Biology Notes & 50 Questions for SSC CGL Tier 2 Exam

Biology- Branch of science in which living beings are studied. Biology has two main branch :

(a) Botany - study of different aspects of plants.Theophrastus is known as father of Botany.

(b) Zoology - study of various aspects of animals. Aristotle is called Father of Biology as well as Zoology.

Important Terms of biology :

- Anatomy- Study of internal structure of organism.
- Agrology – Soil science dealing specially with production of crop.
- Agronomy- Science of soil management and production of crop.
- Agrostology – Study if grass.
- Arthrology- Study of joins.
- Apiculture- rearing of honey bee for honey.
- Anthropology- Study of origin, development and relationship between the culture of past and present human.
- Anthology – Study of flower and flowering plant.
- Angiology- Study of blood vascular system including arteries and veins.
- Andrology- Study of male reproductive organ.
- Bryology- Study of bryophytes.
- Biometrics – Statical study of biological problem.
- Biomedical engineering- Production and designing of spare part for man for overcoming various defects in man .e.g. artificial limbs, Iron lung, Pacemaker etc.
- Biotechnology- Technology connected with living being for wilful manipulation on molecular level.
- Bacteriology- Study of bacteria.
- Cytology– Study of cell.
- Cryobiology – It is the study of effect of low temperature on organisms and their preservation.
- Clone – Celones are genetically identical individuals in a population.
- Cardiology – Study of heart.
- Clone – Clones are genetically identical individuals in a population.
- Demography- Study of population.
- Diffusion- Random movement of molecule / ion or gases from a region of higher concentration to lower concentration.
- Diffusion- Random movement of molecule / gas / ion from reign of higher concentration to lower concentration.
- Dermatology – Study of skin.
- Dendrochronology- Counting and analyzing annual growth rings of tree to know its age.
- Ecology – Study of inter- relationship between living and their environment.
- Evolution- Study of origin of life, variation and formation of new species.
- Embryology- It is the study of fertilization and development if zygote.
- Eugenics – Study of factors connected with the improvement of race.
- Euthenics – Treatment of defective in heredity through genetics engineering.
- Ethnology – Study of science dealing with different races of human.
- Ethology – Study of animal behavior.
- Etiology – Study of life cycle of pathogen.
- Entomology- Study of insects.
- Exobiology- Study of possibility of life in space.
- Floriculture- Cultivation of plant for their flower.
- Food technology-Scientific processing, preservation, Storage and transportation of food.
- Forensic science – Application of science for identification of various facts civilian.
- Fishery- catching, breeding, rearing and marketing of fishes.
- Forestry- Development and management of forest.
- Fermentation- process of incomplete oxidation that occur in microbes and other cells in absence of oxygen, leading to the for nation of ethyl alcohol.
- Genetics- Study of variation and transmission of characters from parents to their young ones.
- Growth – Permanent increase in the weight and volume or size of an organism.
- Gynecology- Study of female reproductive organ.
- Gerontology-Study of ageing.
- Gastroenterology- Study of alimentary canal or stomach, intestine and their disease.
- Hypertonic- when two solution have differcut sdute concentration. The sol at ion which have higher concentration is called hypertonic.
- Hypotonic- in two solation which have lawer solute con centration is called hypotonic.
- Home thermic- Animals who have a constant body temperature are called home thermo cot warmblooded animal.
- Histology- Study of tissue with the help of microscope.
- Hydroponics- Study of growing plant without soil in water which contain nutrient.

