

Inter (Part-I) 2017

Biology	Group-II	PAPER: I
Time: 20 Minutes	(OBJECTIVE TYPE)	Marks: 17

Note: Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

- 1-1- **A group of similar cells that performs a specific function is called:**
- (a) Organ (b) Tissue ✓
(c) Organelle (d) Organ system
- 2- **The specific heat of vaporization of water is:**
- (a) 574 Kcal / kg ✓ (b) 374 Kcal / kg
(c) 474 Kcal / kg (d) 674 Kcal / kg
- 3- **The vitamins are essential raw materials for the synthesis of:**
- (a) Coenzymes ✓ (b) Activators
(c) Holoenzymes (d) Apoenzymes
- 4- **The percentage of lipids in plasma membrane is:**
- (a) 60 – 80 % (b) 30 – 60 %
(c) 20 – 40 % ✓ (d) 10 – 20 %
- 5- **Organelle of symbiotic origin is:**
- (a) Mitochondria ✓ (b) Vacuole
(c) Ribosome (d) Golgi body
- 6- **Germ theory of disease was formulated by:**
- (a) Robert Koch ✓ (b) Louis Pasteur
(c) Edward Jenner (d) Christian Gram
- 7- **The feeding stage of a slime mold is called:**
- (a) Thallus (b) Hyphae
(c) Mycelium (d) Plasmodium ✓
- 8- **Rhizopus belongs to the phylum:**
- (a) Ascomycota (b) Basidiomycota
(c) Zygomycota ✓ (d) Deuteromycota

Mosses belong to the subdivision:

- 9- (a) Hepaticopsida (b) Bryopsida ✓
(c) Anthoceropsida (d) Ascomycota

10- In phylum coelenterata, special cells cnidocytes give rise to:

- (a) Polyps (b) Nematocysts ✓
(c) Gastrozooids (d) Gemmules

11- *Ancylostoma duodenale* is commonly known as:

- (a) Flatworm (b) Tapworm
(c) Hookworm ✓ (d) Fluke-worm

12- Energy poor inorganic oxidized compounds are reduced to energy-rich carbohydrates during:

- (a) Respiration (b) Photosynthesis ✓
(c) Development (d) Growth

13- Thylakoid membranes are involved in ATP synthesis by:

- (a) Glycolysis (b) Dark reaction
(c) Chemiosmosis ✓ (d) Photolysis

14- The partly digested food in cockroach is temporarily stored in:

- (a) Crop ✓ (b) Gizzard
(c) Rectum (d) Stomach

15- In the lungs of birds, tiny thin walled ducts for constant ventilation are called:

- (a) Gill rakers (b) Parabronchi ✓
(c) Larynx (d) Pharynx

16- Change in water potential of a system due to the presence of solute molecules is called:

- (a) Pressure potential
(b) Solute potential ✓
(c) Matric potential
(d) Gravitational potential

17- In male human beings, the amount of red blood cells per cubic millimeter is:

- (a) 5 – 5 ½ million ✓ (b) 4 – 4 ½ million
(c) 6 – 6 ½ million (d) 3 – 3 ½ million

Inter (Part-I) 2017

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

SECTION-I

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

(i) What F. Sanger concluded about insulin?

Ans F. Sanger concluded that the insulin had a precise amino acid sequence.

(ii) Differentiate between prosthetic group and co-enzyme.

Ans If the non-protein part is covalently bonded, it is known as a prosthetic group. If it is loosely attached to the protein part, it is known as co-enzyme.

(iii) What do you mean by induce fit model of enzyme action?

Ans Koshland proposed Induce Fit Model. He argued that when a substrate combines with an enzyme, it induces changes in the enzyme structure. The change in structure enables the enzyme to perform its catalytic activity more effectively.

(iv) Write down the effect of high temperature on an enzyme.

Ans The rate of enzyme controlled reaction may increase with increase in temperature but up to a certain limit. All enzymes can work at their maximum rate at a specific temperature called as optimum temperature. For enzyme of human body, 37°C is the optimum temperature.

