot, so their respective contributory functions are each necessary to the survival of the whole, then it is a multicellular organism.

Q.9: Differentiate between Agriculture and Horticulture

Ans:

Agriculture	Horticulture
A branch or sub category of agriculture.	A broad term that covers forestry, agronomy, animal husbandry, aquaculture, and, horticulture.
Focuses on cultivating, marketing, improving, and technology of plants for food and other human necessities	Covers cultivating plants and raising animals for food and other human necessities
Sometimes called "gardening".	Sometimes called "farming"

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