

# 1. Heredity and Evolution

**Q.1. (A)**

- i. (C)
- ii. (B)

[1 Mark]

[1 Mark]

**Q.1. (B)**

- i. Intestine
- ii. Origin of species
- iii. True

[1 Mark]

[1 Mark]

[1 Mark]

**Q.2. (A)**

- i.
  - a. The animals like dog, sheep and wolf resemble each other in various morphological features.
  - b. They possess similarities in structure of mouth, position of eyes, structure of nostrils and ear pinnae and thickly distributed hairs on body.

Hence, morphological evidences provide proof that dog, sheep and wolf share a common origin.

[2 Marks]

- ii.
  - a. Forelimb of bat and flipper of whale appear different superficially and also have different functions.
  - b. They however, are similar in structure of bones and bony joints in organs and hence indicate a common ancestry.

[2 Marks]

[Note: Students are expected to attempt any one out of above two questions.]

**Q.2. (B)**

- i.
  - a. Darwin's theory of natural selection is based on the concept of survival of the fittest.
  - b. Organisms can reproduce prolifically.
  - c. Under limited resources, organisms compete with each other in a life-threatening manner for their survival.
  - d. According to this theory, only those organisms survive which show modifications for winning the competition. The selected organisms then give rise to new species with their specific set of characters.

[2 Marks]

ii.

	Lamarckism	Natural selection
a.	All acquired characters are transferred to the next generation.	Only useful modifications/ variations are transferred to next generation.
b.	It is not based on survival of the fittest.	It is based on survival of the fittest.
c.	It occurs due to morphological changes.	It occurs due to modifications.
d.	It occurs due to continued activity or laziness of an organism.	It occurs due to life- threatening competition.

[2 Marks]

[Note: Students are expected to attempt any one out of above two questions.]

**Q.3.**

- i.
  - a. The cellular process depicted in the diagram is transcription.
  - b. The enzyme required for this process is RNA polymerase.
  - c. This process occurs in the nucleus of a cell.
- ii.
  - a. Embryological evidences arise from comparative study of embryological developmental stages of various vertebrates.
  - b. Embryos of different vertebrates appear similar during the initial stages of development and these similarities gradually decrease as the embryo develops.
  - c. Embryology can be used as evidence of evolution as similarities in initial stages of development indicate common origin of the animals.

[1 Mark]

[1 Mark]

[1 Mark]

[3 Marks]



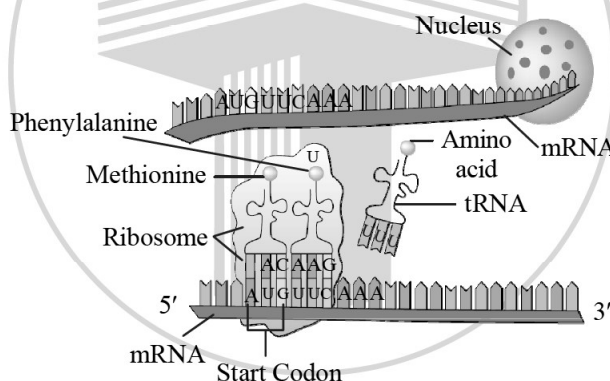
- iii. a. Duck-billed platypus lays eggs like reptiles and has hairs and mammary glands like mammals. Thus, it is the connecting link between reptiles and mammals.
- b. Lungfish is a fish which breathes air through its lungs. It is the connecting link between amphibians and fishes.
- c. *Peripatus* has segmented body, thin cuticle and parapodia-like appendages like annelids and shows tracheal respiration and open circulatory system like arthropods. It is considered as the connecting link between phylum Annelida and phylum Arthropoda.
- In this manner these organisms provide proof of evolution. [3 Marks]

[Note: Students are expected to attempt any two out of above three questions.]

#### Q.4.

- i. Process of formation of complex proteins is as follows:
- Information about protein synthesis is stored in the DNA. mRNA is synthesised from this DNA by the process of **transcription**. The process of synthesis of proteins from DNA through RNA is called the **Central Dogma**.
  - Translation** occurs in the following manner:
    - mRNA formed in the nucleus during transcription moves in the cytoplasm, carrying the coded message by DNA.
    - Each mRNA contains codes for amino acids in the form of triplet codons.
    - As per the message on mRNA, amino acids are supplied by the tRNA, which has an anticodon (complementary sequence) to the codon on mRNA.
    - The amino acids supplied by tRNA are bound together by peptide bonds with the help of rRNA.
  - The process continues as the ribosome moves along the entire length of the mRNA by a distance of one triplet codon, also known as **translocation**.

In this way, many such chains of amino acids (peptides) come together to form complex proteins.



**Translation**

[5 Marks]

- ii. a. Similarities in the leaf shape, venation and size of plants provide morphological evidences of evolution. [1 Mark]
- b. Similarities in structure of bones indicate that the organisms may have a common ancestor. [1 Mark]
- c. Similarities in bone structure provide anatomical evidence of evolution. [1 Mark]
- d. Similarities in structure of mouth, position of eyes, structure of nostrils and ear pinnae, and thickly distributed hair on the body of animals like dog, sheep and wolf is an example of morphological evidence. [1 Mark]
- e. Ox and bat, whale and bat, human and ox, ox and whale are examples of animals with a common ancestor based on anatomical evidence. [1 Mark]

[Note: Students are expected to attempt any one out of above two questions.]