(v) What is histoplasmosis? How does its infection spread?

Ans **Histoplasmosis:**

Histoplasmosis is a serious infection of lungs caused by inhaling spores of a fungus which is common in soil contaminated with bird faeces.

(vi) Differentiate between septate and non-septate hyphae.

Ans Septate hyphae are divided by cross-walls called septa into individual cells containing one or more nuclei.

Non-septate hyphae lack septa and are not divided into individual cells; instead these are in the form of an elongated multinucleated large cell.

(vii) What is metameric segmentation? In which phylum is it present?

Ans The repetition of organs and tissues at intervals along the body of an animal, thus dividing the body into a linear series of similar parts or segments is called metameric segmentation. It is present in the Annelida phylum.

(viii) Differentiate between radial and bilateral symmetry.

Ans Radial symmetry is a condition or organization in which the parts of the body are arranged around a central axis in such a way that any plane passing through the central axis divides the animals in halves that are almost mirror image of each other. While in an animal where the right side is approximately the same as the left side and where there is a distinct anterior end is said to have bilateral symmetry.

(ix) What is metamorphosis?

Ans Life history of insects is characterized by metamorphosis. This is an abrupt change of form or structure during the life cycle. There are three morphologically distinct stages in the life cycle, the egg finally develops into larva which is converted into motionless pupa that finally develops into an adult.

(x) Give three basic characteristics of chordates.

Ans All chordates possess three basic characters which are as follows:

1. As already mentioned all possess the notochord.

2. All chordates have central nervous system that is dorsal in position and is hollow.
3. All chordates develop paired gill openings in embryonic stage. In some, these are non-functional, while, in others, they are functional for some period in their life history e.g., frogs, etc. in still other, these are functional throughout life e.g., amphioxus, and fishes, etc.

(xi) Give the function of spectrophotometer.

Ans Spectrophotometer is an instrument used to measure relative abilities of different pigments to absorb different wavelengths of light.

(xii) Define glycolysis. Where does it take place?

Ans Glycolysis is the breakdown of glucose up to the formation of pyruvic acid. Glycolysis can take place both in the absence of oxygen (anaerobic condition) or in the presence of oxygen (aerobic condition).

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

16

(i) Define bio-elements. Give two examples.

Ans Those commonly used elements which are used in forming the chemical compounds from which living organisms are made, and others which occur in a particular organism are called bio-elements.

Examples:

Out of 16 commonly used chemicals, six commonest bioelements account for 99% of body mass. These are, Oxygen, Carbon, Hydrogen, Nitrogen, Calcium, Phosphorus. While other elements are Potassium, Sulphur, Chlorine, Sodium, Magnesium, Iron, Copper, Manganese, Zinc and Iodine.

(ii) Differentiate between deductive and inductive reasoning.

Ans **Deductive Reasoning:**

It moves from general to the specific. It involves drawing specific conclusion from some general principle /

assumptions. Deductive logic of "if then" is frequently used to frame testable hypothesis.

Inductive Reasoning:

The other way of reasoning used in the formulation of hypothesis is inductive reasoning, which is reasoning from the specific to the general. It begins with specific observations, and leads to the formation of general principle.

(iii) **Define fluid mosaic model of cell membrane.**

Ans The protein layers are not continuous and are not confined to the surface of the membrane but are embedded in lipid layers in a mosaic manner. This discovery led to the proposal of fluid mosaic model of cell membrane.

(iv) **Write down the two functions of golgi complex.**

Ans Following are the two functions of golgi complex:

1. Golgi complex is concerned with cell secretions.
2. The most important function of this apparatus is to modify the proteins and lipids by adding carbohydrates and converting them into glycoproteins or glycolipids.

(v) **What is chlorella? Give its importance.**

Ans Chlorella is a genus of single cell green algae belonging to the division of chlorophyta. Chlorella benefits us by helping to regulate hormones, helping with metabolism, improving circulation and promoting higher level of energy.

