



MARCH-2019 (AP)

PREVIOUS PAPERS**IPE: MARCH-2019(AP)****Time : 3 Hours****JR.ZOOLOGY****Max.Marks : 60****SECTION-A****I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. Define the term histology. What is it otherwise called ?
2. Radial symmetry is an advantage to the sessile or slow moving organisms. Justify this statement.
3. Distinguish between a tendon and a ligament
4. What is the haematocrit value ?
5. Distinguish between amphids and phasmids.
6. What are pneumatic bones ? How do they help birds ?
7. List any two differences between a flagellum and a cilium.
8. Why do we refer to the offspring, formed by asexual method of reproduction, a clone?
9. The eggs of *Ascaris* are called 'Mammillated eggs'. Justify
10. What is cyclomorphosis ? Explain its importance in *Daphnia*

SECTION-B**II. Answer any SIX of the following SAQs:****6 × 4 = 24**

11. Explain in brief 'Biodiversity Hot Spots'
12. Describe the structure of a multipolar neuron
13. What are the salient features of the echinoids ?
14. List out eight characteristics that help distinguish a fish from the other vertebrates.
15. Give an account of pseudopodia
16. What are the adverse effects of tobacco?
17. Draw a neat and labelled diagram of the salivary apparatus of cockroach.
18. What are the deleterious effects of depletion of ozone in the stratosphere?

SECTION-C**III. Answer any TWO of the following LAQs:****2 × 8 = 16**

19. Describe the life cycle of *Plasmodium vivax* in mosquito.
20. Describe the respiratory system of cockroach with the help of neat and labelled diagrams.
21. Describe different types of food chains that exist in an ecosystem.

IPe AP MARCH-2019

ANSWERS

SECTION-A

1. Define the term histology. What is it otherwise called? [AP M-19, 15]

- A: 1) **Histology:** Histology is the study of microscopic structure of different tissues.
2) It is also known as Microanatomy.

2. Radial symmetry is an advantage to the sessile or slow moving organisms. Justify this statement. [AP M-19]

- A: 1) Animals having radial symmetry live in water and they receive stimuli from any direction.
2) Accordingly, they can respond equally to any stimuli that come from all directions.

3. Distinguish between a ligament and a tendon. [TS May-22] [AP M-15,17,19]

- A: 1) Ligaments connect one bone with another bone.
They contain collagen fibres along with few elastic fibres.
2) Tendons connect skeletal muscles to the bone. They contain only collagen fibres.

4. What is the haematocrit value? [AP M-17,19,22][TS May-19]

- A: 1) The percentage of volume of RBC in total volume of blood is Haematocrit value.
2) It is also called packed cell volume.

5. Distinguish between amphids and phasmids. [AP M-19,22]

- A: 1) **Amphids** are cuticular depressions around the mouth of nematodes. They are chemoreceptors.
2) **Phasmids** are posterior unicellular glands of some nematodes. They are glandulo sensory.

6. What are pneumatic bones? How do they help birds? [AP Mar-19][AP May-17,19]

- A: 1) Pneumatic bones are bones with air cavities.
2) They reduce the weight of the bird (flight adaptation) and helps in easy flight of the bird.

7. List any two differences between a flagellum and cilium. [APM-17,19,20] [TS M-16,18,20]

A:	Flagellum	Cilium
	1) Flagellum is long whip like locomotor organelle .	1) Cilium is small hair like structure.
	2) Flagellum performs undular movement.	2) Cilium performs pendular movement.
	3) Flagellum helps in locomotion	3) Cilium helps in locomotion, food collection, movement of materials and also sensory.

8. Why do we refer to the offspring, formed by asexual method of reproduction, a clone? [APM-19,20][TS Mar-17]

- A:**
- 1) The term clone is used to describe morphologically and genetically similar individuals which are exact copies of their parent.
 - 2) Lower organism produce offspring by asexual reproduction.
 - 3) The offspring show 'uniparental inheritance' without any genetic variation, hence they are called a clone.

