Model Answers (AS-2892)

B.Sc (Hon's) (First Semester) Examination, 2013 ,

BIOTECHNOLOGY (Zoology-II)

Paper-LBZS- 104 (higher nonchordata and Economic Zoology)

Section A

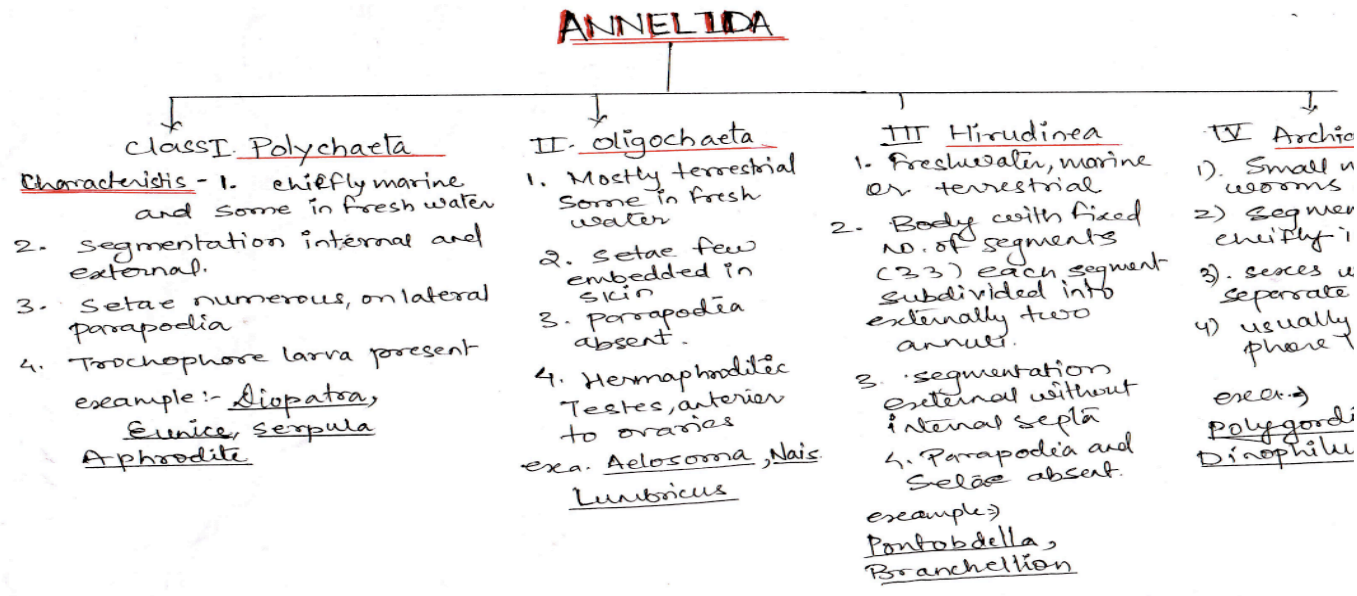
Q. 1- Answer

(i)- (d) (ii)- (d) (iii)- (a) (iv)- (d) (v)- (d)
(vi)- (d) (vii)- (c) (viii)- (a) (ix)- (b) (x)- (b)