- Haematology- Study of blood
- Hepatology- Study of liver.
- Ichthyology- Study of fishes.
- Immunology- Study of immunity or resistance of body to disease.
- Metazoans- All multicellular animals are called metazoans.
- Monoecious- Plant which have both male and female flower.
- Morphology – Study of external structure.
- Microbiology- Study of Micro- Organism like virus bacteria algae fungi and protozoa.
- Molecualr biology- Study of molecule found in the body of living organism.
- Medicine- Study of treating disease by drug.
- Mammography – Brach of science which deal test of breast cancer.
- Mycology – Study of fungi.
- Neurology – Study of nervous system.
- Neonatology- Study of new born.
- Nephrology- Study if kidneys.
- Osmosis- movement of water moledcule across semipermeable membrane from the region of its higher concentration to the region of lower communication.
- Odontology- Study of teeth and gum.
- Osteology- Study of bones.
- Oncology- Study of cancer and tumours.
- Obstetrics- Science connected with care of pregnant woman before, during and after child birth.
- Ornithology- Study of birds.
- Ophthalmology- Study of eyes.
- Orthopaedics- Diagnosis and repair of disorders of locomotery system.
- Phytoplanktons- Microscopic organism which passively float on the surface of water.
- Parasite- organism which depend on other living for their food and shelter.
- Poikilothermic- Organism which change their body temperature according to surrounding. These are also called cold blooded animal.

CELL

Cell: It is the basic structural unit of life.
Cells were first **discovered** by **Robert Hooke.**
The smallest cell is 0.1 to 0.5 micrometre in bacteria. The largest cell measuring 170 mm ×130 mm, is the egg of an ostrich.
Amoeba acquires its food through **endocytosis.**
1. **Prokaryotes cells -** cells that have no defined nucleus
Eg: Bacteria & Blue-green Algae
2. **Eukaryote -** cells which have definite nucleus
Eg: Other than Bacteria & Blue-green Algae
Compounds called **proteins** and **phospholipids** make up most of the cell membrane.

Diffusion-It is a process of movements of substance from a region of high concentration to a region where its concentration is low. Water also obeys the law of diffusion. Eg: Substances like Co_2 and O_2 can move across the cell membranes by a process called diffusion.

Osmosis: The movement of water molecules is called **osmosis**. Osmosis is a special case of diffusion through a selectively permeable membrane.

Types of Osmosis:
1. **Hypotonic:** More water will come into the cell than will leave. The cell is likely to swell up.
2. **Isotonic:** The amount going in is the same as the amount going out of the cell.The cell will stay the same size.
3. **Hypertonic:** More water leaves the cell than enters it. Therefore the cell will shrink.
When a living plant cell loses water through osmosis there is shrinkage or contraction of the contents of the cell away from the cell wall. This phenomenon is known as **plasmolysis.**

Cytoplasm: It is the fluid that fills a cell. Scientists used to call the fluid protoplasm.

Ribosomes: It synthesis protein, and Endoplasmic reticulum sent these protein in various part of the cell. Whereas Smooth Endoplasmic reticulum helps in the manufacture of fats. It a made up of ribonucleic acid.

Functions of these proteins and fats:
- Protein and fat (lipi(d) help in building the cell membranes. This process is known as **membranes biogenesis.**
- Smooth Endoplasmic reticulum plays a crucial role in detoxifying many poisons and drugs.
-

Golgi apparatus : It is another packaging organelle like the endoplasmic reticulum
Functions:
- It is the organelle that builds lysosomes (cells digestion machines).

Lysosomes(suicidal bag): It is a kind of waste disposal system of the cell.

Mitochondria(power hous(e): The energy required for various chemical activities headed for life is released by mitochondria in the form of ATP (adenosine tri-phosphat(e) molecules.
- **ATP is known as the energy currency of the cell.**
- Mitochondria are strange organelles in the sense that they have their own DNA and ribosomes, therefore mitochondria are able to make their own protein.
- Mitochondria is absent in bacteria and the red blood cells of mammals and higher animals.

Centrioles: centrioles are concerned with cell division. It initiates cell division.

