E6135

B. SC. DEGREE EXAMINATION, MARCH 2017

Fourth Semester

Core Course-Animal Diversity- Chordata

(Common for B.Sc. Zoology Model I, Model II and B.Sc. Industrial Microbiology and Zoology

Time: 3 hrs **(2013 admission onwards)** **Max.marks: 60**

Answer Scheme

PART A (Answer all questions; each carries 1 mark)

1. **Tunicin**: The adult body of urochordates is enclosed within a test or tunic. This tunic is made of a substance tunicin.
2. A **marsupial**: Kangaroo/ Wallabies/ Wombats or any one marsupial.
3. **Diastema**: The natural gap in the buccal cavity between incisors and pre molars is termed diastema. eg. Rabbit.
4. **Larynx** and **Syrinx**: Larynx is the enlarged part seen at the anterior end of trachea in tetrapods, which help in sound production.
   Syrinx or voice box is seen in birds, located at the junction where trachea divides into two bronchi.
5. **Ascidia**.
6. **Organ of Corti**: is a sensory organ of hearing located within the cochlea of mammalian ear.
7. Teeth attached by their sides to the inner side of the jaw is **pleurodont** dentition.
8. **Endostyle** is a ciliated tract present on the ventral surface of pharynx of protochordates which assist to accumulate food particles.

PART B (Answer any six; each carries two marks)

9. What is **retrogressive metamorphosis**? Explain with an example.
Metamorphosis during which a free swimming tadpole larva with all chordate characters get transformed into a degenerate adult with the loss of several structures is called **retrogressive metamorphosis**.eg.,Ascidia. Notochord & nerve cord disappear-fixes by adhesive papillae-tail length is reduced-nerve cord is reduced to a solid ganglion-sense organs like ocelli & statocyst disappear-notochord disappears-muscle bands become degenerate-tail becomes completely shortened and the whole animal is enclosed in a test.

(definition: $^1/_2$ mark; features of metamorphosis in brief with eg.: $1^1/_2$ marks)

10. Mention the salient features of Prototherians.

1. Egg laying mammals 2. Ureters open into cloaca. 3. Absence of scrotal sacs. Seminal vesicles, prostate glands and corpus callosum. 4. Living fossils

(any 4 points)

11. Discuss the affinities of *Sphenodon*.
Sphenodon is a living fossil which retains several primitive characters.

1. Skull with 2 complete fossae 2. Abdominal ribs embedded in the muscles of body wall 3. Amphicoelous vertebrae 4. Contains vestiges of notochord 5. Well developed parietal eye and pineal body 6. Absence of copulatory organs.

(any 4 points)

12. Explain the structure of **typical vertebra** in rabbit.
3^{rd} lumbar vertebra is considered as the typical vertebra in rabbit. It has an amphiplatyan or acoelous centrum with both surfaces flat; neural arch encloses neural

canal; neural spine present; transverse processes are flat with expanded ends; anterior zygapophyses are directed outwards and inwards and posterior zygapophyses are directed downwards and outwards; anapophyses are also present. **(2 marks)**

13. Distinguish between **latitudinal** & **longitudinal** migration.
    Migration in north – south direction is latitudinal migration.eg.American Golden Plover/Ruff/Arctic Tern.
    Migration in east – west direction is longitudinal migration. eg.,Starling/Patagonian Plover
14. Distinguish between placoid & ctenoid scales?
    Scales of cartilaginous fishes with a rhomboidal basal plate and a trident spine are called placoid scales.eg.,**shark/rays.**
    Ctenoid scales are scales of certain bony fishes with teeth like structures or cteni.eg., **Perch/Cirrhinus mrigala (definition with one example)**
15. Comment on any 2 lung fishes.
    Lepidosiren (South America)/ ***Protopterus*** (Africa)/ ***Epiceratodus*** *or* ***Neoceratodus***(Australia).
    Lepidosiren: inhabitant of marshes or stagnant fresh-water, omnivorous,undergoes aestivation in summer; body long & eel like with small cycloid scales; pectoral fins are reduced & filamentous; pelvic fins are larger; diphycercal tail fin; paired lungs.
    (Full marks may be given if a correct account of *Lepidosiren* is written - minimum 4 relevant points)
16. Explain the mechanism of respiration in frog.
    - Cutaneous respiration on land or in water: vascular skin is kept moist.
    - Bucco-pharyngeal :on land; vascularised buccal epithelium; alternate lowering and raising of buccal cavity.
    - Pulmonary (lung) respiration: on land. Involves inspiration and expiration. **(Full marks may be given if the above points in brief are given or an explanation of inspiration & expiration is written).**