Q.2-Answer : Characters of Annelida

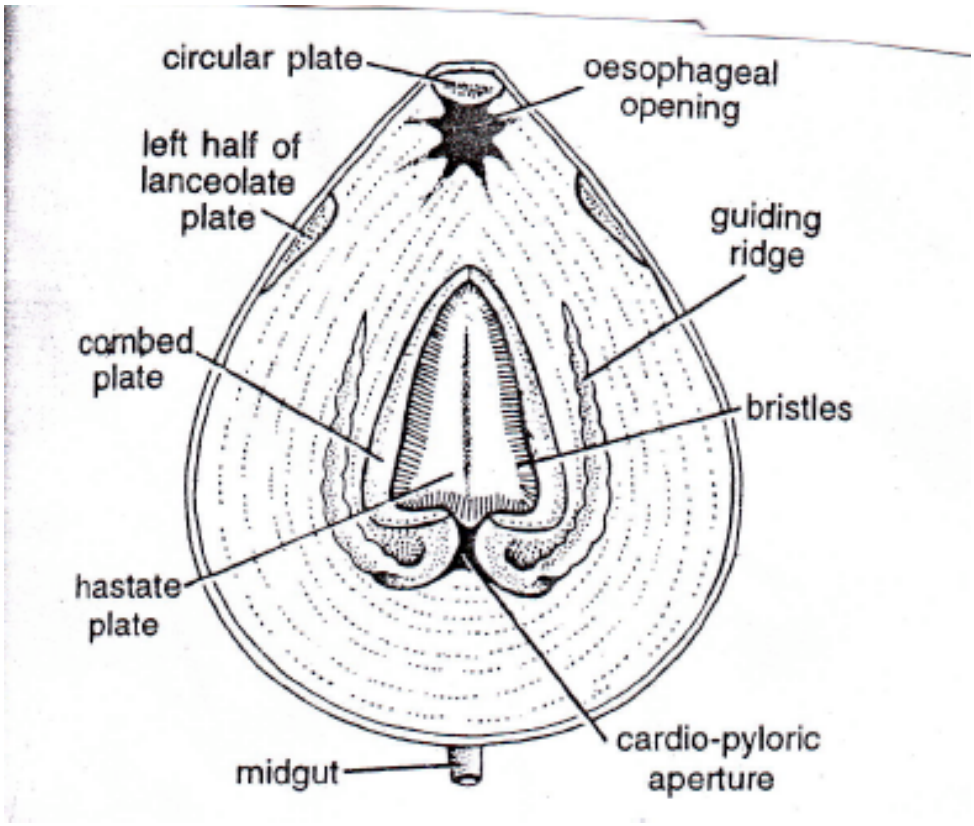
1. Mostly aquatic, some terrestrial, burrowing or tubicolous
2. Bilaterally symmetrical, triploblastic, truly coelomate and metamerically segmented into similar metamers
3. Epidermis of a single layer of columnar epithelial cells, covered externally by a thin cuticle.
4. Locomotory organs are segmentally repeated chitinous bristles called setae.
5. True coelom.schizocoelous,
6. Digestive system straight and complete.
7. Blood vascular system closed. Respiration by moist skin or gills of parapodia and head
8. Excretory system consisting of metamwrically disposed coiled tubes called nephridia
9. Nervous system with a pair of cerebral ganglia(brain) and a double ventral nerve cord bearing ganglia and lateral nerves in each segment.
10. Hermaphrodite, larva is trochophore. Regeneration common

Classification of Annelida



Q.3 Answer

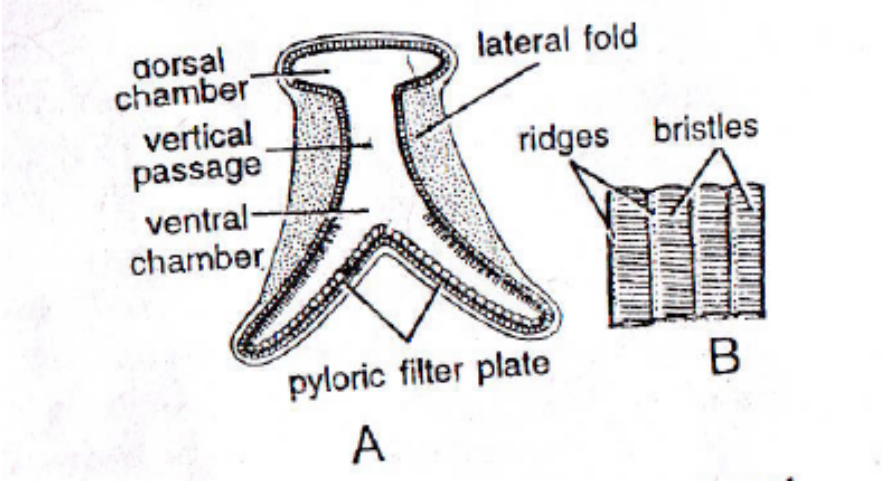
(a) Hastate plate: Hastate plate makes the mid-ventral floor of cardiac stomach. It looks like the head of spear. Its upper surface has thick growth of delicate setae and has a median ridge with gradually sloping sides. The posterior triangular part of hastate plate is depressed and fringed with setae along its edge. A narrow lateral groove makes the lateral broders of hastate plate and is supported by grooved plates. Inner side of each lateral groove is guarded by supporting rod bears a row of delicate bristles while outer side is bounded by ridged plate. These bristles always keep moving in a living prawn. The posterior part of hastate plate forms cardiopyloric aperture. The lateral longitudinal folds of hastate plate at the sides of cardiopyloric aperture act as guiding ridges and guide the food towards the cardio-pyloric aperture.