Plastids: These are present only in plant cells.
Types of plastids:-

- **Chromoplast**(colour plastides) impart colour to flowers and fruits.
- **Leucoplasts**(white or colourless plastids) present in which starch, oils and protein are stored.
- **Plastids** are self-replicating. i.e. they have the power to divide, as they contain DNA, RNA and ribosomes.
- Plastides contains the pigment chlorophyll that is known as **chloroplast**. It is the site for photo synthesis.

non –living parts with in the cell :-

Vacuoles: it is a fluid filled spaces enclosed by membranes. Its size in animal is small and in plant it is big.
Amino acids and sugars are stored in vacuoles.

Granules: It is not bounded by any membranes. It store fats, proteins and carbohydrates.

Cell nucleus: The cell nucleus acts like the brain of the cell. It helps control eating, movement
and reproduction. Not all cells have a nucleus.
The nucleus contain, the following components :

(a) Nuclear envelope (nuclear membran(e)

(b) Chromatin : When the cell is in resting state there is something called **chromatin** in the nucleus. Chromatin is made up of DNA, RNA and nucleus protein. DNA and RNA are the nucleus acids inside the cell. When the cell is going to divide, the chromatin become very compact. It condenses when the chromatin comes together we can see the chromosomes.

(c) Chromosomes: Chromosomes make organisms what they are. They carry all the information used to help a cell grow, thrive and reproduce.

- Chromosomes are made up of DNA.
- Segments of DNA in specific patterns are called **genes**.
- In prokaryotes, DNA floats in the cytoplasm in an area called the **nucleoid**.
- Chromosomes are not always visible. They usually sit around uncoiled and as loose shards called **chromation.**
- Chromosomes are usually found in pairs.
- Human Beings probably have 46 chromosomes (23 pairs).
- Peas only have 12, a dog has 78 chromosomes.
- The number of chromosomes is not related to the intelligence or complexity of the creature.

(d) Nucleolus: It is a dense spherical granule contained within the nucleus.It stores proteins.

Cell Division

Organisms grow and reduce through **cell division**.
There are two methods of replication **mitosis** and **meiosis**.

(a) Mitosis: It duplicates its DNA and the two new cells (daughter cells) have the same pieces and generic code. There are five steps in this process. **You should remember the term PMATI.** It breaks down to :

1. Prophase
2. Metaphase
3. Anaphase
4. Telophase
5. Interphase.

The main theme of **meiosis** is that there are two cell division. Mitosis has one division.

Some important facts regarding cells :

- Nerve cells in animals are the longest cells.
- Smallest human cell is red blood cell.
- Largest human cell is female ovum.
- The single largest cell in the world is of an ostrich.
- The smallest cells are those of the mycoplasma.
- Every minute about 3 million cells in our body die.
- Sieve tube in plants and the mature mammalian red blood cells do not have a nucleus.
- The red blood cell carries respiratory gases.
- Sieve cells in plants transport nutrients in plants.
- The lysosomal enzymes of the sperm cells digest the limiting membranes of the ovum (egg). Thus the sperm is able to enter the ovum.
- During the transformation of tadpole into frog. The embryonic tissues like gills and tail are digested by the lysosome.
- Mitochondria contain DNA, hence capable of replication.
- Matrix is a transparent, homogenous semi-fluid substance. In its active state. It remains saturated with water.

TISSUE

Epithetical Tissue

(i) On the basis of cell layers

(a) When an epithelium has a single layer of cells it is called a simple epithelium.

(b) Where as a multiple tier of cells are known as stratified epithelium.

(ii) On the basis of simple shape of cells:

- **Cuboidal :** its occurrence is in kidney tubules, salivery glands, inner lining of the cheek. Its main function is to give mechanical strength.
- **Columnar :** its occurrence is in sweat gland, tear gland, salivary gland its main function is to gives mechanical strength concerned with secretions.
- **Squamous :** when it forms a living as that of blood vessels, it is called endothelium.

Its main function is to protect the underlying parts from injury, entry of germs, etc.

- **Connective tissue :** Its main function is to bind and support other tissues.

There are a few types of connective tissue.