17. Comment on the affinities of *Archaeopteryx*?
    Archaeopteryx is a connecting link between reptiles and birds. It is a fossil bird.
    Reptilian characters: presence of long tail with 18-20 free caudal vertebrae; homodont teeth; absence of pneumatic bones; fewer cervical vertebrae; presence of cervical, thoracic & abdominal ribs; ribs-single headed with uncinate process; sternum week or absent; epidermal scales present; fore limbs with 3 free metacarpals; carpometacarpus absent; pelvic girdle has an elongate ilium 7 a backwardly directed pubis.
    Avian characters: presence of feathers; fore limbs modified as wings; tail with two rows of feathers; rounded brain case; presence of beak; bird like limbs & girdles; 'V'shaped furcula; presence of sternum. **(4 reptilian & 4 avian characters)**

18. Comment on **ammocoetus** larva.
    Larva of *Petromyzon* or Lamprey.
    - Buccal cavity bounded by hood like upper lip and distinct lower lip.
    - No suctorial buccal funnel
    - Non-functional paired eyes
    - BC is separated from pharynx by velum
    - Continuous median fin present
    - Endostyle, peripharyngeal and hypopharyngeal grooves present. **(4 points).**

Part C

(Answer any 4; each carries 4 marks)

19. Briefly explain any 4 culture fishes of Kerala

***Catla catla*-** fastest growing carp in India, deep body, conspicuous head, large upturned mouth and non fringed lips. Broad dorsal fin, body is silvery white but darkish in weedy waters. Surface feeder, feeding mainly on zooplankton. It matures when 2 years old and weighs five kilograms.

***Labeo rohita*-** relatively slower growth than Catla but tastiest of Indian carps. Small or pointed head, terminal mouth with fringed lower lip, dull reddish scales on the sides and pink reddish fins. Column feeder. May growover 1m in length. This species attains sexual maturity when about 2 years old.

***Cirrhinus mrigala*-** small head with blunt snout, terminal mouth with non fringed lips, bright silvery body with reddish fins relatively slower growth than Catla and Rohu, bottom feeder subsisting mainly on semi rotten vegetables matter and detritus. species become sexual mature by the second year.

***Etroplus suratensis*-** Delicious table fish, body is light greenish with eight yellow transverse bands and white spots. Body laterally compressed. Herbivore, exhibits parental care, easily cultured in paddy fields. Growth rate is 210 mm for the first year and by second year the fish attains maturity.

***Cyprinus carpio*-** Exotic species but adapts well to warm waters, breeds almost throughout the year. Omnivorous scavenger generally feeding at the bottom of the ponds. Common carp reaches sexual maturity by the first year.

***Tilapia mossambica*-**Exotic species, mouth is larger, single dorsal fin, have cycloid scales, rapid growth rate, breeds throughout the year. Exhibits parental care. Predatory in habit therefore not a compatible species for culture with carp.

(explanation of any 4 relevant culture fishes may be considered)

20. Explain the features of Chondrichthyes and Osteichthyes.

Chondrichthyes: Skeleton made of cartilage; placoid scales; **heterocercal** caudal fin; **swim bladder & lungs are absent**; liver filled with oil to provide buoyancy; mouth is ventral in position; polyphyodont dentition; intestine characterised by **spiral valve** in majority of species; **5-7 pairs of gills slits**; separate sexes & 3 ways of reproduction- oviparous, viviparous or ovoviviparous; claspers serve as copulatory organs; sharks, skates and rays.

Osteichthyes: bony skeleton; body laterally compressed mostly; scales are cycloid, **ganoid** or **ctenoid**; mouth is terminal or sub terminal in position; gills & gill opening covered by **operculum**; **homocercal** caudal fin; many possess swim bladder to control buoyancy; spiral valve absent except in lung fishes; **cloaca absent**, separate anal & urinogenital openings; mostly claspers are absent; bony fishes.**(8 points each).**

21. Compare the salient features of Apoda and Anura

Apoda	Anura
1. Limbless amphibians 2. Blind; small eyes hidden beneath the skin 3. Dermal scales embedded in the wrinkled skin 4. An eversible copulatory organ present 5. Fertilization is internal 6. Middle ear & tympanum absent 7. Compact & solid skull adapted for burrowing 8. *Ichthyophis/Gegenophis/ Uraeotyphlus*	1. Limbs are well developed 2. Well developed bulging eyes 3. Skin is scalelss & loosely attached to the body 4. No special copulatory organ 5. Fertilization is external 6. Middle ear & tympanum present 7. Not a typical burrowing form 8. Eg.,frogs, toads etc.