(vi) **How algae differ from plants?**

Ans Algae differ from the plants in their sex organs which are unicellular and the zygote is not protected by the parent body. A plant zygote, on the other hand, grows into a multicellular embryo that is protected by parental tissue.

(vii) **What is giant amoeba?**

Ans The giant amoeba pelomyxia palustris may be the most primitive of all eukaryote like forms.

Giant amoebas obtain energy from methanogenic bacteria, which reside inside them. Moreover, the giant amoeba has multiple membrane bound nuclei. These are found in the mud at the bottom of freshwater ponds.

(viii) Write down two characteristics of dinoflagellates.

Ans Following are the two characteristics of dinoflagellates:

1. Dinoflagellates are commonly seen in freshwater habitats.
2. These are unicellular, free-swimming biflagellate organisms.

(ix) Define cercinate vernation.

Ans Cercinate vernation is the manner in which a fern frond emerges. As the fern frond is formed, it is tightly curled so that the tender growing tip of the frond is protected within a coil.

(x) Define ovule and embryo sac.

Ans **Ovule:**

Ovule is the part of the ovary of seed plants that contains the female germ cell and after fertilization becomes the seed.

Embryo Sac:

The female gametophyte of angiosperms is called the embryo sac, which contains only a few nuclei and the cytoplasm associated more or less directly with these nuclei. This is not partitioned by cell walls.

(xi) What is humoral immune response?

Ans The humoral immune response is mediated by antibody molecules that are secreted by plasma cells.

(xii) Differentiate between thrombus and embolus.

Ans Thrombus is a clot of blood formed within a blood vessel and remaining attached to its place of origin. While an abnormal particle (such as an air bubble) circulating in the blood, that is called embolus.

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

Define binomial nomenclature. Give an example.

(i) **Ans** The assignments of names to organisms using two Latin words, the first denoting the genus and the second descriptive name, the two together constitute the name of species. For example, Human is called *Homo sapiens*.

(ii) Differentiate between lophotrichous and amphitrichous.

Ans If tuft of flagella is present only at one pole of bacteria then these are lophotrichous flagella. On the other hand, amphitrichous is a condition when tuft of flagella at each of two poles is present.

(iii) How diarrhoea and constipation are caused?

Ans Food poisoning is the basic cause of both diarrhoea and constipation.

(iv) Differentiate between ingestion and egestion.

Ans Taking in of complex food is called ingestion while egestion is the elimination of undigested matter from the body.

(v) What is heart burn or pyrosis?

Ans Heart burn, or pyrosis, is a painful burning sensation in the chest usually associated with the back flush of acidic chyme into the esophagus. This is due to overeating, eating fatty food, lying down immediately after a meal, consuming too much alcohol, caffeine or smoking.

(vi) How air is better respiratory medium than water?

Ans Air is better respiratory medium than water. Oxygen can be obtained more easily from air than from water because of many reasons.

Firstly, the oxygen content of air is much higher than the oxygen content of equal volume of water. A liter of water cannot contain even 10 ml of oxygen whereas oxygen content of fresh air is about 200 ml per liter. Secondly, oxygen diffuses about 8,000 times more quickly in air than in water.

- (ii) Blood helps to transport materials in the body including nutrients, water, salts and waste products. All hormones are transported by blood from the endocrine tissues to the target cells.
- (iii) Gases O_2 and CO_2 are transported by blood.
- (iv) Blood helps in body defenses against disease, neutrophils and monocytes engulf and destroy invading microorganisms e.g., bacteria.
- (v) Blood provides immunity by the lymphocytes.
- (vi) Blood produces interferon, and antitoxins which are proteins, and protects our body from nucleic acids and toxins of invading organism.
- (vii) Blood acts as a buffer to maintain the acid-base balance *i.e.*, concentration of H^+ and OH^- ions of the body.
- (viii) Helps in maintaining the body temperature, concentration of water and salts, thus helps in homeostasis.
- (ix) Wall of Blood helps in the exchange of materials between blood and body tissue through blood capillaries via interstitial fluid.
- (x) Blood helps the body in maintaining the internal environment, by producing heparin, histamines, and also maintaining the amounts of chemicals including water and salts, in the body and maintains body temperature to a constant or nearly constant levels.
- (xi) Helps in blood clotting process and seals the wounds, that stop entry of pathogens into body.