Connective Tissue

Areolar

(i) Tendon

(ii) Ligament

Adipose Skeletal

(i) Bone

(ii) Cartilage

Fluid

(i) Blood

(ii) Lymph

A. Areolar tissue : It fills spaces inside organs found around muscles, blood vessels and nerves. Its main function is to joins skin to muscles, support internal organs, help in the repair of tissues. Whereas tendon's main function is to connect muscles to bones and ligament is connects bones to each other.

B. Adipose tissue : Its occurrence is below skin, between internal organs and in the yellow bone Marrow. Its main function is to storage of fat and to conserve heat.

C. Skeletal tissue : Bone & cartilage occurrences is in nose, epigotis and in intervertebral disc of mammals. Its main function is to provide support and flexibility to body part. Whereas bone protects internal delicate organs provides attachments for muscles, bone marrow makes blood cells.

D. Fluid tissue : Blood & Lymph blood transport O_2 nutrients, hormones to tissues and organs. Whereas leucocytes fight diseases and platelets help in clotting of blood. Lymph transport nutrients into the heart and it also forms the defense system of the body.

Muscular Tissue

It is specialized for ability to contract muscle cells.

Types of Muscular tissue:

A. Skeletal muscle: It attached primarily to bones. Its main function is to provide the force for locomotion and all other voluntary movements of the body.

B. Cardiac muscle: It occurs only in the heart. The contraction and relaxation of the heart muscles help to pump the blood and distribute it to the various parts of the body.

C. Smooth muscle: It can be found in stomach, intestines, and blood vessels these muscles cause slow and prolonged contractions which are involuntary.

D. Nervous tissue: This tissue is specialized with a capability to conduct electrical impulses and convey information from one area of the body to another. Most of the nervous tissue (98%) is located in the central nervous system. The brain and spinal cord.

Types of Nervous Tissue

- Neurons
- Neuroglial

Important facts regarding animal tissue:-

- Muscles contain special protein called contractile protein.
- Fat storing adipose tissue is found below the skin and between internal organs.
- Two bones are connected to each other by a tissue called ligament. This tissue is very elastic.
- The skin, the living of the mouth, the living blood vessels, kidney tubules are all made up of epithelial tissue.
- Voluntary muscles and cardiac muscles are richly supplied with blood whereas involuntary muscles are poorly supplied with blood.

MUSCULAR AND SKELETAL SYSTEM

Skeletal Systems of Various Animals

Skeletons are either a fluid-filled body cavity, exoskeletons, or internal skeletons.

Note: Spiders use a combination of an exoskeleton for protection and fluid pressure for movement.

- Sharks, and rays have skeletons composed entirely of cartilage; other vertebrates have an embryonic cartilage skeleton progressively replaced by bone as they mature and develop.
- Some areas of the human body, however, retain cartilage in the adult: in joints and flexible structures such as the ribs, trachea, nose and ears.
- The upper bones of the limbs are single: humerus (arm) and femur (leg).
- Below a joint (elbow or kne(e), both limbs have a pair of bones (radius and ulna in the arms; tibia and fibula in legs) that connect to another joint (wrist or ankl(e).
- The carpals makeup the wrist joint; the tarsals are in the ankle joint.

Bone

- Bones have cells embedded in a mineralized (calcium) matrix and collagen fibers.
- The spongy bone of the femur, humerus, and sternum contains red marrow, in which stem cells reproduce and form the cellular components of the blood and immune system. Yellow marrow, at the center of these bones, is used to store fats. The outer layer of the bones is known as the periosteum.
- When fractures occur, the pain is carried to the brain by nerves running through the periosteum.

- **Joints**
- A joint is a location at which two bones make contact and is essential for all types of movements, involving the bony parts of the body.
- Synovial Joints - Movable Joints : They are characterised by the presence of a closed space or cavity between the bones.
- This kind of joint are classified into six major categories.
- Plane (gliding joint) : Present between carpals. Only sliding motion in all direction is allowed.
- Hinge joint : Present between Knee joint
- Pivot joint : Present between atlas and axis
- Saddle joint : Present between carpal and metacarpal
- Ball and Socket joint : Present between humerus and pectoral girdle.

