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Model Answer of AU-7002

B.Sc. (R.T.) I - Semester - 2014-15

RTZ - 103 : Invertebrates

Section - A

Q.1. Objective Type Questions :

- (i) Arthropoda
- (ii) Lamarck
- (iii) Sol-gel
- (iv) Choanocytes
- (v) Aschelminths
- (vi) Digenetic
- (vii) Annelida
- (viii) 19
- (ix) Hemichordata
- (x) Echinodermata

Section - B

Short answer type questions :

Q.2. Describe the classification of animals given by Aristotle :

- Father of Zoology
- Founder of Taxonomy
- Wrote first book on Zoology: Historia animalia
- Classified the animals for first time
- Classified living things into plants, animals and human beings - Artificial Classification.

- Also classified animals on the basis of their habitats
eg. Air, water and land.

- Finally he classified the animals as:

(A) Anaima - Animals without red blood (invertebrates)

(B) Enaima → Animals with red blood (vertebrates)

(i) Vivipara → Animals giving birth to young ones

(ii) Ovipara → Animals that lay eggs.

Q.2. What is Polymorphism? Describe it in short.

Definition → Occurance in the same species of more than one type of individuals which differ in form and function is known as polymorphism.

- This ensures an efficient division of labour between the individuals.

eg. Hydrozoan Colony → Zooids are united in the form of Colony.

- Basic forms →

(1) Polyp → Sessile, Asexual, Nutritive

(2) Medusa → Motile, Sexual, reproductive

Patterns of Polymorphism → Degree of Polymorphism varies greatly in different groups of Hydrozoa.

(a) Dimorphic Polymorphism: simplest and commonest
eg. Obelia

(i) Gastrozooids → Related with feeding.

(ii) Gonozooids → Related with reproduction.

(b) Trimorphic Polymorphism →

- (i) Gastrozooids →
- (ii) Gonozooids →
- (iii) Dactylozooids → Non-feeding & with nematocyst, related with protection.

eg. Plumularia

(c) Polymorphic polymorphism → Generally five types of zooids are present. eg. Hydractinia

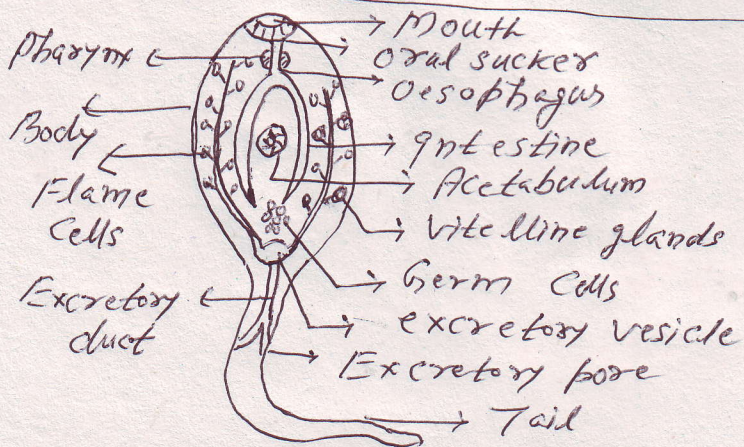
→ Extreme examples of Polymorphism is Physalia, Porpita, Velella, etc.

- (i) Gastrozooids
- (ii) Gonozooids
- (iii) Dactylozooids
- (iv) Tentaculozooids → Tentacles with sensory cells.
- (v) Skeletozooids → spiny projections of chitin.

→ Importance of Polymorphism →

- (a) Essentially a phenomenon of division of labour.
- (b) Polyp concerned with feeding, protection & asexual reproduction.
- (c) Medusa concerned with sexual reproduction.