HASTATE PLATE

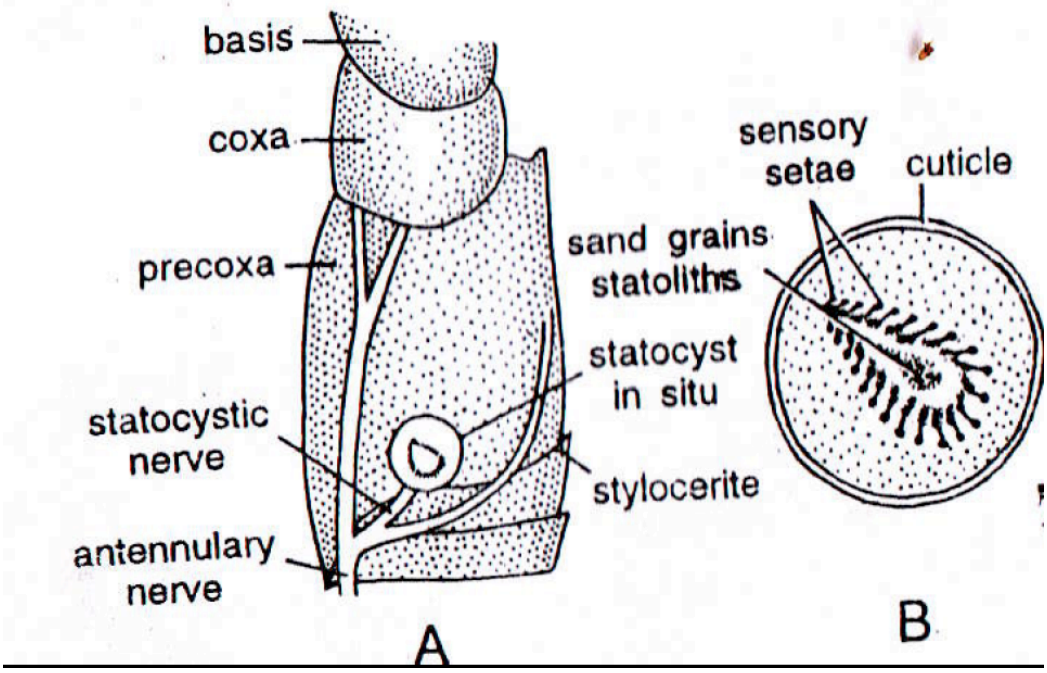
(b) Filter Plate

Filter plate is situated on the pyloric stomach. Food particles are filtered with the help of pyloric filter plate, when the food particles are large and are not passes through filter plate, these particles again return into the cardiac stomach for churning. Thus the filter plate help in digestion of food.



(c)Statocyst

The statocyst consists of a sac-like structure containing a mineralised mass (statolith) and numerous innervated sensory hairs. The statolith's inertia causes it to push against the setae when the animal accelerates. Deflection of setae by the statolith in response to gravity activates neurons providing feedback to the animal on change in orientation and allowing balance to be maintained. In other words, the statolith shifts as the animal moves. Any movement large enough to throw the organism off balance causes the statolith to brush against tiny bristles which in turn send a message to the brain to correct its balance



(A) Statocyst in precoxa region of Anntenule **(B) T.S. of Statocyst**

Q.4 Answer:

· Trochophore is a small, translucent, free-swimming larva found in marine annelids and most groups of molluscs.