(b) **What is cloning? Discuss its methods and application.** (4)

Ans For Answer see Paper 2016 (Group-I), Q.5.(a).

Q.6.(a) Discuss Watson and Crick model of DNA. (4)

Ans James D. Watson and Francis Crick built the scale model of DNA. All the data thus obtained strongly

(vii) What is asthma? Give its causes.

Ans Asthma is a serious respiratory disease associated with severe paroxysm of difficult breathing, usually followed by a period of complete relief, with recurrence of attack at more or less frequent intervals. It is an allergic reaction to pollen, spores, cold, humidity, pollution, etc. which manifests itself by spasmodic contraction of small bronchiole tubes. Asthma results in the release of inflammatory chemicals such as histamines into the circulatory system that cause severe contraction of the bronchiole.

(viii) State myoglobin and its functions.

Ans Myoglobin is an iron and oxygen-binding protein found in the muscle tissue of vertebrates in general and in almost all mammals. Its function is to carry of oxygen molecules to muscle tissues.

(ix) Describe the CO_2 concentration in artery and venous blood of man.

Ans It has been found that arterial blood contains about 50 ml of CO_2 per 100 ml of blood whereas venous blood has 54 ml of CO_2 per 100 ml of blood. In this way, each 100 ml of blood takes up just 4 ml of CO_2 as it passes through the tissues and gives off 4 ml of CO_2 per 100 ml of blood as it passes through the lungs.

SECTION-II

NOTE: Attempt any Three (3) questions.

Q.5.(a) Write a comprehensive note on functions of blood. (4)

Ans **Functions of blood:**

The overall functions of blood in humans can be listed as follows:

(i) The plasma proteins maintain colloid osmotic pressure of the blood (75% by albumins, 25% by globulins and almost none by fibrinogen).

suggested that DNA is made of two polynucleotide chains or strands. The two strands are coiled round each other in the form of a double helix. Coiling of two strands is opposite *i.e.*, they are coiled antiparallel to each other. The two chains are held together by weak bonds (hydrogen bonds). Adenine (A) is always opposite to thymine (T), and guanine (G) and cytosine (C) are opposite to each other. There are two hydrogen bonds between A and T pair, and three hydrogen bonds between G and C pair. The two strands are wound around each other so that there are 10 base pairs in each turn of about 34 Angstrom units (one Angstrom = one 100-millionth of a centimeter).