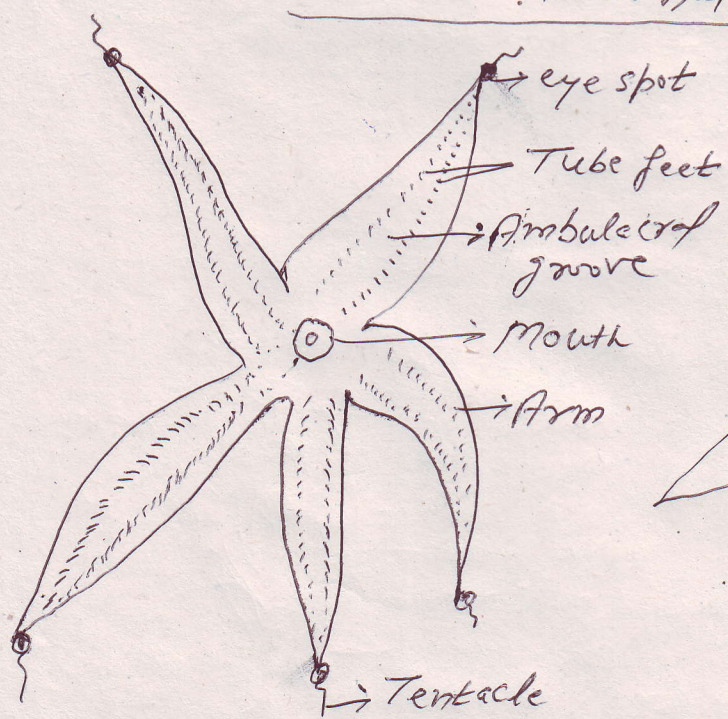
Q.3. Draw a labeled diagram of Cercaria larva:



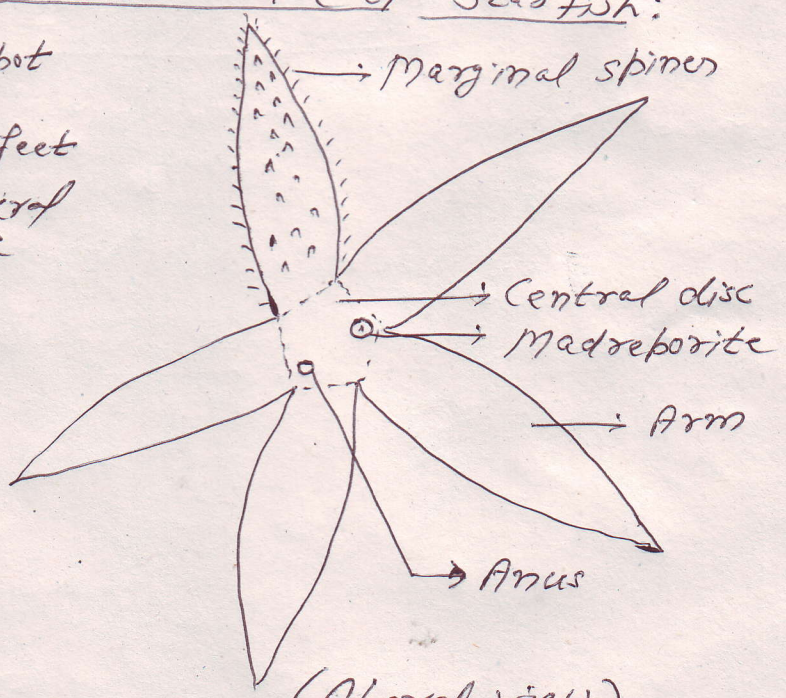
Q.4. Write the general characters of Phylum Annelida

- ① Aquatic, burrowing, parasitic, etc.
- ② Triploblastic, eucoelomates, bilateral symmetry
- ③ Elongated and metamerically segmented.
- ④ Locomotory organs are setae or parapodia
- ⑤ Alimentary Canal complete & digestion extracellular.
- ⑥ Closed Blood vascular system & Hb dissolved in plasma.
- ⑦ Cutaneous respiration
- ⑧ Excretion by nephridia
- ⑨ In nervous system, nerve ring is present
- ⑩ Many types of receptors present.
- ⑪ Hermaphrodite and fertilization external
- ⑫ Larva is Trochophore
- ⑬ Regeneration is common.

Q.5. Describe external structure of Starfish:



(Oral view)



(Aboral view)

Classification → Phylum - Echinodermata

Class - Asteroidea, Genus - Asterias

- Exclusively marine forms, free living on bottom, move by tube feet, carnivorous, have power of autotomy & regeneration.
- It is star shaped, mostly have five arms, pentamerous radial symmetry, yellow to orange in colour. flat body with distinct oral and aboral surfaces.
- Oral surface → Directed to the substratum, central disc bears mouth, from each angle of mouth extends an ambulacral groove, covered by spines, having two rows of tube feet which perform locomotion, respiration and capturing of food. Tip of each arm bears a terminal tentacle which is tactile and olfactory organ. At its base, occurs a eye spot which is photosensitive.
- Aboral surface: Dorsal surface is convex, contains long spines, between these, pedicellariae (for cleaning or protecting the body) & dermal branchiae (for respiration and excretion) are present. Anus is situated ^{close} to the centre. A madreporite is present in an inter-radius between two arms which leads into the W.V.S.