· It is unsegmented, spherical or pear-shaped with distinct oral and aboral surfaces and is girdled by a ring of cilia, the prototroch that enables them to swim.

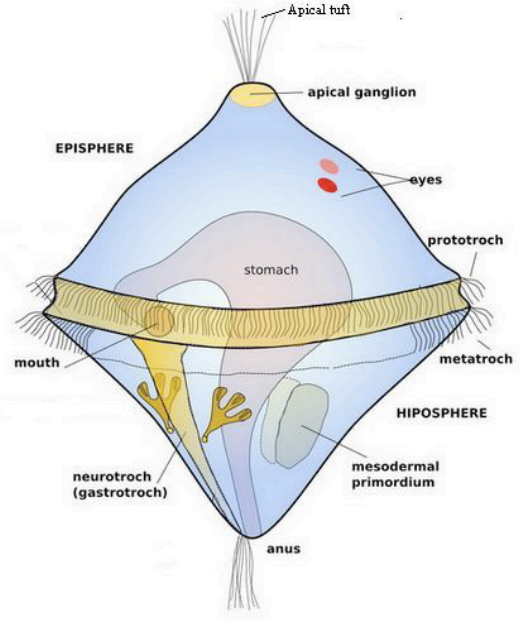
· There is a sensory apical organ or plate bearing a tuft of cilia. Apical ganglion is present beneath the apical organ.

· An ocellus (simple eye) is also present near the ganglion.

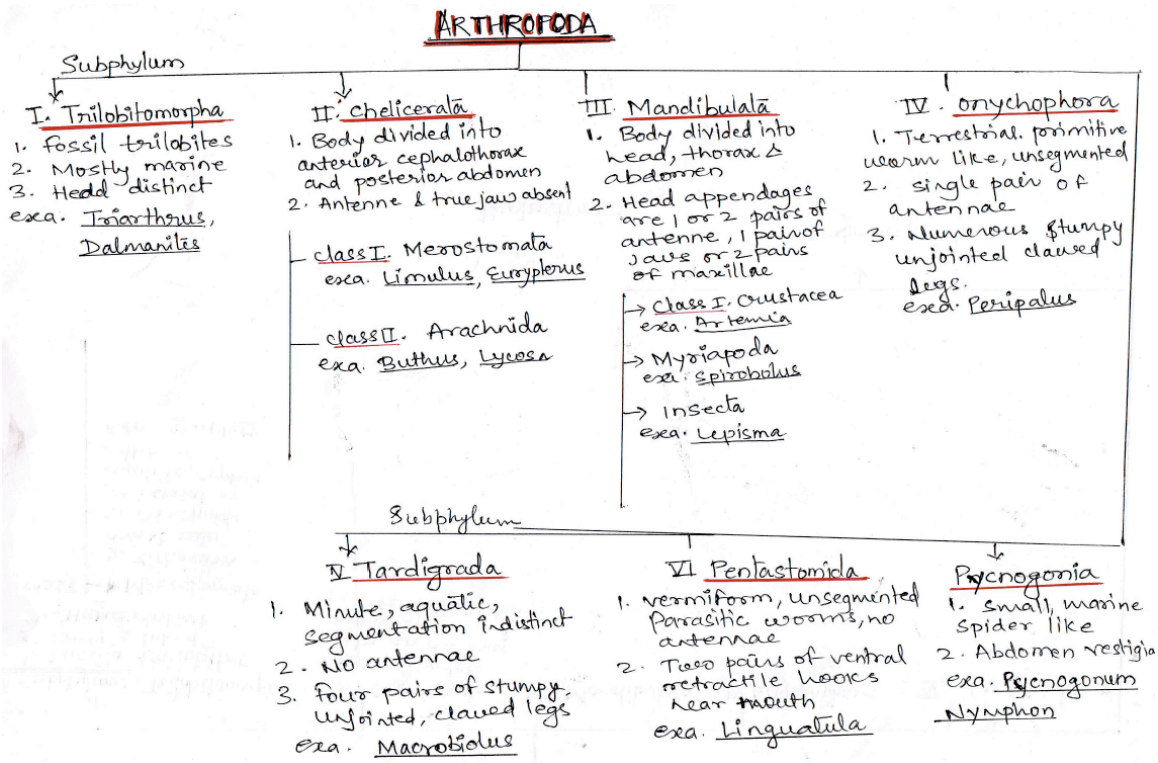
· Digestive tract is complete. Mouth is present on the ventral surface just beneath the prototroch.

