

# Inter (Part-I) 2018

Biology	Group-I	PAPER: I
Time: 2.40 Hours	(SUBJECTIVE TYPE)	Marks: 68

## SECTION-I

2. Write short answers to any EIGHT (8) questions: (16)

(i) Differentiate between anatomy and morphology.

**Ans** Anatomy:

The study of internal gross structure is called anatomy. It is the branch of biology.

**Morphology:**

It is the branch of biology. The study of formation and structure of living things is called morphology.

(ii) Define ecosystem with an example.

**Ans** A community together with its non-living surroundings is called ecosystem.

(iii) Differentiate between procariotique and eucariotique.

**Ans** The prokaryotes have only a limited number and type of organelles in their cytoplasm.

Eukaryotes are rich in number and include both membranous and double membranous organelles.

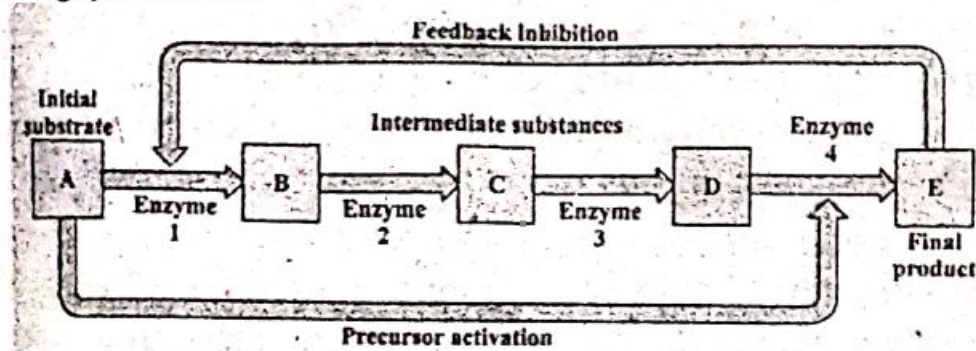
(iv) Differentiate between substrate and active site of enzymes.

<b>Ans</b> Substrate	Active site of enzyme
Every enzyme by virtue of its specificity recognizes and react with a special chemical substances called substrate.	Enzymes are composed of hundreds of amino acids joined together and coiled upon each other to form a structure. The catalytic activity is restricted to a small portion of the enzyme known as active site of enzyme.



(v) Define feedback inhibition of enzymes with diagram.

**Ans** A type of metabolic pathway control to regulates the rate at which cells synthesize amino acids and use them in building proteins.



(vi) What is induce fit model of enzyme action, who proposed it?

**Ans** On the basis of new evidences, Koshland (1959) proposed its modified form. This is known as "Induced Fit Model". He argued that when a substrate combines with an enzyme, it induces changes in the enzyme substrate. The change in structure enable the enzyme to perform its catalytic activity more effectively.

(vii) Differentiate between oligochaeta and polychaeta.

**Ans** **Oligochaeta:**

These animals have internal and external segmentation. Organs of locomotion are setae. Head region not prominent or distinct. They are hermaphrodite (bisexual).

**Polychaeta:**

These have a distinct head region with eyes and structure known as palps and tentacles. Sexes are usually separate. The organs of locomotion are parapodia.

(viii) What is meant by arachnida? give its two features.

**Ans** **Arachinda:**

Body has the anterior segments that are fused to form a combined cephalothorax, with a pair of appendages called chelicerae with claws, two pairs as pedipalps and four pairs of legs. There are no antennae



and no true jaws. Abdomen may be segmented or unsegmented with or without appendages. Respiration is by gills or special structures called book lungs, excretion is by the Malpighian tubules. Eyes simple, sexes are separate. They are oviparous (lay eggs). No true metamorphosis e.g., scorpions, spiders, mites and ticks.

(ix) Differentiate between gastropods and cephalopods.