9. The eggs of *Ascaris* are called 'mammillated eggs'. Justify.

[AP Mar-19] [TS M-18,19]

- A:** The eggs of *Ascaris* have a protein outer coat which has papillae hence looks rippled. So it is called mamillated egg.

10. What is cyclomorphosis? Explain its importance in *Daphnia*. [AP M-19,22][TS May-17]

- A:** 1) **Cyclomorphosis:** It is the cyclic seasonal morphological changes of organisms

Ex: *Daphnia* (water flea).

- 2) **Importance:** In *Daphnia*, it is an adaptation for the changing densities of water.

In winter its head is round . In spring season, a hood starts developing.

In summer, a prominent hood is formed. In autumn the hood starts receding.

By the winter, the head becomes round again.

SECTION-B

11. Explain in brief 'Biodiversity Hot Spots'.

[AP M-19]

- A:**
- 1) The concept of 'Biodiversity Hotspot' was proposed by Norman Myers.
 - 2) Biodiversity hot spot is a 'Biogeographic region' with a significant reservoir of biodiversity that is under threat of extinction from humans.
 - 3) They are the earth's biologically richest and most threatened terrestrial Ecoregions.
 - 4) There are about 34 biodiversity hotspots in the world.

Ex: Western ghats and Srilanka, Indo-Burma and Himalayas.

- 5) Ecologically unique and biodiversity rich regions are legally protected in
 - (i) Biosphere Reserves
 - (ii) National parks
 - (iii) Sanctuaries
 - (iv) sacred groves.

12. Describe the structure of a multipolar neuron.

[TS M-18,22][AP M-19,22]

A: **Multipolar neurons** are the common neurons of the body. They consist of

- (1) Dendrites
- (2) Cell body
- (3) Axon.

1) Dendrites:

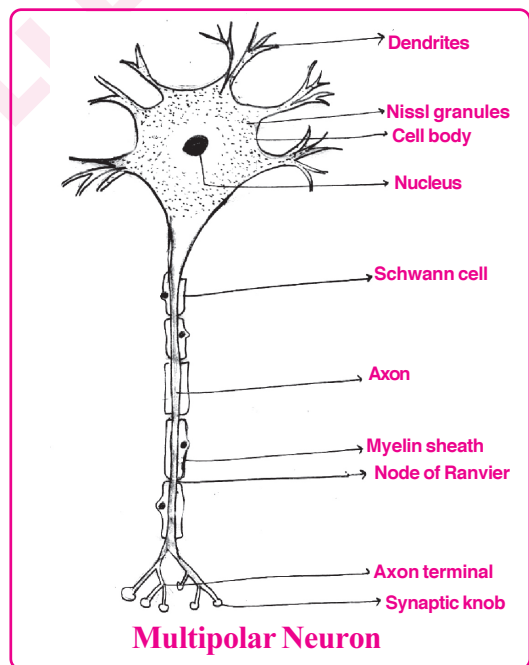
- i) They are short branched processes which arise from cell body.
- ii) They contain Nissl granules and neurofibrils.
- iii) They conduct nerve impulse towards the cell body (afferent)

2) Cell body :

- i) It is also called cyton or soma or perikaryon.
- ii) It includes Nissl granules (RER) for protein synthesis.
- iii) It contains larger spherical nucleus, Neurofibrils & Lipofuscin granules.

3) Axon:

- i) It is a long cylindrical thread like structure which arises from cell body.
- ii) The junction between cell body and axon is called Axon hillock
- iii) The plasma lemma is called axolemma.
- iv) The cytoplasm is called axoplasm.
- v) Microfibrils are present. Nissl bodies are absent.
- vi) The terminal part of axon is branched into small filaments called telodendria.
- vii) Telodendria have knob like endings called synaptic knobs or terminal boutons.
- viii) Synaptic knobs contain neuro transmitters (acetyl choline).
- ix) Axon carries nerve impulse from the cell body to the next neuron (efferent).