Disorders of Muscular and Skeletal System

- Myasthenia gravis - Autoimmune disorder. It affects neuromuscular transmission.
- Muscular dystrophy - Progressive skeletal muscle weakness, defects in muscle proteins, the death of muscle cells and tissue.
- Rheumatoid Arthritis : Inflammation of synovial membrane.
- Osteoarthritis : Degeneration of articular cartilage.
- Gout : Caused by excess formation of uric acid and their deposition in the joints.
- Osteoporosis : Low bone mass, increased fragility and proneness to fracture.

THE NERVOUS SYSTEM

- The Central Nervous System (CNS) includes the brain and spinal cord.
- The Peripheral Nervous System (PNS) connects the CNS to other parts of the body, and is composed of nerves(bundles of neurons)

The Neuron

Nervous tissue is composed of two main cell types: neurons and glial cells. Neurons transmit
nerve messages. Glial cells are in direct contact with neurons and often surround them.
The neuron is the functional unit of the nervous system. Humans have about 100 billion neurons in their brain alone!

Functions of the three parts of a neuron:

- **Axon:** It conducts messages away from the cell body.
- **Dendrite**: It receives information from axon of another cell and conducts the messages towards the cell body.
- **Cell body**: It contains nucleus, mitochondria, and other organelles. It is mainly concerned with the maintenance and growth.

SYNAPSES

The junction between a nerve cell and another cell is called a synapse.
The space between two cells is known as the synaptic cleft.

- The function between two neurons is called a 'ganglion'.

HUMAN EYE

The human eye is like a camera. Its lens system forms an image on a light-sensitive screen called the retina.
The eyeball is approximately spherical in shape with a diameter of about 2.3 cm.
The eye lens forms an inverted real image of the object on the retina.

RETINA - The retina is a delicate membrane having enormous number of light-sensitive cells.

CORNEA - Light enters the eye through a thin membrane called the cornea.It is the eye's outermost layer. It is the clear, dome-shaped surface that covers the front of the eye. It plays an important role in focusing your vision.
PUPIL - The pupil is a hole located in the centre of the iris of the eye that allows light to strike the retina. It appears black because light rays entering the pupil are either absorbed by the tissues inside the eye directly, or absorbed after diffuse reflections within the eye. The pupil regulates and controls the amount of light entering the eye.
IRIS - It is a dark muscular diaphragm that controls the size of the pupil and thus the amount of light reaching the retina.
CILIARY MUSCLE - The ciliary muscle is a ring of smooth muscle in the eye's middle layer that controls accommodation for viewing objects at varying distances and regulates the flow of aqueous humour into Schlemm's canal. It changes the shape of the lens within the eye, not the size of the pupil.
The light-sensitive cells get activated upon illumination and generate electrical signals. These signals are sent to the brain via the optic nerves. The brain interprets these signals, and finally, processes the information so that we perceive objects as they are.

Note: When the light is very bright, the iris contracts the pupil to allow less light to enter the eye. However, in dim light the iris expands the pupil to allow more light to enter the eye. Thus, the pupil opens completely through the relaxation of the iris.
A human being has a horizontal field of view of about 150° with one eye and of about 180° with two eyes.

HUMAN BRAIN

The brain is the most complex part of the human body. This three-pound organ is the seat of intelligence, interpreter of the senses, initiator of body movement, and controller of behavior.

The brain can be divided into three basic units:

- The forebrain,
- The midbrain, and
- The hindbrain

The **forebrain** is the largest and main thinking part of the brain. It has regions which receive sensory impulses from various receptors. Separate areas of the fore-brain are specialised for hearing, smell, sight and so on.
The **Midbrain** connects the forebrain to the hindbrain.
The **hindbrain** controls the body's vital functions such as respiration and heart rate.