**Ans** **Gastropods:**

These are asymmetrical and their body is covered with usually coiled one piece shell. The animal can withdraw itself into the shell. Both aquatic and terrestrial species are included in this class.

**Cephalopods:**

The members of this class are bilaterally symmetrical with dorso-ventrally flattened body. All species are aquatic. The shell is much reduced and internal.

(x) What is regeneration? Give its importance.

**Ans** Regeneration, the ability to reform lost organs is common among echinoderms, starfish, sea cucumber, sea lily, brittle star and sea-urchin exhibit this characteristics.

(xi) What is meant by parasexuality? Give its importance.

**Ans** Despite absence of sexual reproduction, imperfect fungi show special kind of genetic recombination, called parasexuality in which portions of chromosomes of two nuclei lying in the same hypha are exchanged.

(xii) Differentiate between conidiphores hyphae and coenocytic hyphae.

**Ans** **Conidiphores hypha:**

Conidia are non-motile, asexual spores which are cut off at the end of modified hyphae called conidiphores hypha.

**Coenocytic hypha:**

Such hyphae in which cytoplasm moves effectively, disturbing the materials throughout are called coenocytic hyphae.



**3. Write short answers to any EIGHT (8) questions: (16)**

**(i) Write down four postulates of germ theory of diseases by Robert Koch.**

**Ans** Following are the four postulates of germ theory of diseases by Robert Koch:

1. A specific organism can always be found in association with a given disease.
2. The organism can be isolated and grown in pure culture in the laboratory.
3. The pure culture will produce the disease when inoculated into susceptible animal.
4. It is possible to recover the organism in pure culture from experimentally infected animal.

**(ii) Write four important features of algae.**

**Ans** Following are the four important features of algae:

1. They are major producers of the aquatic ecosystem.
2. They play basic role in food chains and provide food and oxygen to other organisms.
3. Some algae such as kelps are source of food.
4. Many chemical substances are obtained from marine algae like Algin, Agar, carrageenan and antiseptics.

**(iii) What are diatoms? Write their importance.**

**Ans** The cell wall of each diatom consists of two shells that overlap where they fit together, much like a petri dish. Silica is deposited in the shell, and this glass-like material is laid down in intricate patterns.

**Importance:**

Diatoms are the major producers in the aquatic (marine and freshwater) ecosystems because of their extremely large numbers. Diatoms are very important in aquatic food chains.

**(iv) What are the red tides? How they are formed?**

**Ans** Dinoflagellates are known to have occasional population explosions or blooms. These blooms frequently colour the water orange, red or brown and are known as red tides.



(v) What are the apicomplexans?

**Ans** Apicomplexans are a large group of parasitic protozoa, some of which cause serious diseases such as malaria in humans.

(vi) What are the fronds?

**Ans** The class Filicineae contains seedless plants with foliar sporangia. The leaves are called fronds.

(vii) Write botanical name of two plants belong to family Solanaceae.

**Ans** Botanical name of two plants belong to family Solanaceae is given below:

1. *Solanum tuberosum* (Potato).
2. *Nicotiana glauca* (Tobacco).

(viii) Write photolysis of water in photosynthesis.

**Ans** This hole is filled by the electrons which are extracted, by an enzyme, from water. This reaction splits a water molecule into two hydrogen ions and an oxygen atom, which immediately combines with another oxygen atom to form  $O_2$ . This water splitting step of photosynthesis that release oxygen is called photolysis. The oxygen produced during photolysis is the main source of replenishment of atmospheric oxygen.

(ix) What is Z-scheme of phosphorylation?

**Ans** The path of electrons through the two photosystems during non-cyclic photophosphorylation is known as Z-scheme from its shape.

(x) Write the role of human pancreas in digestion.

**Ans** The pancreas is a vital digestive organ because it produces a variety of enzymes that break down all of the major food groups. These enzymes are secreted into the duodenum along with a high concentration of bicarbonate. Bicarbonate makes the pancreatic secretions alkaline in nature. This flow of alkaline fluid into the smaller intestine helps to neutralize the acidic chyme that comes from the



stomach. Neutralizing the acidic chyme provides a better environment for activation of the pancreatic enzymes.