13. What are the salient features of the echinoids?**[AP M-17,19,22]****A: Salient features of Echinoids:**

- 1) Echinoidea is a class of phylum echinodermata.
- 2) Their body form is either semiglobular or disc like.
- 3) The spines over the body are movable.
- 4) Arms are absent.
- 5) The calcarious ossicles unite to form a strong test (corona or case)
- 6) Madreporite and Anus are Aboral. [MAA]
- 7) Ambulacral grooves are Closed. [AC]
- 8) Peidicellaria have Three jaws. [PT]
- 9) Aristotle's lantern is a five jawed masticatory apparatus present in mouth of sea urchins and absent in heart urchin.
- 10) Larva is Echinopleuteus.
- 11) **Ex:** Echinus (sea urchin), Echinocardium (heart urchin), Echinodiscus (sand dollar).

14. List out eight characteristics that help distinguish a fish from the other vertebrates.**A: Exclusive characters of fishes:****[AP M-19]**

- 1) Fishes are aquatic, ectothermal, scaly vertebrates.
- 2) The scales are mesodermal: In some fishes they are modified into shields or spines.
- 3) Vertebrae are amphicoelous (cavity on each side of centrum)
- 4) Fins are present for locomotion.
- 5) The fins are paired (pectoral and pelvic) and median (dorsal, caudal and anal)
- 6) Gill are respiratory organs.
- 7) Gill slits are open in cartilaginous fishes and enclosed by operculum in bony fishes.
- 8) The heart is ventral and two chambered, it is also called Branchial heart and Venous heart.

15. Give an account of pseudopodia.**[TS May-19] [AP M-19,20,22]**

A: I) Pseudopodia: Pseudopodia means false feet. They are temporarily formed for locomotion and food collection in Rhizopods. They are extensions of cytoplasm in the direction of movement.

II) Types of Pseudopodia:

(1) Lobopodia - Blunt, finger like pseudopodia. **Ex:** Amoeba and Entamoeba

(2) Filopodia - Filamentous pseudopodia. **Ex:** Euglypha

(3) Reticulopodia - Network like pseudopodia. **Ex:** Elphidium

(4) Axopodia or Heliopodia - Ray like pseudopodia **Ex:** Actinophrys

III) Process of formation:

- 1) Pseudopodium is formed by conversion of gel cytoplasm to sol cytoplasm and vice versa (Sol to gel)
- 2) Sol-gel theory is the most accepted theory.
- 3) Allen's theory 'Front contraction' or 'fountain zone' theory is more appropriate.
- 4) Actin and myosin molecules also have a role.
- 5) Pseudopodial movement or amoeboid movement is performed by Amoeba, Entamoeba macrophages, neutrophils etc.

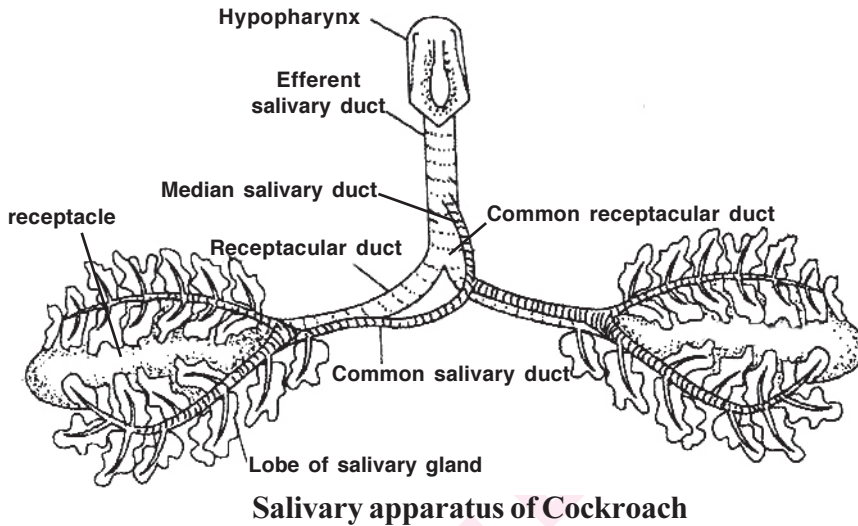
16. What are the adverse effects of tobacco?**[TS May-17,19,22] [AP M-16][IPE-14]****A: Adverse effects of Tobacco:****[AP Mar, May-19]**