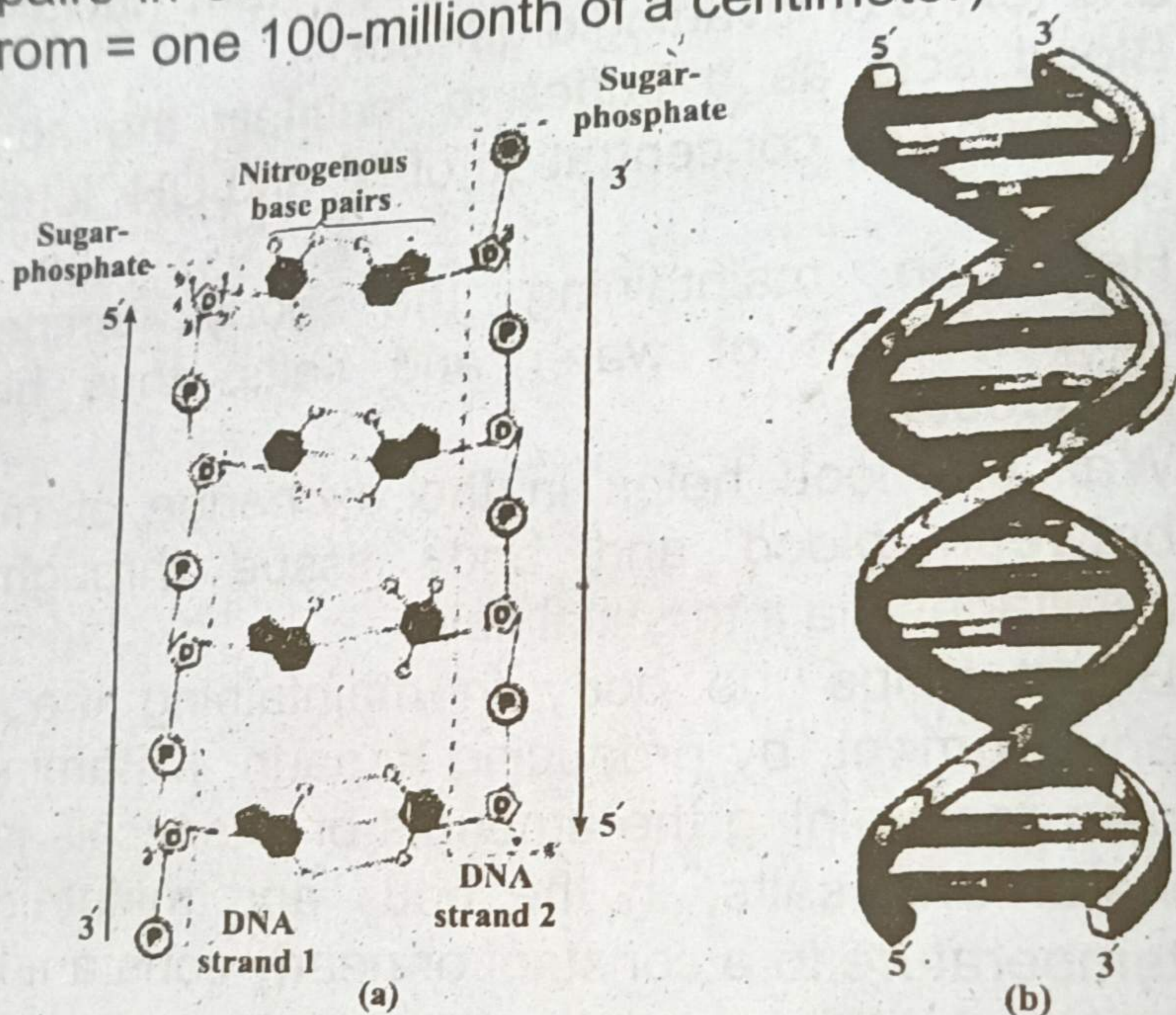


Fig. Model of DNA. Double helical structure of DNA proposed by Watson & Crick (b). A hypothetical sequence of nucleotides (on the left side) shows hydrogen bonding between the complementary bases. Note a double bond between A and T, and triple bond between C and G (a).

(b) Discuss the process of nutrition in insectivorous plants.

Ans Nutrition in insectivorous plants:

There are a few plants that supplement their inorganic diet with organic compounds. These organic

compounds are obtained by trapping and digesting insects and small animals. All of the insectivorous plants are true autotrophs, but when they capture prey, their growth becomes rapid. Apparently, nitrogenous compounds of animal body are of benefit to these plants. In some plants, the trapped insects are decomposed by bacteria. In others, the trapped insects are digested by enzymes secreted by the leaves. The plants absorb the nitrogenous compounds thus formed.

Pitcher plant:

(*Sarracenia purpurea*) has leaves modified into a sac or a pitcher, partly filled with water. The end of the leaf is modified to form a hood, which partly covers the open mouth of the pitcher. Small insects that fall into the pitcher are prevented from climbing out by numerous stiff hairs. The proteins of trapped insects are decomposed by bacteria or enzymes and the products of this decay are absorbed by the inner surface of the pitcher leaf.

Venus-fly trap:

(*Dionaea muscipula*) The leaf is bilobed with midrib between them. There is a row of long stiff bristles along the margins of each lobe. When an insect touches small sensitive hairs on the surface of the leaf, the lobes quickly come together with their bristles interlocked. The trapped insect is then digested by the enzymes secreted from the glands on the leaf surface and the products are then absorbed.