(xi) What are the piles?

**Ans** Piles or haemorrhoids are masses of dilated, tortuous veins in the anorectal mucosa. These masses may sometimes start bleeding during bowel movements. Situation may aggravate when the patient suffers from constipation. The urge to defecate is depressed and it becomes difficult to expel the faeces.

(xii) Differentiate between obligate parasite and facultative parasite.

**Ans**

Obligate parasite	Facultative parasite
1. They can grow only on living host and cannot be grown on available defined growth culture medium.	1. These can grow parasitically on their host as well as in artificial growth medium and saprophytically.
2. They do not normally kill their host.	2. They frequently kill their host.

#### 4. Write short answers to any SIX (6) questions: (12)

(i) Give functions of smooth endoplasmic reticulum.

**Ans** Smooth endoplasmic reticulum helps in metabolism of different types of molecules. It helps to detoxify the harmful drugs. In muscle cells and nerve cells, smooth endoplasmic reticulum is responsible for transmission of impulses. Smooth endoplasmic reticulum plays an important role in the transport of materials from one part of cell to the other.

(ii) What is nucleolus? Give its function.

**Ans** Nucleolus is darkly stained body within the nucleus and is without any membranous boundary. There may be one or more nucleoli in the nucleus.

#### Functions:

1. The ribosomal RNA is synthesized and stored in nucleolus.



2. Ribosomes are formed in the nucleolus and then exported to the cytoplasm through nucleus pores.

(iii) Define heat of vaporization. Give heat of vaporization of water.

**Ans** Water absorbs much heat as it changes from liquid to gas. Heat of vaporization is expressed as calories absorbed per gram vaporized. The specific heat of vaporization of water is 574 Kcal/kg, which plays an important role in the regulation of heat produced by oxidation. It also provides cooling effect to plants when water is transpired, or to animals when water is perspired. Evaporation of only two ml out of one liter of water, lowers the temperature of the remaining 998 ml by  $1^{\circ}\text{C}$ .

(iv) What is imbibition?

**Ans** Imbibition is the force in ascent of sap. Water molecules move along the cell walls of xylem vessels due to imbibition. The cell wall components, especially cellulose, pectin and lignin can take up water and increase in volume but the components do not dissolve in water, this is called imbibition.

(v) What is honey dew? Give its composition.

**Ans** The composition of materials flowing in phloem has been studied by using aphids -- the insects which are phloem feeders. These insects insert their stylets into stem or leaf and extend them to puncture a sieve tube. The pressure in the sieve tube cell forces sap through aphid's digestive tract and, out its posterior end as droplets called "honey dew". The composition of honey dew has revealed that it contains 10-25% dry matter 90% or more of which is sucrose. Nitrogenous compounds are about 1%.

(vi) Give percentage of  $\text{CO}_2$  in arterial and venous blood.

**Ans** It has been found that arterial blood contains about 50 ml of  $\text{CO}_2$  per 100 ml of blood whereas venous blood



has 54 ml of  $\text{CO}_2$  per 100 ml of blood. In this way, each 100 ml of blood takes up just 4 ml of  $\text{CO}_2$  as it passes through the tissues and gives off 4 ml of  $\text{CO}_2$  per 100 ml of blood as it passes through the lungs.

(vii) **What are the important factors which affect the capacity of haemoglobin to combine with oxygen?**

**Ans** The pH of blood also influences the degree to which oxygen binds to haemoglobin. As the pH of the blood declines, the amount of oxygen bound to haemoglobin also declines. This occurs because decreased pH results from an increase in hydrogen ions, and the hydrogen ions combine with the protein part of the haemoglobin molecules, causing a decrease in the ability of haemoglobin to bind oxygen. Conversely, an increase in blood pH results in an increased ability of haemoglobin to bind oxygen.