➽CEREBRUM - Largest part of the human brain

- It is at the topmost part of the brain.
- It is the source of intellectual activities.
- It holds your memories, allows you to plan, enables you to imagine and think.
- It allows you to recognize friends, read books, and play games.
- It controls the voluntary motor actions.
- It is the seat of learning and memory.
- It is the site of sensory perceptions; like tactile and auditory perceptions.
- It is divided into two hemispheres; called cerebral hemispheres.

➽HYPOTHALAMUS

- It lies at the base of the cerebrum.
- It controls sleep and wake cycle (circadian rhythm) of the body.
- It also controls the urges for eating and drinking.
- It gets the adrenaline flowing during a test or job interview.

➽CEREBELLUM

- It lies below the cerebrum and at the back of the whole structure.
- It coordinates the motor functions.
- It is responsible for precision of voluntary actions and maintaining the posture and balance of the body.
- Example: When you are riding your bicycle; the perfect coordination between your pedaling and steering control is achieved by the cerebellum.

➽MEDULLA

- It forms the brain stem; along with the pons.
- It lies at the base of the brain and continues into the spinal cord.
- It controls various involuntary functions
- Example: heartbeat, respiration, size of the pupil, blood pressure, salivation and vomiting etc.

➽THALAMUS

- A major clearinghouse for information going to and from the spinal cord and the cerebrum.
- Cerebrospinal fluid (CS(F) is a watery fluid that circulates through the brain's ventricles (cavities or hollow spaces) and around the surface of the brain and spinal cord.

THE ENDOCRINE SYSTEM

Hormones

The endocrine system is made up of glands that produce and secrete hormones, chemical substances produced in the body that regulate the activity of cells or organs. These hormones regulate the body's growth, metabolism (the physical and chemical processes of the body), and sexual development and function.
Exocrine glands (not part of the endocrine system) secrete products that are passed outside the body. Sweat glands, salivary glands, and digestive glands are examples of exocrine glands.
Hormones are grouped into three classes based on their structure:
1. Steroids 2. Peptides 3. Amines

The Nervous and Endocrine Systems

The pituitary gland (often called the master glan(d) is located in a small bone cavity at the base
of the brain. A stalk links the pituitary to the hypothalamus, which controls release of pituitary hormones. The pituitary gland has two lobes: the anterior and posterior lobes.
Too little or two much GH(Growth hormon(e) can cause **dwarfism or gigantism**, respectively.
Prolactin is secreted near the end of pregnancy and prepares the breasts for milk production.

THE POSTERIOR PITUITARY

ADH(Antidiuretic hormon(e) controls water balance in the body and blood pressure. Oxytocin is a small peptide hormone that stimulates uterine contractions during childbirth.
Thyroid secretion is usually higher in winter than in summer.
Endocrines: The Postal System of Communication and Co-Ordination

- Hormones are chemical substances manufactured by organs called endocrine glands or ductless glands. **Ductless glands** are also sometimes called 'exocrine glands'.

ENDOCRINE GLANDS OF THE BODY

Adrenal gland

The adrenal glands (also known as suprarenal glands) are endocrine glands that produce a variety of hormones including adrenaline.
They are found above the kidneys.

Hypothalamus

The hypothalamus is a portion of the brain that contains a number of small nuclei with a variety of functions.

Function: Link the nervous system to the endocrine system via the pituitary gland.

Pituitary gland

It is an endocrine gland about the size of a pea and weighing 0.5 grams in humans.

Hormones secreted from the pituitary gland help control:

- growth,
- blood pressure,
- certain functions of the sex organs,
- metabolism,
- pregnancy,
- childbirth,
- nursing,
- water/salt concentration,
- temperature regulation
- pain relief.

The Pituitary gland is also called Master gland of Human Body.