Q.7.(a) What are lysosomes? Give their functions. (4)

Ans For Answer see Paper 2017 (Group-I), Q.7.(a).

(b) Draw and label Z-scheme/non-cyclic phosphorylation. (4)

Ans **Non-cyclic Phosphorylation:**

1. When photosystem II absorbs light, an electron excited to a higher energy level in the reaction center

chlorophyll P_{680} is captured by the primary electron acceptor of PS II. The oxidized chlorophyll is now a very strong oxidizing agent; its electron "hole" must be filled.

2. 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 releases oxygen is called photolysis. The oxygen produced during photolysis is the main source of replenishment of atmosphere oxygen.
3. Each photoexcited electron passes from the primary electron acceptor of photosystem II to photosystem I via an electron transport chain. This chain consists of an electron carrier called plastoquinone (Pq), a complex of two cytochromes and a copper containing protein called plastocyanin (Pc).
4. As electrons move down the chain, their energy goes on decreasing and is used by thylakoid membrane to produce ATP. This ATP synthesis is called photophosphorylation because it is driven by light energy. Specifically, ATP synthesis during non-cyclic electron flow is called non-cyclic photophosphorylation. This ATP generated by the light reactions will provide chemical energy for the synthesis of sugar during the Calvin cycle, the second major stage of photosynthesis.
5. The electron reaches the "bottom" of the electron transport chain and fills an electron "hole" in P_{700} , the chlorophyll a molecules in the reaction center of photosystem I. This hole is created when light energy is absorbed by molecules of P_{700} and drives an electron from P_{700} to the primary acceptor of photosystem I.
6. The primary electron acceptor of photosystem I passes the photoexcited electrons to a second electron transport chain, which transmits them to ferredoxin (Fd), an iron containing protein. An enzyme called NADP reductase then transfers the electrons from Fd to NADP.

This is the redox reaction that stores the high-energy electrons in NADPH. The NADPH molecule will provide reducing power for the synthesis of sugar in the Calvin cycle.

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

Q.8.(a) What is hepatitis? Give its symptoms and discuss its three common types. (4)

Ans Hepatitis is an inflammation of the liver. It is usually caused by viral infection, toxic agents or drugs. It is characterized by Jaundice, abdominal pain, liver enlargement, fatigue and some time fevers. It may be mild or can be acute and can lead to liver cancer. The different types of viral hepatitis are:

Hepatitis A:

Formally called infectious hepatitis, which is transmitted by contact with faeces from infected individuals.

Hepatitis B:

Serum hepatitis. Formally called non-A, non-B hepatitis.

Hepatitis C:

It passes through blood from mother to child during pregnancy.

(b) Describe life cycle of adiantum. (4)

Ans Life Cycle:

Life cycle of Adiantum shows hetromorphic alternation of generation, sporophyte being dominant and gametophyte small and reduced but separate and independent. The diploid sporophyte produce large number of sori (singular-sorus). They are green, but when ripe they become dark brown. Each sorus consists of a number of sporangia covered by false indusium. The leaves bearing sporangia are called sporophylls.

Each sporangium is slightly flattened, biconvex body (capsule) born on a multicellular stalk.

When a spore falls on a moist soil, it germinates at a suitable temperature and produces a haploid gametophyte or prothallus.

The prothallus (gametophyte) is an autotrophic, small, flat, heart-shaped structure. At the anterior end of the prothallus is a notch in which lies the growing point. Its size is about 8 mm at its longest diameter. It is horizontally placed on the soil, and has unicellular rhizoids on its lower surface towards the posterior end. The rhizoids fix the prothallus to the soil and absorb nutrients for it. It is composed of rounded thin walled cells. The margin of the prothallus is one-celled thick but the middle part is many-celled and is cushion-like.

The prothallus is monoecious *i.e.*, male and female sex organs appear on the under-surface of the same prothallus. In the mature prothallus, archegonia occur near the notch and the antheridia are scattered among the rhizoids.