- 1) Tobacco is smoked, chewed as gutkha or snuffed.
- 2) Smoking increases carbon monoxide level in blood and reduces oxygen level.
- 3) Tobacco contains Nicotine, an alkaloid.
- 4) Nicotine stimulates adrenal gland.
- 5) The hormones adrenaline and non-adrenaline increase blood pressure and heart rate.
- 6) It causes bronchitis, emphysema, coronary heart disease and gastric ulcers.
- 7) It increases the incidence of cancer of throat, lungs and urinary bladder.

17. Draw a neat labelled diagram of the salivary apparatus of cockroach.[AP Mar-19,20]

A:

[AP,TS M-17]



18. What are the deleterious effects of depletion of ozone in the stratosphere? [IPE-14]

A: I) Depletion of Ozone layer:

- 1) When ozone layer is depleted marketedly, it leads to ozone hole. [TS May-19] [AP Mar-19]
- 2) Then ozone layer becomes very thin and it can't prevent the UV radiation completely.
- 3) Then the UV radiations with shorter wavelengths (UV-B) enter the earth surface.

II) Deleterious (Harmful) effects of depletion of ozone:

- 1) UV rays damage DNA and may induce mutations.
- 2) They cause aging of skin, damage to skin cells and cause skin cancer.
- 3) High concentrations of UV-B radiation results in inflammation of cornea.
- 4) This leads to snow blindness and cataract.

Some times it permanently damages cornea.

SECTION-C**19. Describe the life cycle of Plasmodium vivax in mosquito. [AP, TS M-16,17,22]****A: Life cycle of Plasmodium in Mosquito(Mosquito Phase)- Ross Cycle: [AP Mar-20]**

Gametocytes of Plasmodium are formed in man and their further development takes place in female Anopheles mosquito.

When a female Anopheles mosquito bites and sucks the blood of a malaria patient, the gametocytes along with the other stages of the erythrocytic cycle reach the crop of mosquito. Here all the stages are digested except the gametocytes.

Further part of the life cycle consists of four phases.

I) Gametogony II) Fertilization III) Formation of Ookinete & Oocysts IV) Sporogony

I) Gametogony: The formation of male and female gametes from the gametocytes is called gametogony. It occurs in the lumen of the crop of mosquito.

(1) Formation of male gametes:

- i) During this process, the nucleus of microgametocyte divides into eight daughter nuclei.
- ii) The eight daughter nuclei pass into eight flagella like structures and form male gametes.
- iii) Then the flagella like structures begin lashing movements and get separated from the flagellated body. This process is called **exflagellation**.

(2) Formation of female gamete:

- i) The female gametocyte undergoes a few changes and transforms into a female gamete. This process is called maturation.
- ii) The nucleus moves towards the periphery, and the cytoplasm forms a projection called **fertilization cone**.

II) Fertilization: The fusion of male and female gametes is called fertilization.