(viii) **Write different ways of respiration in frog.**

**Ans** Here are such types of respiration in frog:

1. Cutaneous respiration
2. Pulmonary respiration

(ix) **What is larynx or voice box?**

**Ans** The larynx or voice box is a complex cartilaginous structure surrounding the upper end of the trachea. One of the cartilages, the epiglottis has a muscularly controlled, hinge-like action and serves as a lid which automatically covers the opening of the larynx during the act of swallowing, so as to prevent the entry of food or liquid into the larynx.

## SECTION-II

**NOTE:** Attempt any Three (3) questions.

**Q.5.(a) Write a note on population and community level of biological organization. (4)**

**Ans** **Population:**

A population is a group of living organisms of the same species located in the same place at the same time.



Examples are the number of rats in a field of rice, the number of students in your biology class, or human population in a city.

Population is a higher level of biological organization than organism (whole) because here a group of organisms of the same species is involved. This level of organization has its own attributes which come into being by living together of a group of organisms of the same species.

Some of these attributes are gene frequency, gene flow, age distribution, population density, population pressure, etc. All these are new parameters, which have appeared due to population of an organism. You will study them in detail in population ecology.

### **Community:**

Populations of different species (plants and animals) living in the same habitat form a community. Communities are dynamic collections of organisms, in which one population may increase and others may decrease due to fluctuation in abiotic factors. Some communities are complex and well-interrelated, other communities may be simple. In a simple community, any change can have drastic and long-lasting effects.

The foregoing account makes it clear that an organism can be studied at different levels of organization. It can be studied at subatomic, atomic, molecular, macromolecular, organelle, cell, tissue, organ and organ system level. We can also look at it as an individual, as a part of population of similar individuals, as a part of a community that includes other populations and a part of community of an ecosystem which includes abiotic factors as well as living organisms.

The organisms, interaction can take many shapes. It may be predation, parasitism, commensalism, mutualism and competition.



**Ans** Immunity:

The capacity to recognize the intrusion or any material foreign to the body and to mobilize cells and cell products to help remove the particular sort of foreign material with greater speed and effectiveness is called immunity.

There are two types of immunity:

**(i) Active Immunity:**

The use of vaccines, which stimulate the production of antibodies in the body, and making a person immune against the disease or infection, is called active immunity.

But this active immunity has been achieved by artificially introducing antigens in the body, so it is called artificially induced active immunity.

When a person is exposed to an infection (antigen) -- becomes ill, and in most cases survives, then this immunity, developed against that disease is called naturally induced immunity or auto immune response.

**(ii) Passive immunity:**

In contrast to active immunity, in which case antigens are introduced to stimulate the production of antibodies, by artificial or natural method; antibodies are injected in the form of antisera, to make a person immune against a disease, this is called passive immunity.

In body, antigen -- antibody complexes are formed which are taken up by phagocytes and destroyed. The patient is spared the complications (or possibly death) caused by the infection or venom.

Passive immunity response is immediate, but not long-lasting. Because no time is taken for the production of sufficient level of antibodies (as antibodies are being injected) and after the level of antibodies is reduced or they are used up -- No more antibodies production is there.



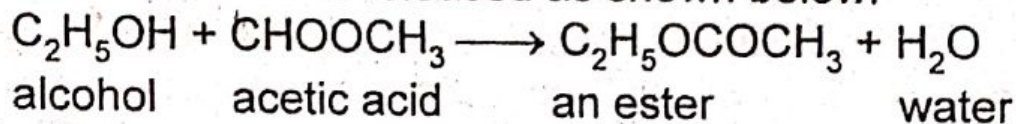
The method of passive immunization is used to combat active infections of tetanus, infectious hepatitis, rabies, snake-bite venom, etc. In the case of snake-bite venom, passive immunity is produced by the antitoxins – so, the serum is called antivenom serum.