· A post oral ciliated band called metatroch lies behind the mouth whereas telotroch lies just in front of anus. Below the prototroch are the mouth, stomach and anus. Mesoderm is a pair of undifferentiated masses of cells located in the lower cone. Solenocyte maintain proper internal salt-water balance. In some molluscs (such as gastropods and bivalves), the trochophore develops into a second stage, the veliger, before metamorphosing to adult form.

Trochophore larva



Q.5 **Ans**



Q.6 Ans

Insects arc well suited to live in different ecological habits; the feeding habits of insects are associated with ecological habits and modified to meet the requirement of their feeding habits.

TYPES OF MOUTH PARTS

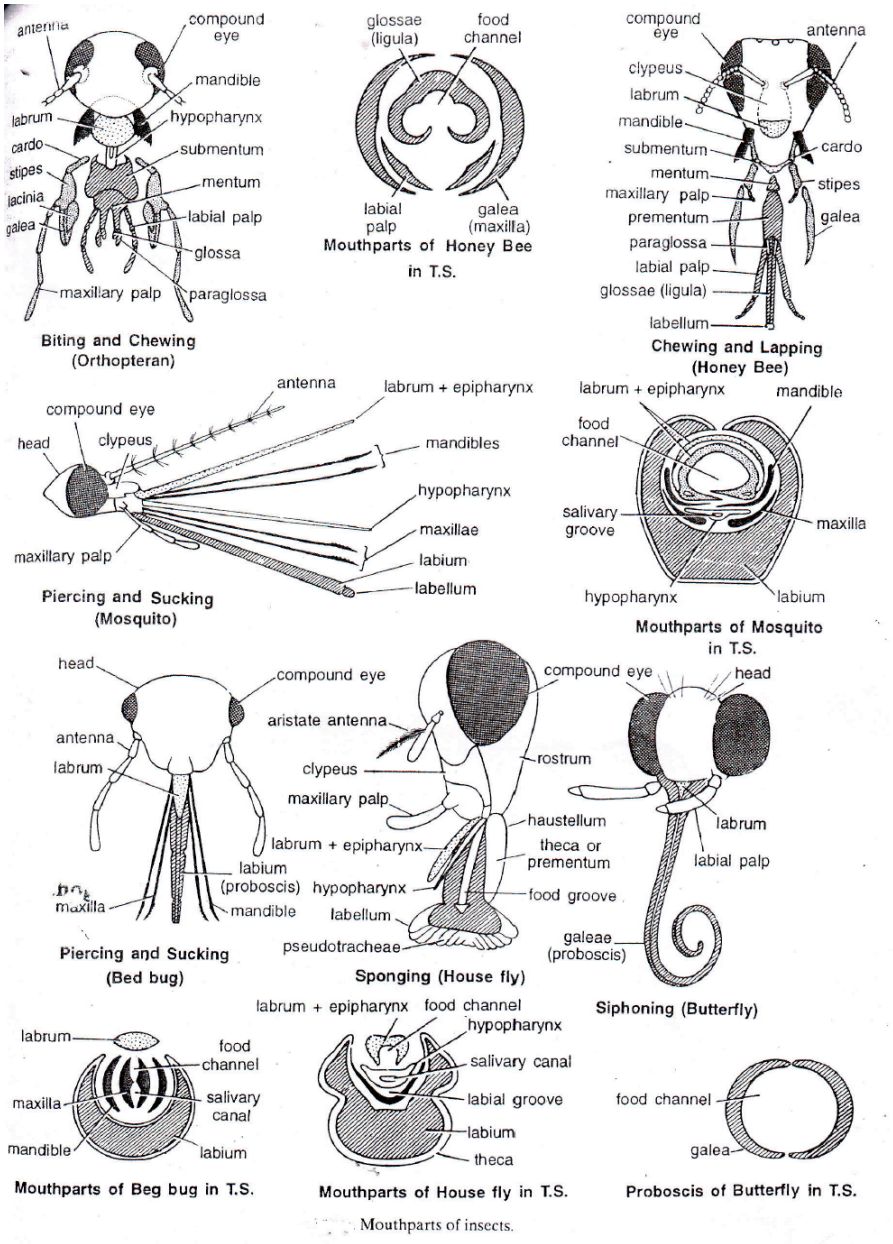
Biting and chewing mouth parts of cockroaches, grasshoppers, Dragon Hies and beetles arc of most primitive type. The larvae of mosquitoes, houscflies, butterflies and honeybees have biting and chewing type mouth parts.