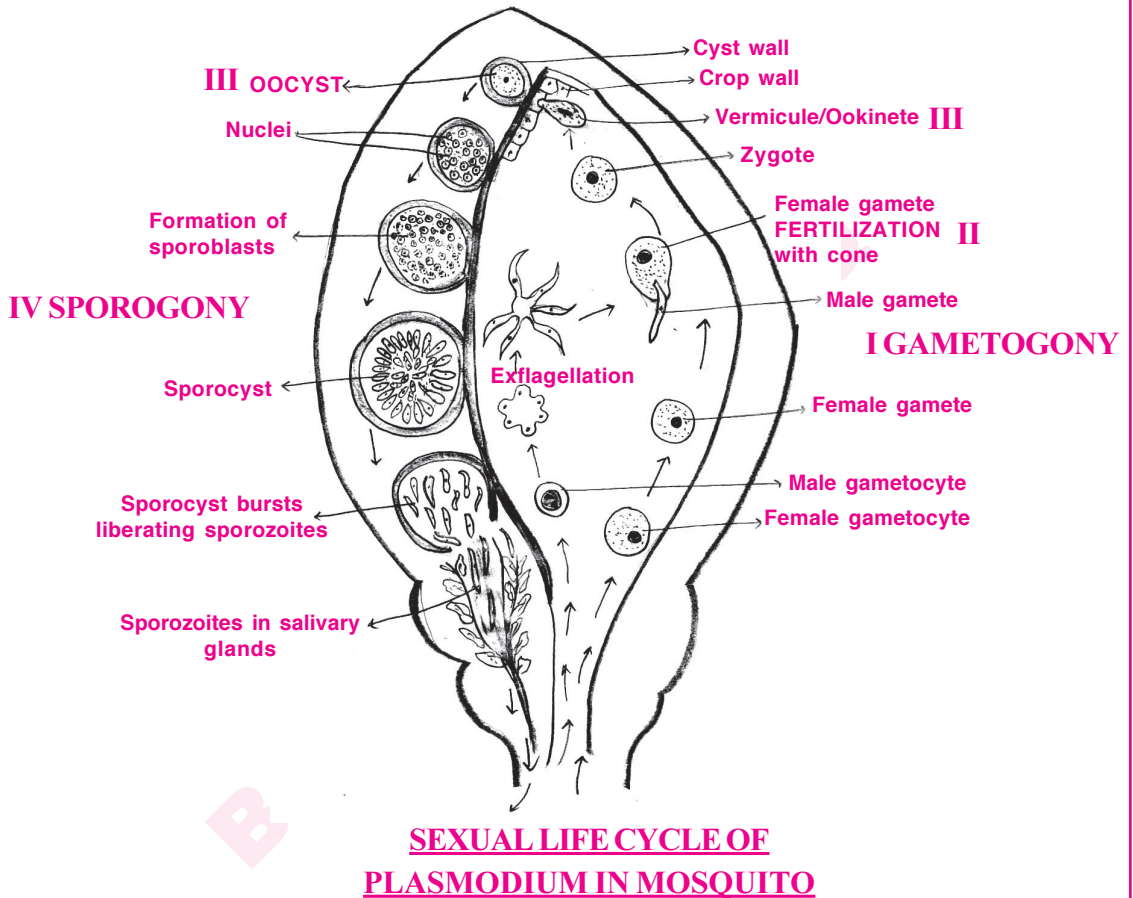
- 1) One of the active male gamete comes in contact with the 'fertilization cone' of the female gamete and enters into it.
- 2) The pronuclei and cytoplasm of these two gametes fuse with each other. As a result the zygote is formed.
- 3) These gametes are dissimilar in size and hence the process is called anisogamy.

III) Formation of Ookinete & Oocysts:

- 1) The **zygote elongates and becomes motile** and is called ookinete within **18 to 24 hours**.
- 2) It pierces the wall of the crop and settles beneath the basement membrane.
- 3) It becomes round and secretes a cyst around its body.
- 4) This encysted ookinete is now called oocyst

IV) Sporogony: The oocyst enlarges in size and begins sporogony.

- 1) According to Bano, the nucleus of the oocyst first undergoes reduction division.
- 2) Then the nucleus divides repeatedly by mitosis and produces a number of nuclei.
- 3) Each bit of nucleus is surrounded by a little bit of the cytoplasm and it transforms into a sickle shaped sporozoite. Oocyst with such sporozoites (about 10,000) is called sporocyst.
- 4) Sporocysts are formed into spindle shaped sporozites.
- 5) From there, they travel into the salivary glands and become ready for infection of a healthy person.
- 6) The life cycle of plasmodium in mosquito is completed in about **10 to 24 days**.



