Chapter 19
Origin and Evolution of Life

I. Choose the correct answer.

Question 1.
Biogenetic law states that:
(a) Ontogeny and phylogeny go together
(b) Ontogeny recapitulates phylogeny
(c) Phylogeny recapitulates ontogeny
(d) There is no relationship between phylogeny and ontogeny
Answer:
(b) Ontogeny recapitulates phylogeny

Question 2.
The 'use and disuse theory' was proposed by:
(a) Charles Darwin
(b) Ernst Haeckel
(c) Jean Baptiste Lamarck
(d) Gregor Mendel
Answer:
(c) Jean Baptiste Lamarck

Question 3.
Paleontologists deal with:
(a) Embryological evidences
(b) Fossil evidences
(c) Vestigial organ evidences
(d) All the above
Answer:
(a) Embryological evidences

Question 4.
The best way of direct dating fossils of recent origin is by:
(a) Radio-carbon method
(b) Uranium lead method
(c) Potassium-argon method
(d) Both (a) and (c)
Answer:
(a) Radio-carbon method

Question 5.
The term Ethnobotany was coined by:
(a) Khorana
(b) J.W. Harshberger
(c) Ronald Ross
(d) Hugo de Vries
Answer:
(b) J.W. Harshberger

II. Fill in the blanks.

1. The characters developed by the animals during their life time, in response to the environmental changes are called ……..
2. The degenerated and non-functional organs found in an organism are called ……..
3. The forelimb of bat and human are examples of ……. organs.
4. The theory of natural selection for evolution was proposed by ……..

Answer:

1. acquired characters
2. vestigial organs
3. homologous
4. Charles Darwin

III. State true or false. Correct the false statements.

1. The use and disuse theory of organs' was postulated by Charles Darwin.
2. The homologous organs look similar and perform similar functions but they have different origin and developmental pattern.
3. Birds have evolved from reptiles.

Answer:

1. False – The use and disuse theory of organs' was postulated by Jean Baptiste Lamarck.
2. False – The analogous organs look similar and perform similar functions but they have different origin and developmental pattern.
3. True

IV. Match the following.

Column I		Column II	
A	Atavism	*(i)*	caudal vertebrae and vermiform appendix
B	Vestigial organs	*(ii)*	a forelimb of a cat and a bat's wing
C	Analogous organs	*(iii)*	rudimentary tail and thick hair on the body
D	Homologous organs	*(iv)*	a wing of a bat and a wing of an insect
E	Wood park	*(v)*	radiocarbon dating
F	W.F. Libby	*(vi)*	Thiruvakkarai

Answer:
A. (iii)
B. (i)
C. (iv)
D. (ii)
E. (vi)
F. (v)

V. Answer in a word or sentence.

Question 1.
A human hand, a front leg of a cat, a front flipper of a whale and a bat's wing look dissimilar and adapted for different functions. What is the name given to these organs?
Answer:
Homologous organ – as they have inherited from common ancestors with similar developmental pattern in embryos.

Question 2.
Which organism is considered to be the fossil bird?
Answer:
Archaeopteryx is the fossil bird, found in the Jurassic period.

Question 3.
Why is Archaeopteryx considered to be a connecting link?
Answer:
Archaeopteryx is considered to be a connecting link between reptiles and birds as it had wings with feathers like a bird and had a long tail, clawed digits and conical teeth like a reptile.

VI. Short Answers Questions

Question 1.
The degenerated wing of a kiwi is an acquired character. Why is it an acquired character?
Answer:
The characters developed by the animals during their life time in response to the environmental changes are called acquired character. The acquired characters are transmitted to the offspring by the process of inheritance.

Question 2.
Why is Archaeopteryx considered to be a connecting link?
Answer:
Archaeopteryx is the oldest known fossil bird. It is considered to be a connecting link between reptiles and birds. It had wings with feathers, like a bird. It had a long tail, clawed digits and conical teeth, like a reptile.

Question 3.
Define Ethnobotany and write its importance.
Answer:
Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

Question 4.
How can you determine the age of the fossils?
Answer:
The age of fossils is determined by radioactive elements present in it. The elements may be carbon, uranium, lead or potassium. Carbon consumption of animals and plants stops after death, and the decaying process of C14 occurs continuously. The time passed since the death of a plant or animal can be calculated by measuring the amount of C14 present in their body.

VII. Long Answer Questions

Question 1.
Natural selection is a driving force for evolution-How?
Answer:
Survival of the fittest or Natural selection : During the struggle for existence, the organisms which can overcome the challenging situation, survive and adapt to the surrounding environment. Organisms which are unable to face the challenges, are unfit to survive and disappear. The process of selection of organisms with favourable variation is called as natural selection.

Question 2.
How do you differentiate homologous organs from analogous organs?

Answer:

Homologous organs	Analogous organs
The homologous organs are those which have inherited from common ancestors with similar developmental pattern in Embryos.	The Analogous organs look similar and perform similar functions, but they have different origin and developmental pattern.
Their mode of development and basic structure are similar.	Their basic structures are different.
Eg: A human hand, flipper of a whale, Bat's wing.	**Eg:** Wings of bat, wings of birds, wings of insects.

Question 3.
How does fossilization occur in plants?
Answer:
The process of formation of fossil in the rocks is called Fossilization. The common methods of fossilization include:
1. Petrifaction: Minerals like silica slowly penetrate in and replace the original organic tissue and forms a rock-like fossil. This method of fossilization can preserve hard and soft parts mostly bones and wood fossils are petrified.

2. Mould and cast: A replica of a plant or animal is preserved in sedimentary rocks. When the organism gets buried in sediment it is dissolved by underground water leaving a hollow depression called a mould. It shows the original shape but does not reveal the internal structure. Minerals or sediment fill the hollow depression and form a cast.

3. Preservation: Original remains can be preserved in ice or amber (tree sap). They protect the organisms from decay. The entire plant or animal is preserved.

4. Compression: When an organism dies, the hard parts of their bodies settle at the bottom of the sea bed and are covered by sediment. The process of sedimentation goes on continuously and fossils are formed.

5. Infiltration or Replacement: The precipitation of minerals takes place which later on infiltrates the cell wall. The process is brought about by several mineral elements such as silica, calcium carbonate and magnesium carbonate. Hard parts are dissolved and replaced by these minerals.

VIII. Higher Order Thinking Skills (HOTS).

Question 1.
Arun was playing in the garden. Suddenly he saw a dragon fly sitting on a plant. He observed the wings of it. He thought it looked similar to a wing of a crow. Is he correct?

Give reason for your answer.

Answer:

No. Arun is not correct. It is called as Analogous organ. They look similar and perform similar functions, but they have different origin and developmental pattern.

Question 2.

Imprints of fossils tell us about evolution-How?

Answer:

Fossils provide solid evidence that organisms from the past are not the same as those found today. Fossils show a progression of evolution by comparing the anatomical record of fossils with modem and extinct species. Palaeontologist can infer the linkages of their species. For this the body parts such as shell bones or teeth are used. The resulting fossil record tells the story of the part and show the evolution of form over millions of years.

Question 3.

Octopus, cockroach and frog all have eyes. Can we group these animals together to establish a common evolutionary origin. Justify your answer.

Answer:

No, we cannot group these animals together because development of eye is not a point utilised in classification as well as in evolution.