**Q.6.(a) Give an account of acylglycerols.**

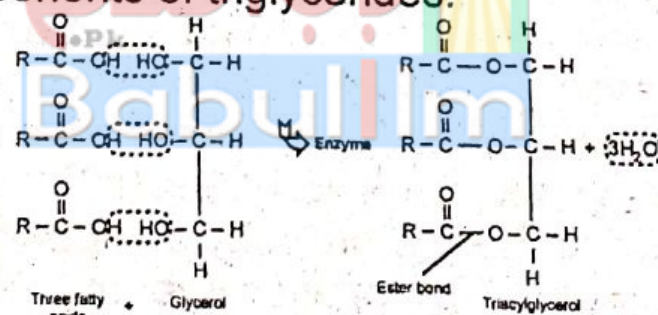
**(4)**

**Ans** **Acylglycerols:**

Acylglycerols are composed of glycerol and fatty acids, see (Fig. (a)). The most widely spread acyl glycerol is triacyl glycerol, also called triglycerides or neutral lipids. Chemically, acylglycerols can be defined as esters of fatty acids and alcohol. An ester is the compound produced as the result of a chemical reaction of an alcohol with an acid and a water molecule is released as shown below:



As indicated by dotted squares, OH is released from alcohol and H from an acid, H and OH combine and form a water molecule. Fatty acids are one of the most important components of triglycerides.



**Fig. (a) Triacylglycerol is composed of one glycerol and three fatty acids molecules.**

Fatty acids contain even numbers (2–30) of carbon atoms in straight chain attached with hydrogen and having an acidic group COOH (carboxylic group). They may contain to double bond (saturated fatty acids) or up to 6 double bonds (unsaturated fatty acids). In animal, the fatty acids are straight chains (Fig. (b)), while in plants, these may be branched or ringed. Solubility of fatty acids in organic solvents and their melting points increase with increasing



number of carbon atoms in chain. Palmitic acid ( $C_{16}$ ) is much more soluble in organic solvent than butyric acid ( $C_4$ ). The melting point of palmitic acid is  $63.1^\circ\text{C}$  as against  $-8^\circ\text{C}$  for butyric acid.

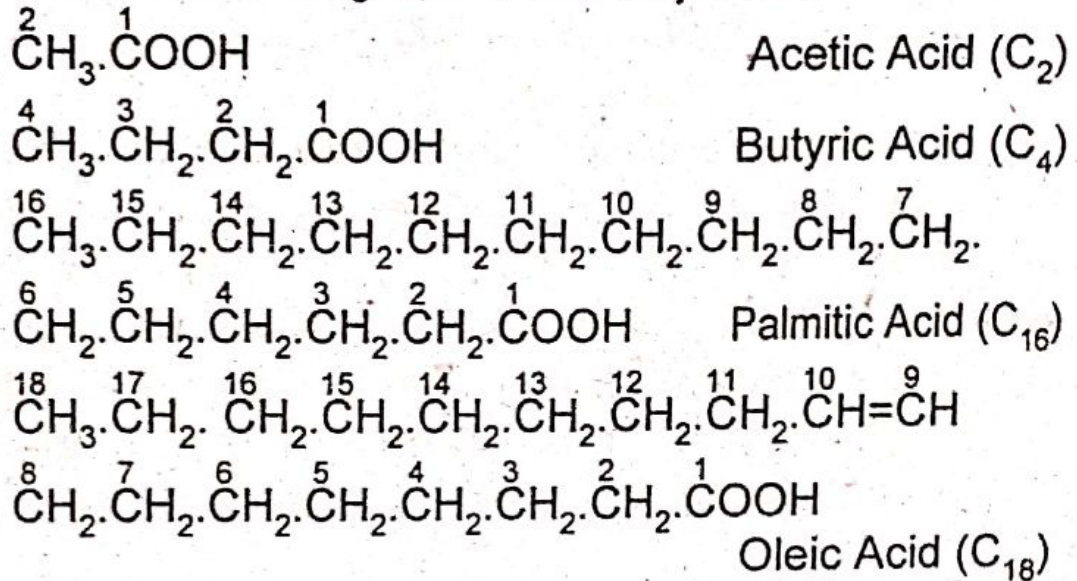


Fig. (b): Some fatty acids with carbon number 2-18 are shown. Oleic acid is an unsaturated fatty acid (note a double bond between  $C_9$  and  $C_{10}$ ). Other fatty acids are saturated.