20. Describe the respiratory system of cockroach with the help of neat and labelled diagrams?
[AP M-16,18] [TS M-15,19]

A: D) Respiratory system of cockroach:

It is explained in two parts I) Tracheal System II) Mechanism

I) Tracheal system consists of (1) Stigmata (2) Tracheae (3) Tracheoles.

1) Stigmata (spiracles):

- i) The external openings of tracheal system are called stigmata (or) spiracles.
- ii) There are ten pairs of spiracles.
- iii) The first two pairs are in thorax. Remaining eight pairs are present in the abdominal segments.
- iv) Spiracles are located on the pleura.
- v) The respiratory system of cockroach is described as polypneustic (having more than 3 pairs of spiracles) and Holopneustic (all the spiracles are functional).
- vi) All spiracles are valvular. Each spiracle is supported by a chitinous ring peritreme.
- vii) The spiracle has hair like trichomes to filter dust from air.

2) Tracheae:

- i) All the stigmata open internally into small chambers called atria.
- ii) In thoracic region, horizontal tracheae arise from atria.
They join to form dorso cephalic and ventrocephalic trunks.
- iii) Branches from these trunks enter various parts of head.
Lateral longitudinal trunks are also present.
- iv) Three tracheal tubes arise from each abdominal atrium.
- v) They open into 3 longitudinal trunks, namely dorsal, lateral and ventral longitudinal trunks.
- vi) These trunks of both side are connected by commissural tracheae.
- vii) Branches are given out from all these trunks to various parts of the body.
- viii) The tracheal wall has three layers. They are
(a) Outer basement membrane (b) Middle epithelium (c) Inner cuticle called intima.
- ix) Intima is produced into a spiral thickening called Taenidia.
- x) Taenidia prevents the collapse of tracheae, when air is not present in it.

3) Tracheoles:

- i) Trachea ends in tracheoblast cell. It has several intra cellular tubules called tracheoles.
- ii) Intima and taenidia are absent in tracheoles. Their inner surface is lined by a protein called trachein.
- iii) Tracheoles are filled with tracheolar fluid.

II) Mechanism: Respiration involves two events namely inspiration and expiration.

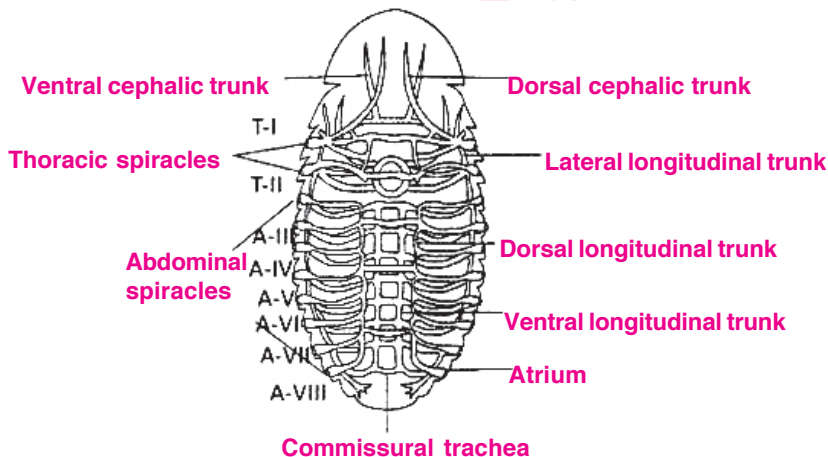
The muscles that help in this process are dorsoventral and ventral longitudinal muscles.

