SF-17009

(553) M.Sc. ZOOLOGY (III–SEM.)

Examination, Dec.- 2023

Compulsory/Optional

Paper - I

COMPARATIVE ANATOMY OF VERTEBRATES

Time : Three Hours] *[Maximum Marks : 80*

Note : Answer from both the section as directed. The figures in the right hand side indicate marks.

Section-A

1. Answer the following questions: 1×10=10

(a) What is the primary function of the vertebral column in vertebrates?

(b) How do the skeletal structures of

fish and mammals differ in terms of limb adaptation?

(c) What is the significance of the amniotic egg in reptiles and birds compared to amphibians?

(d) Describe the structural differences between the heart of a fish and that of a mammal.

(e) How do the forelimbs of bats and birds demonstrate convergent evolution?

(f) What is the role of the notochord in the early development of vertebrate embryos?

(g) Compare the respiratory systems of amphibians and reptiles in terms of adaptations to terrestrial life.

(h) Explain the adaptive advantages of the mammalian jaw joint compared to that of reptiles.

(i) How do the gills of fish and the lungs

of mammals reflect adaptations to their respective environments?

(j) Discuss the evolutionary significance of the development of mammary glands in mammals.

2. Answer the following short-answer type question:- 2×5=10

(a) Name two types of skeletons found in vertebrates and provide an example of an organism for each.

(b) How does the heart structure vary among different vertebrate classes?

(c) Compare the respiratory systems of fish and mammals.

(d) Differentiate between endothermic and ectothermic vertebrates.

(e) Identify the major components of the tetrapod limb and their functions.

Section-B 15×4=60

3. Discuss the origin of chordates, tracing the evolutionary development from their earliest ancestors to the emergence of key chordate characteristics. Highlight the major evolutionary innovations that led to the formation of the notochord, dorsal nerve cord, pharyngeal gill slits, and post-anal tail.

OR

How did the appearance of chordate characteristics contribute to the success and diversification of this group within the animal kingdom? Consider the geological time frames and any significant events that coincide with the evolutionary milestones in the origin and diversification of chordates.

4. By discussing the general features of the integumentary system, including the skin, scales, feathers, fur, and glands, elaborate the specific roles these structures play in protection, thermoregulation, sensory perception, and communication within the diverse vertebrate groups.

OR

Examine the evolutionary journey of the vertebrate heart, detailing its origin, structural adaptations, and functional modifications across different taxa. Begin by discussing the primitive cardiac structures in early chordates and trace the development of more sophisticated hearts in fish, amphibians, reptiles, birds, and mammals. Address the significance of the four-chambered heart in birds and mammals.

5. By discussing the respiratory structures in primitive chordates and elucidate the progressive modifications leading to the development of gills in fish, lungs in amphibians, reptiles, and mammals, and air sacs in birds. Additionally, analyze the advantages and limitations associated with each respiratory adaptation in relation to the unique challenges posed by terrestrial and aquatic lifestyles.

OR

Explore the type of vertebral column in vertebrates. Begin by discussing the embryonic development of the notochord and its role as a precursor to the vertebral column. Highlight any adaptations in the vertebral column related to locomotion, support, and protection. Discuss the functional significance of the vertebral column in terms of its role in providing structural support, facilitating movement, and protecting the spinal cord.

6. Examine the functional aspects of the urinogenital system in mammals, detailing the interconnected development of the urinary and reproductive system.

OR

Elaborate the classification of sensory receptors based on their modality. How do these receptors differ in terms of structure and function? Provide examples of each type and elucidate how they contribute to our sensory experiences.