(any relevant 8 points)

22. Explain the arterial system in rabbit
    Explanation of arterial system. Credit may be given if diagram is drawn.
23. Give an account of the salient features of Order Chiroptera.
    - True **flying mammals**
    - Nocturnal & power of echo-location
    - Fore limbs are modified for flight
    - Presence of **patagium** for flight
    - Hind limbs are weak with clawed digits
    - Small eyes & poor vision
    - Large **pinnae**
    - Sternum with keel or carina
    - Hollow limb bones to reduce weight
    - Eg: Bats or flying fox/flying lemur **(8 points)**
24. Explain the parental care in fishes.
    Parental care in fishes exhibited either by male only or female only or by both.
    - **Brooding the eggs**: directly by aeration/fanning or indirectly by protecting the eggs from predators **(1 mark)**
      Mouth brooding, external egg carrying & egg carrying in brood pouch
    - **Internal parental care: (1 mark)**
      Oviparity/viviparity/ovoviviparity: Nutrients are given at different stages;
      Sea-horse deposits eggs into the male's brood pouch where they are fertilized.
    - **External Parental Care: (2 marks)**
      1. Eggs or young ones are guarded by one or both parents.
      2. Eggs may be deposited in a pre-constructed nest. In some, males will exhibit territoriality or fan the eggs, remove dead eggs and guard against predation.
      3. Some fishes use parts of their bodies to carry eggs or brood.
      4. Bubble nests are built by some fishes using sticky saliva.
      5. Some lay eggs in burrows and defend them.

6. Certain species of cat fishes have brood pouch on their dorsal lip to carry the eggs.
7. Some carry eggs in their mouth, in gill cavities etc..

Part D

(Answer any 2; each carries 12 marks)

25. Write an essay on flight adaptations in birds.
The external as well as the internal body organization of birds are well adapted for an aerial mode of life.
Morphological Volant adaptations:
1. Shape of the body 2. Wings & feathers 3. Mobile neck & beak 4. Bipedal locomotion **(explanation of the above points: 4 marks)**

Anatomical Volant adaptations:
1. Flight muscles 2. Endoskeleton 3. Respiratory system 3. Viscera 5. Digestive system 6. Circulatory system 7. Warm bloodedness 8. Excretory system 9. Brain & sense organs 10. Reproductive system

(explanation of the above points: 8 marks)

26. With suitable diagram, explain the structure of heart in rabbit?
Diagram of rabbit heart with labels: **5 marks**
Description of structure: **7 marks**

27. Write an essay on aquatic mammals and their adaptations.
Mammals under the orders **Cetacea**, **Sirenia** are completely adapted for an aquatic mode of life. **Carnivora** include Walrus. Examples of Cetacea: Gangetic dolphin, Killer whale, Sperm whale, Porpoise.
Sirenia: Sea cow or Dugong. **(2 marks)**
Modifications of original structures:
Spindle shaped body; large size; paddles or flippers with modifications; position of valvular nostrils; Lung peculiarities; skeletal adaptations; digestive system and dentition; circulatory system modifications.
Loss of structures: skin peculiarities; absence of pinnae, skin glands, nails, hind limbs, scrotal sacs etc.
Development of new structures: Flukes; unpaired dorsal fin; blubber; baleen plates; harderian glands etc.
(Explanation of the above points-modificaton of the original structures: 5 marks; loss of structures: $2^1/_2$ marks; development of new structures: $2^1/_2$ marks)

28. Give the salient features of the following orders citing suitable examples:
a] Rhynchocephalia
b] Squamata:
c] Chelonia
Order Rhynchocephalia and Squamata come under the sub class Diapsida of class Reptilia. egs.,*Sphenodon* and *Chamaeleon* respectively. Order Chelonia belongs to sub class Anapsida of Reptilia.eg.,*Chelone mydas.*
(Detailed explanation of the above examples along with orders:

(4x3= 12 marks)

29. Write an essay on flight adaptations in birds.

The external as well as the internal body organization of birds are well adapted for an aerial mode of life.

Morphological Volant adaptations:

2. Shape of the body 2. Wings & feathers 3. Mobile neck & beak 4. Bipedal locomotion **(explanation of the above points: 4 marks)**

Anatomical Volant adaptations:

2. Flight muscles 2. Endoskeleton 3. Respiratory system 3. Viscera 5. Digestive system 6. Circulatory system 7. Warm bloodedness 8. Excretory system 9. Brain & sense organs 10. Reproductive system

(explanation of the above points: 8 marks)