Q.6. Write the affinities of the Balanoglossus

- It is also called as phylogenetic relationships
- Affinities with Chordata:
 - (a) Notochord Present
 - (b) Dorsal, hollow and tubular nerve cord Present
 - (c) Pharyngeal gill slits present
 - (d) Coelom is enterocoelic

- Objections: (a) Notochord is not true, it is termed as stomochord or buccal diverticulum

- (b) Nervous system is invertebrate type
- (c) Gill slits are numerous but in chordates only 5-7 pairs.
- (d) Lacks metameric symmetrization, cephalization, paired appendages, post anal tail, exoskeleton, etc.
- (e) Dorsal heart & colourless blood.

- Affinities with Annelids:

- (a) Body is vermiform
- (b) Burrowing habit & casting production.
- (c) Collar is similar to clitellum
- (d) Proboscis and prostomium similar
- (e) Dorsal position of heart
- (f) Similarities in Tornaria and Trochophore larva.

- Objections:

- (a) Annelids do not have pharyngeal gill slits, buccal diverticulum & dorsal tubular nerve cord.
- (b) Nephridia present in annelids but Balanoglossus lacks.
- (c) Dissimilarity in Tornaria & Trochophore larva in respect to Coelom.

- Affinities with Echinodermata:

- (a) Enterocoelic Coelom present
- (b) Heart vesicle and glomerulus of Balanoglossus and dorsal sac and axial gland of echinoderms are homologous structures.
- (c) Nervous system is poorly developed
- (d) Both have common habits & ecological niches.
- (e) Both have power of regeneration
- (f) Tornaria larva is similar to Bipinnaria larva.

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Objections: (a) Tornaria larva has apical plate but in Bipinnaria, it is absent.

Section - 'C'

Long answer type questions

Q.1. Describe in detail the canal system in Sycon

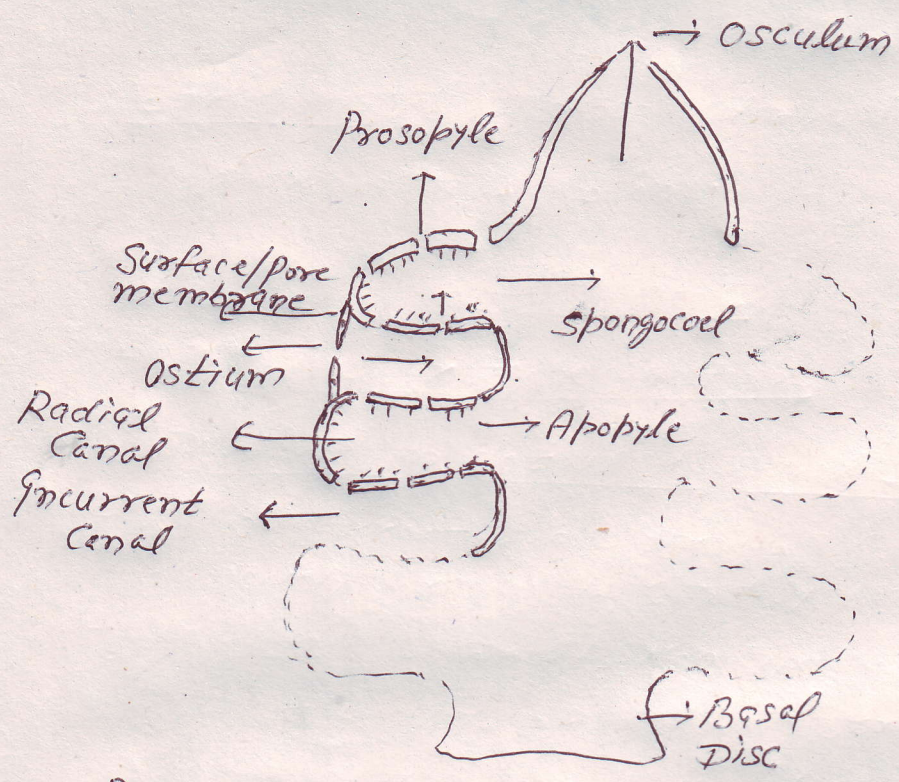
- Water current flows through a certain system of spaces collectively forming the canal system.