Fats containing unsaturated fatty acids are usually liquid at room temperature and are said to be oils. Fats containing saturated fatty acids are solids. Animal fats are solid at room temperature, whereas, most of the plant fats are liquids. Fats and oils are lighter than water and have a specific gravity of about 0.8. They are not crystalline but some can be crystallized under specific conditions.

**(b) Write down economic losses due to fungi. (4)**

**Ans** Economic losses due to Fungi:

**Plant Diseases:**

Fungi are responsible for many serious plant diseases. Powdery mildews (on grapes, rose, wheat, etc.), ergot of rye, red rot of sugar-cane, Potato wilt, cotton root rot, apple scab, and brown rot of peaches, plums, apricots and cherries are some other common plant diseases caused by fungi.



### **Animal Diseases:**

Fungi also cause certain animal diseases. Ringworm and athlete's foot are superficial fungal infections caused by certain imperfect fungi. Histoplasmosis is a serious infection of lungs caused by inhaling spores of a fungus which is common in solid contaminated with birds' faeces. *Aspergillus fumigatus* causes aspergillosis, but only in persons with defective immune system such as AIDS, and may cause death. Some strains of *Aspergillus* produce one of the most carcinogenic (cancer-causing) mycotoxins (toxins produced by fungi), called aflatoxins. *Aspergillus* contaminates improperly stored grains such as peanuts and corn etc.

### **Other losses:**

Saprobic fungi are not only useful recyclers but also cause incalculable damage to food, wood, fiber, and leather by decomposing them. 15-50% of world's fruit is lost each year due to fungal attack. Wood-rotting fungi destroy not only living trees but also structural timber.

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### **Q.7.(a) Define cell membrane. Explain its functions. (4)**

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#### **Ans** **Cell Membrane:**

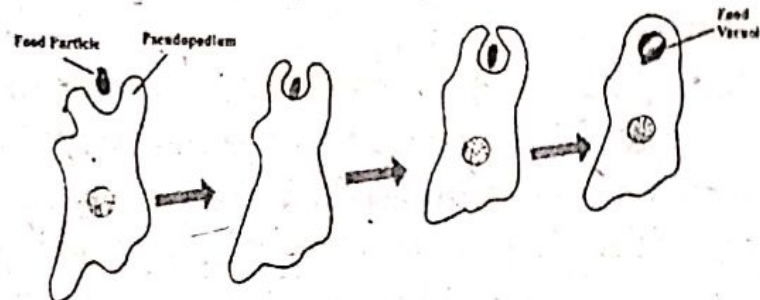
Just beneath the cell wall is the cell membrane or plasma membrane. It is very thin, flexible and completely surrounds the cytoplasm. Plasma membrane is very delicate in nature, any damage to it results in death of the organism. Bacterial membranes differ from eukaryotic membranes in lacking sterols such as cholesterol.

Cell membrane regulates the transport of proteins, nutrients, sugar and electrons or other metabolites. The plasma membranes of bacteria also contain enzymes for respiratory metabolism.