Piercing and sucking type - Female mosquitoes, bedbugs, head louse, tsetse fly and Lac insect.

1. Sucking type - male mosquito
2. Sponging and sucking type - Housefly
3. Siphoning type - Butterfly

- Housefly mouth parts arc of **sponging and sucking type.**
- In Housefly, **labium** is modified into proboscis.The proboscis consists of 3 parts.
- Proximal - rostrum
- Middle - Haustcllum
- Distal - Labellum
- The rostrum distally articulated with haustellum by **hinge joint.**
- Haustellum is ventrally supported by **mentum or theca.**

• The labellum consists of 2 lobes known as labellae. Minute channels present on labellae are known as **pseudotrachea.**



Mouthparts of insects.

SIPHONING TYPE OF MOUTH PARTS:

Mouth parts of butterfly and moths are **siphoning type.**They are modified for sucking the juices from flowers or nectar from flowers The proboscis which helps in sucking the food is formed by apposition of **two galea** of 1st maxillae.. Maxillary palps and labial palps are present in reduced condition. Labium or upper lip is reduced. Mandibles are absent, Hypopharynx is absent. Labium is reduced to a triangular plate represented by a pair of labial palps. While ingesting the food material proboscis is uncoiled and inserted into the interior part of flower to suck the nectar due to flow of haemolymph into it under high pressure.

Q. 7 Ans:

Many molluscs are of social, medical, and economic importance.. times, and provide food, pearls, jewellery, dye, calcium and even cloth, and have been used as currency. Some snails transmit disease-causing parasites while others produce venoms now used in medicine. Many mollusca species are on the edge of extinction, while others are notorious pests.

Larva of Mollusca

Trochophore)

Trochophore, also called trochosphere, small, translucent, free-swimming larva characteristic of marine annelids and most groups of mollusks. Trochophores are spherical or pear-shaped and are girdled by a ring of cilia (minute hairlike structures), the prototroch, that enables them to swim. Above the prototroch is a sensory plate, an apical tuft of cilia, and an ocellus (simple eye). Below the prototroch are the mouth, stomach, anus, and other structures including the solenocyte, the function of which seems to be to maintain proper internal salt-water balance, and, in some species, one or two additional ciliary rings. In some mollusks (such as gastropods and bivalves), the trochophore develops into a second stage, the veliger before metamorphosing to adult form. Rotifers and the larvae (sometimes considered trochophores) of such invertebrates as phoronids and bryozoans are trochophore-like in appearance.