- In Sycon, sponoid / sycon type canal system is present

It consists of following structures:

- ① Ostia → These are situated on surface membrane formed by pinnaocytes. These open into internal canal.
- ② Internal Canals → These are lined by pinnaocytes and open into flagellated canal through prosopyle.
- ③ Prosopyle → It is formed by porocyte which connects internal canal to flagellated canal.
- ④ Flagellated / Radial Canal → It is lined by choanocytes / flagellated / collar cells. It opens into spongocoel by apopyle.
- ⑤ Apopyle → It connects radial canal to spongocoel.
- ⑥ Spongocoel → It is lined by pinnaocytes and opens outside by osculum.
- ⑦ Osculum → It is exit pore through which water current goes out side.

- Generation of Water Current: Due to continuous beating of flagella of choanocytes, water current is generated which flows through canal system.



Path of Water Current:

Water → Ostia → Incurrent Canal → Prosopyle →
 → Radial Canal → Apopyle → Spongocoel → Osculum
 Water (Outside) ←

- Function of Canal system → All the vital activities are performed through canal system like Nutrition, respiration, excretion, reproduction, etc.

Q.2. Describe reproductive system of Prawn.

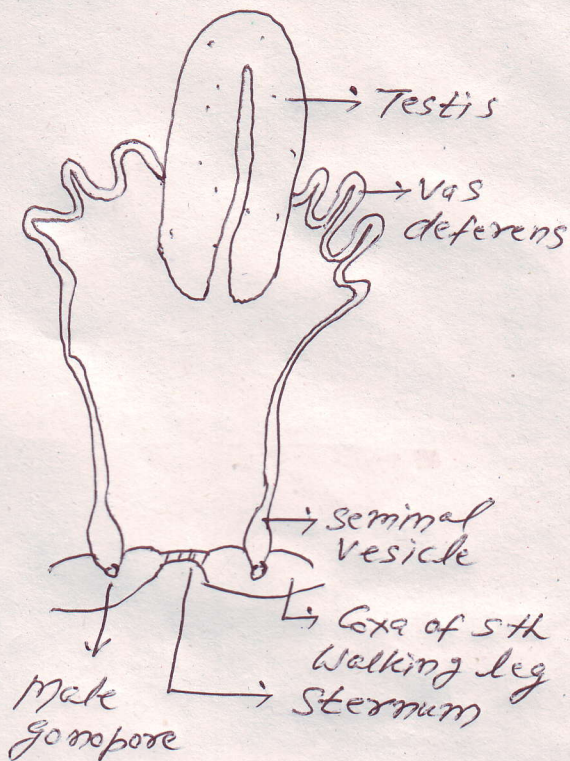
- Prawn shows clear sexual dimorphism (Unisexual)

Ⓐ Male reproductive system:

- It consists of following organs:

- ① Testes → These are one pair. Both are fused at anterior end. They form sperms by the process of spermatogenesis.

② Vasa deferentia: These are long, narrow and coiled tubes which conduct the sperms to Seminal Vesicles.