**Ans** Digestion in Amoeba:

Amoeba proteus has intracellular mode of digestion and feeds on many kinds of tiny organisms which live with it in freshwater ponds and shallow lakes. Amoeba also feeds on particulate organic matter. Food may be ingested at any points on the surface of the body. When Amoeba comes in contact with food particle, it immediately puts out pseudopodia around it. These pseudopodia fuse together around the food particle forming the food vacuole as shown in the following figure:



**Fig. Amoeba ingesting food by pseudopodia.**

If the food particle is too big, such as Paramecium, Amoeba encircles it, thus, forming a large food vacuole. The food vacuole undergoes many changes as digestion proceeds. First it grows smaller, then larger and again smaller. Lysosomes, which contain hydrolytic enzymes, fuse with the food vacuole and enzymes are secreted into it. The first phase of digestion is killing and softening of food that take place in the acidic medium (approximately pH 5.6) and later it becomes alkaline (about pH 7.3) during which digestion is completed. When digestion is complete in food, vacuole membrane is drawn into numerous fine canals. The products of digestion are passed into the canals and finally into the surrounding cytoplasm and subsequently, utilized in various metabolic reactions of the animal. Undigested matter is voided from the organism in the surrounding water by digestion at any point of its surface as shown in the following figure:



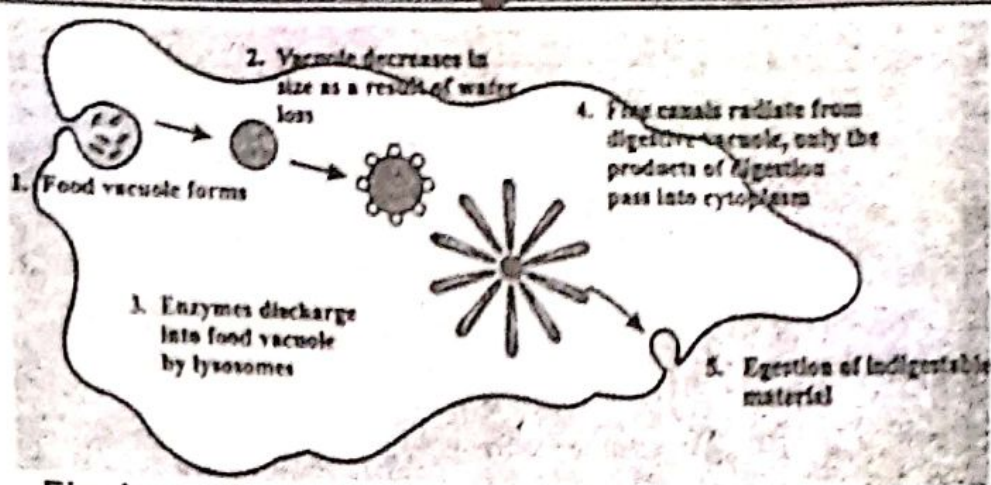


Fig. Ingestion, digestion and absorption in Amoeba.

**Q.8.(a) Write a note on smallpox and polio. (4)**

**Ans** **Smallpox:**

Smallpox, which is caused by pox viruses (the DNA enveloped virus) is an ancient disease that is known to have occurred as epidemic in China as early as the twelfth century B.C. Until the early twentieth century, smallpox was a common disease throughout the world. In smallpox, raised fluid-filled vesicles are formed on the body which become pustules later on and form pitted scars, the pocks. By 1950s, immunization and other control measures had largely decreased the danger. But it is still present in the Third World countries, where many people are affected. In 1980, it was declared by World Health Organization that smallpox has been eradicated from the world.

**Polio:**

Poliomyelites, caused by polio virus, is found all over the world. It occurs mostly in childhood. The age at which primary infection occurs varies with social and economic factors. The polio-viruses are the smallest known viruses and contain RNA in spherical capsid.