1) Inspiration:

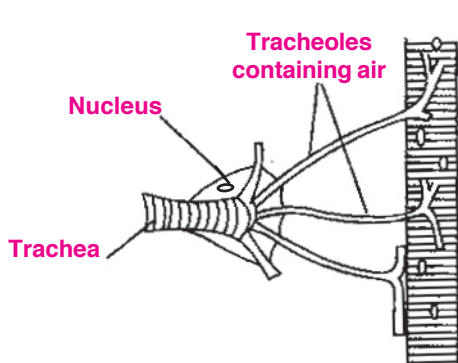
- i) Taking in of air is inspiration. The volume of body is increased by relaxation of dorsoventral and ventral longitudinal muscles. Air is drawn into tracheal tubes and reaches tissues.
- ii) During inspiration, thoracic spiracles are kept open and abdominal spiracles are closed.
- iii) Inspiration is a passive process (does not use energy)

2) Expiration: Sending out air is Expiration.

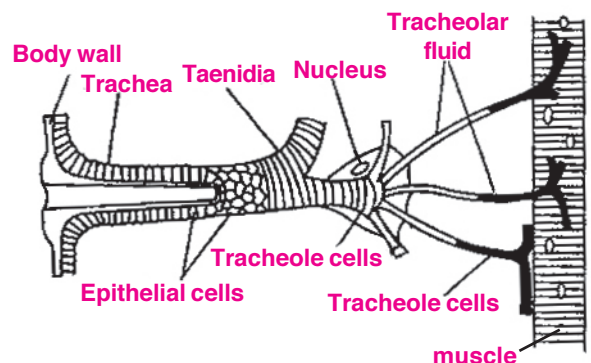
- i) During expiration, thoracic spiracles are closed. The thoracic spiracles are closed and abdominal spiracles are kept open.
- ii) Expiration is an active process as it uses energy.
- iii) Opening and closing of spiracles is influenced by CO_2 tension in haemolymph and O_2 tension in trachea.



RESPIRATORY SYSTEM OF COCKROACH



Tracheoles without fluid during active



Tracheoles with fluid during resting

21. Describe different types of food chains that exist in an ecosystem.

[TS May-22][AP, TS Mar-19][AP May-17] [AP, TS M-16][IPE-14]

A: I) Food Chain:

- 1) Sun is the main source of energy to ecosystem.
- 2) The biological systems of environment have several food levels called trophic levels.
- 3) A trophic level is composed of organisms which have same source of energy and same number of transferring steps. There are generally 3 to 5 trophic levels.
- 4) Sometimes, a given species may occupy more than one trophic level. **Ex:** Sparrow
- 5) The food energy always passes from lower trophic level to higher trophic levels.
- 6) When the food path is linear, the components resemble the links of a chain. Hence, it is called food chain.
- 7) The food chain generally ends in decomposers.

II) Types of Food Chains:

- 1) Grazing food chain
- 2) Parasite food chain
- 3) Detritus food chain.

1) Grazing food chain: It is also called predator food chain. The first trophic level is occupied by green plants (producers). Second trophic level is occupied by Herbivores. The third, fourth and fifth trophic levels are occupied by primary, secondary and tertiary carnivores respectively.

Ex: i) Rose bush → aphids → spiders → small birds → hawks.

ii) Grass → Grass hopper → Frog → Snake → Hawk

iii) Grass → Goat → Man

iv) Plants → Caterpillar → Lizard → Snake

v) Grass → Deer → Tiger.

2) Parasitic Food chain: In this, the food energy passes from large organisms to small organisms. The first trophic level is occupied by large trees. They provide shelter and food to a variety of birds, reptiles and mammals. These animals form the second trophic level. Each of these animals host many ecto and endo parasites.

Ex: Tree → Birds, lizards, mammals → parasites.

3) Detritus Food chain: This food chain begins with detritus. Detritus is dead organic matter of leaves, dead bodies and **faeces** of animals. Detritus has decomposers which secrete enzymes, that break down detritus into simple absorbable substance. Detritus feeders are earthworms, flies and maggots which form the second trophic level.

Ex: Detritus → Earthworms → Frogs → Snakes → Hawks.

- **Food web:** The food chains are not isolated chains. They are interconnected. They form a web called food web. The feeding relationships are not simple. There are omnivores which complicate the chains. **Ex:** Man, Bear, Crow.