Each antheridium produces numerous spermatozoids which are spirally coiled and multiciliated.

The archegonium consists of a venter and a neck. The venter contains the egg or oosphere and is embedded in the cushion of the thallus. The antherozoids reach the archegonium, by swimming in water, Fertilization occurs and an oospore is formed. The oospore forms the sporophyte. Young sporophyte is first attached to the gametophyte but later becomes independent.

Q.9.(a) Describe nutrition in bacteria.

(4)

Ans → **Nutrition in Bacteria:**

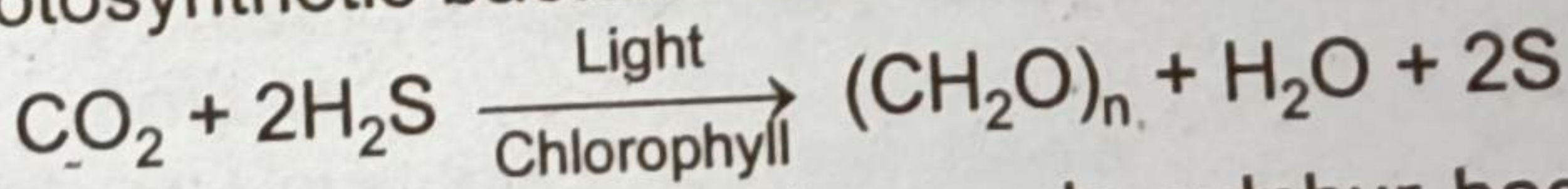
Like other organisms, bacteria need energy for their growth, maintenance and reproduction. Most bacteria are heterotrophic *i.e.*, they cannot synthesize their organic

compounds from simple inorganic substances. They live either as saprophytes or as parasites.

Saprophytic bacteria get their food from dead organic matter. Soil is full of organic compounds in the form of humus. Humus is the material resulting from the partial decay of plants and animals. Many soil inhabiting bacteria have very extensive enzyme system that breaks down the complex substances of humus to simpler compounds.

The bacteria can then absorb and utilize these simpler substances as a source of energy. **Parasitic bacteria** for their nutrition are fully dependent on their host.

Some kinds of bacteria are autotrophic *i.e.*, they can synthesize organic compounds which are necessary for their survival from inorganic substances. These bacteria may be separated into two groups: photosynthetic autotrophs and chemosynthetic autotrophs. Photosynthetic bacteria possess chlorophyll which differs from the chlorophyll of green plants. Unlike most green plants, which have their chlorophyll in chloroplasts, bacterial chlorophyll is dispersed in the cytoplasm. During photosynthesis, the autotrophic bacteria utilize hydrogen sulphide (H_2S) instead of water as a hydrogen source and liberate sulphur instead of oxygen. Nitrifying bacteria are chemosynthetic. Chemosynthetic bacteria oxidize inorganic compounds like ammonia, nitrate, nitrite, sulphur or ferrous iron and trap the energy thus released for their synthetic reactions. The overall reaction of photosynthesis in photosynthetic bacteria can be written as:



Green sulphur bacteria, purple sulphur bacteria and purple non-sulphur bacteria are photosynthetic bacteria.

(b) Give economic gains of fungi.

(4)

Ans Economic gains due to fungi:

1. Certain fungi are edible. About 200 species of mushrooms (e.g., agaricus sp), morels (e.g., morchellaesculenta), truffles (underground fruity bodies of some Ascomycetes e.g., Tuber sp) are common edible fungi. Beware of poisonous mushrooms like Amanita (a death angel).
2. Certain fungi are used in food industry. Because of their fermenting ability, yeasts are used in production of bread and liquor. Penicillium species are used for giving flavour, aroma and characteristics colour to some cheese.
3. Some fungi are source of antibiotics and some other drugs. Penicillin, first antibiotic to be ever discovered is obtained from cyclosporine obtained from a soil fungus is used in organ transplantation for preventing transplant rejection.
4. Some natural dyes obtained from lichens are used in textile industry.