Veliger

A **veliger** is the planktonic larva of many kinds of sea snails, (clams) and tusk shells. The general structure of the veliger includes a shell that surrounds the visceral organs of the larva (e.g., digestive tract, much of the nervous system, excretory organs) and a ciliated velum that extends beyond the shell as a single or multi-lobed structure used for swimming and particulate food collection. The larva may have or may develop a foot that will be used by the newly settled veliger as it moves about and searches for an appropriate place to metamorphose. Following metamorphosis, the foot may be used by the juvenile to move about on (e.g. gastropods) or in (e.g. some bivalves) the seabed. The velum and foot of the veliger can be retracted into the shell to protect these structures from predators or mechanical damage. Veligers hatch from egg capsules or develop from an earlier, free-swimming trochphore larval stage. The veliger haches from an egg capsule, it will pass through the trochophore stage while in the egg capsule.Veligers mature to a point called "competence" where they settle to the substratum and metamorphose to become the juvenile stage. During metamorphosis they lose their velum and undergo external and internal changes that produce the juvenile. Feeding or non-feeding veligers are possible, depending on which species that produced them. In a feeding veliger, the larval stage is, in most cases, relatively "undeveloped" and must feed on phytoplankton for a period of weeks to months in order to develop to the point where it is able to metamorphose. During the larval period, the veliger grows and develops the organ systems needed for the metamorphosis . The veliger will metamorphose in a habitat where it can successfully feed and grow to adulthood.

Q.8 Ans

Prawn Culture: In India, prawns are reared by juveniles in paddy fields and allowing them to grow for a few months till they reach possible maximum size. Popularly this is known as "paddy- field culture". In India there are about 2 million hectares of brackish water areas which can be utilized for rearing prawns. In paddy-fields, juveniles of 5 species of marine prawns are trapped in varying proportions. A prawn culturing factory was started by the Central Marine Fisheries Research Institute in September 1975 at Narakkal, cochin. An improved method of culturing prawn is employed in India Philippines and Japan. It includes keeping male and female prawns together in artificially made tanks and inducing them to spawn. Th eggs and very young juveniles are collected and reared to bigger size by transferring them to bigger culture ponds. They are provided ideal conditions for nourishment and growth till they attain adult size.

Pearl Culture: Pearl is also called 'Moti'. It is white, highly shining globular in shape and made by the clam, a mollusc called *oyster* within its shell. Pearls are prized as gems from ancient times. Kochichi Mikimoto of Toba (Japan) is known to be the father of Pearl Industry. He discovered a method to induce foreign particle between the mantle and the shell of the pearl oyster and thus stimulated pearl formation.

Pearl formation or pearl fisheres:

A pearl is a result of an injury to molluscs. It is secreted by the mantle as a means of protection against some foreign body. Whenever a foreign body such as particle of sand or small parasite (a trematode or cestode larva), a small animalcule or alga or even bit of shell, gets between the mantle and the shell it becomes enclosed in a sac of mantle epithelium which is thus irritated. Irritation stimulates the mantle epithelium to secrete nacre thin concentric layers of mother of pearl all around the foreign body. The amount of deposition is in direct proportion to the degree of irritation. At the end of several years, A pearl is formed.

Pearl molluscs: Most precious pearls are found in pearl oysters of the genus *Pinctada*. Important species for pearls are *p.vulgaris, P.chemnitzi, P. Margaritifera, P.anomioides* and *P. Atropurpurea* found in Indian water.

Artificial pearl production: Japanies have developed a technique of producing pearls artificially by inserting foreign bodies; such as glass beads, into mantle of oysters. The oysters are retained in wire cages or creates until pearls are produced, which can be later removed and sold in markets. It takes 3 to 4 years produce a pearl. The best quality pearl is known as Lingha pearl obtained from marine oysters.

Culture of oysters:

The oysters are collected from the bottom of the sea with the help of nest and reared in rearing cages. Collection of the oysters is best done in two months of the summer season, when the sea is calm and the water is nearer the shore. The oysters are cleaned before being placed in culture cages for about 10- 20 days for acclimatization them to shallow water conditions. After which they are processed for artificial pearl formation.

Prawn Culture