**(b) Sketch Krebs Cycle. (No description) (4)**

**Ans**



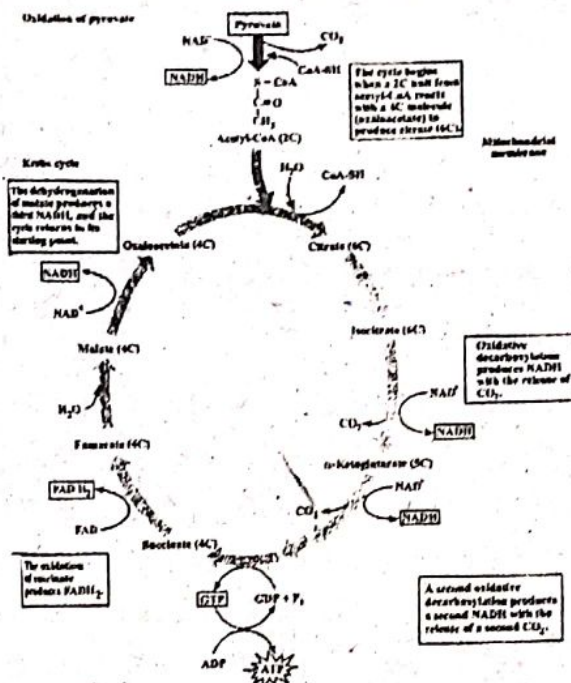


Fig. Outline of the Krebs's cycle. The brackets give the number of carbon atom in each intermediate of the cycle.

### Q.9.(a) Describe structure and reproduction in Nostoc. (4)

**Ans** Nostoc is common as terrestrial and subaerial cyanobacterium. It is widely distributed in alkaline soils and on moist rocks and cliffs. Nostoc forms a jelly-like mass in which numerous filaments are embedded.

#### Structure:

Trichomes are unbranched and appear beaded. Individual cells are mostly spherical but sometimes barrel shaped or cylindrical.

All cells in trichome are mostly similar in structure but at intervals are found slightly large, round, light yellowish thick-walled cells called as heterocysts. Trichome mostly breaks near heterocyst and forms hormogonia and thus help in fragmentation.

#### Reproduction:

There is no sexual reproduction, but it reproduces asexually by formation of hormogonia. Hormogonia are formed when filament break at different points into smaller pieces. This is due to death and decay of an ordinary cell



or the heterocyst may serve as a breaking point. Reproduction can also be due to akinete formation. Akinetes are thick walled, enlarged vegetative cells which accumulate food and become resting cells. On arrival of favourable conditions, they form normal vegetative cell.

**(b) Discuss evolution of leaf.**

**(4)**

**Ans Evolution of Leaf:**

Early vascular land plants did not have true leaves or roots. They were small in size, with dichotomously branched erect smooth aerial parts and equally strong subterranean anchoring and absorptive rhizome.

Cooksonia had the same structural layout *i.e.*, naked stem without leaves. Such plants started to form leaves as small scale-like outgrowths. These outgrowths were not supplied with vascular tissues, therefore, they were not regarded as true leaves. Lycopods were the first plants that formed the true leaves and roots.

However, in lycopods (e.g., Lycopodium), the leaves are small in size. Each leaf has a single undivided vein (vascular supply). Such a leaf is called **microphyll**.

Large leaves having divided veins and veinlets with an expanded leaf blade or lamina are known as **megaphylls**. Megaphylls are characteristic for ferns and seed plants. It is suggested that evolution of megaphylls started from a dichotomous branching system in some primitive psilopsids, approximately 350 million years ago. It is assumed that evolution of a megaphyll included series of successive evolutionary steps which are as follows:

**(i) Overtopping:**

The dichotomously branched aerial portion of the stem showed unequal branching. Some branches remained short, while others grew and expanded at a much faster pace. All these branches grew in different planes. Such an unequal development of various branches is called **overtopping**.



**(ii) Planation:**

Next important step was the arrangement of unequal dichotomies in one plane. This process is termed as planation.

**(iii) Fusion/Webbing:**

Overtopping and planation was followed by a process known as fusion or webbing. The space between the overtopped dichotomous branches was occupied by a sheet of parenchyma cells which connected these branches forming a flat lamina or leaf blade type of structure, having many dichotomously branched veins.

During the course of evolution, fusion of the vascular strands resulted in net or reticulate venation pattern. The process of evolution of leaf was very slow and gradual, which completed in more than 15-20 million years.