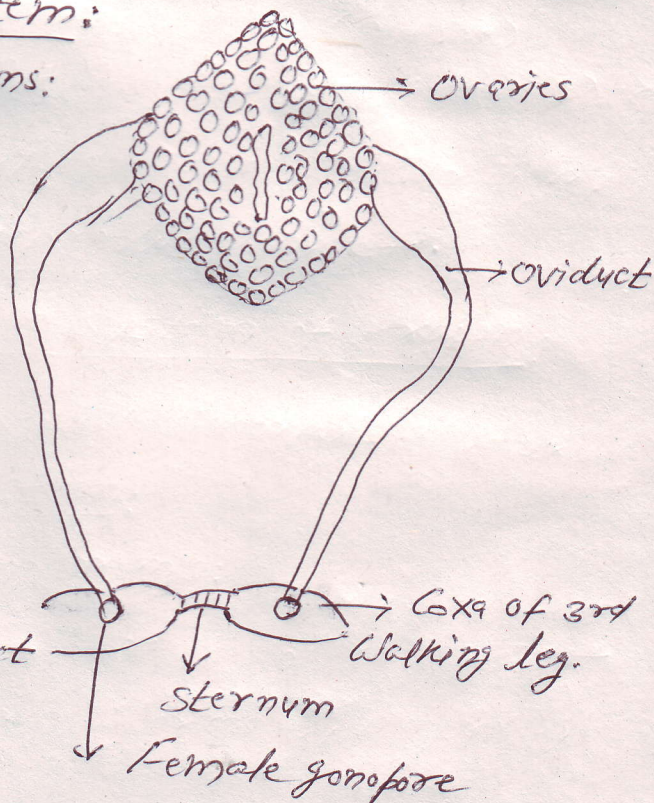


③ Seminal vesicles: These are also one pair and sac like structures which store the sperms temporarily and also provide nutrition to sperms. These open outside by male gonopore.

④ Male gonopores → These are situated on the coxae of 5th walking legs and release the sperms in water.

③ Female Reproductive system:
- It consists of following organs:

① Ovaries: These are one pair, compact, sickle shaped and white in colour. These are fused completely except in the centre. These produce ova by Oogenesis. Ova are polylecithal.



② Oviducts: These are paired, short and wide. These conduct the ova smoothly.

③ Female gonopores: These are situated on the coxae of 3rd water legs which release ova.

Q.3. Classify Phylum Mollusca with general characters and suitable examples.

General characters → (a) These are soft bodied animals.

- (b) These are aquatic and terrestrial.
- (c) Have two distinguish characters: Radula and Mantle.
- (d) Organ system grade of body organisation
- (e) Triploblastic, eucoelomates, mostly unsegmented and bilateral symmetry.
- (f) Univalve or bivalve shell, may be internal.
- (g) Digestive system with hepatopancreas and radula.
- (h) Circulatory system is open but closed in cephalopods and blood with haemocyanin.
- (i) Amphibious respiration.
- (j) Excretion by renal organs
- (k) Nervous system is simple
- (l) A number of sense organs are present.
- (m) Mostly unisexual, fertilization generally internal or external
- (n) Larva is Trochophore.

- Phylum Mollusca is classified on the basis of many characters like foot, shell, mantle, radula, etc.

Class-I - Monoplacophora: Marine forms, bilateral symmetry, dome shaped mantle, limpet shaped shell, broad and flat foot, Radula present eg. Neoplina

Class-II Polyplacophora: Marine forms, Radula present, Shell as 8 dorsal plates, flat and muscular foot, fertilization external, larva is Trochophore. eg. Dentalium

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Class - III Scaphopoda: Marine forms, tusk shells, tubular shell open at both ends, no head and eyes, foot is conical, radula present, gills absent, Trochophore larva is present. eg. Dentalium

Class - IV Gastropoda: Torsion present, radula present, foot large and flat, shell present (univalve (single) or bivalve (double)) or absent, mostly marine, few are freshwater or terrestrial. eg. Pila, Aplysia, Cypraea, Limax

Class - V Bivalvia: Laterally compressed, head, eyes, tentacles, radula, etc. absent, foot flattened shaped, filter feeder, larvae are veliger or glochidium. eg. Mytilus, Unio

Class - VI Cephalopoda: Shell external, internal or absent, foot as tentacles, radula present, development direct, blood vascular system closed, ink gland present. eg. Loligo, Sepia, Octopus

Q. 4. Describe Digestive system of Earthworm:

- Alimentary canal of earthworm consists of following parts:
- ① Mouth → It is lunar shaped, situated on lower side of prostomium.
 - ② Buccal chamber/cavity → small tube, extends upto mid of 3rd segment.
 - ③ Pharynx: Pear shaped, situated in 3^{3/4} segment.
 - ④ Oesophagus → narrow tube, extends upto ^{first part of} 8th segment.
 - ⑤ Gizzard → Highly muscular, situated in 8th segment, it grinds the food.

⑥ Stomach: Extends from 9th to 14th Segment.

⑦ Intestine → It extends from 15th Segment to Anal Segment. It is divided into 03 part:

① Pre-typhlosolar region:

Extends from 14th to 26th Segment.

② Typhlosolar region → Extends

from 26th Segment to last 23-25th Segment. It consists typhlosolae which performs absorption.

③ Post typhlosolar region:

Situated in last 23-25 Segments.

⑧ Rectum: Post-typhlosolar region is also called rectum.

⑨ Intestinal caeca: It extends between 23-26th Segments.

⑩ Anus → It is situated on last Segment