Thyroid

The thyroid gland, or simply the thyroid is one of the **largest endocrine glands** in the body.

It is found in the interior neck, below the Adam's apple.

- It secretes two hormones: Triodothyro (T3) and tetraiodothysonine (T4), are called tyrosine. Both these hormones contain iodine.
- Hypothyroidism (hypo, 'under')–diminished thyroid activity. Hypothyroidism in childhood gives rise to a conditions called cretinism.
- It controls
- Rate of use of energy sources, protein synthesis, controls the body's sensitivity to other hormones.

Goiter – It is called enlargement of the thyroid gland. It manifests itself as a swelling in the neck.

A goiter may be associated with increased, normal or decreased activity of the thyroid gland.

Government of India launched the Universal salt iodization programme in 1986.

Pancreas

The pancreas is a glandular organ in the digestive system and endocrine system of vertebrates. In humans, it is located in the abdominal cavity behind the stomach.

It produce several important hormones

- including insulin,
- glucogen,
- somatostatin, and
- pancreatic polypeptide which circulate in the blood.

The pancreas is also a **digestive organ**, secreting pancreatic juice containing digestive enzymes that assist digestion and absorption of nutrients in the small intestine. These enzymes help to further **break down** the **carbohydrates, proteins, and lipids in the chyme**.

Reduction on the quantity of effective insulin gives rise to Diabetes Mellitus (diabetes, siphon, mellitus of honey) commonly called simply diabetes.

Saliva: Tylene, Maltase

Gastric Juice: Pepsin, Renin

Pancreatic Juice: Trypsin, Amylase, Lipase

Intestinal Juice: Erepsin, Maltase, Lactase, Sucrase, Lipase.

LYMPHATIC SYSTEM AND IMMUNITY

The Lymphatic System

- The spleen serves as a reservoir for blood, and filters or purifies the blood and lymph fluid that flows through it.
- If the spleen is damaged or removed, the individual is more susceptible to infections.

Immunity

- **Antibodies:** Antibodies are a type of protein molecule known as **Immunoglobulins**.

BLOOD

- Blood is a fluid connective tissue.
- The quantity of blood in the human's body is 7% of the total weight.
- pH value of blood is 7.4.
- There is an average of 5-6 litres of blood in human body.
- Female contains half litre of blood less in comparison to male.
- It also fights infection and regulates temperature.

Blood cells are produced in BONE MARROW

The main functions of blood are to transport oxygen, carbon dioxide, water, nutrients, hormones and waste around the body. Blood also fights infection and regulates temperature.

Blood has four components:

(a) Plasma
(b) Red blood corpuscles
(c) White blood corpuscles
(d) Platelets

PLASMA - Liquid portion of Blood

- It constitutes for about 54% of our blood. 92% of it is water.

Its main functions are -

- Maintaining a satisfactory blood pressure
- Volume to supplying critical proteins for blood clotting and immunity
- Medium for exchange of vital minerals such as sodium and potassium
- Helps to maintain a proper pH (acid-bas(e) balance in the body, which is critical to cell function.
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RED BLOOD CORPUSLES - Carry oxygen

- Red blood cells are disc-shaped cells containing haemoglobin
- Haemoglobin enables the cells to pick up and deliver oxygen to all parts of the body, then pick up carbon dioxide and remove it from tissues
- Its life span is from 20 days to 120 days and are then broken down into pigments called bilirubin and biliverdin in the liver
- Its destruction takes place in liver & spleen. Therefore, liver is called grave of RBC.
- They are made in the bone marrow
- They have no nucleus
- Oxyhaemoglobin = oxygen rich haemoglobin
- Deoxyhaemoglobin = low oxygen haemoglobin

WHITE BLOOD CELLS - It defend body from infections

- White blood cells, also called leukocytes
- White cells are the body's primary defense against infection
- They can move out of the blood stream and reach tissues to fight infection
- They are essential for good health
- Its life span is from 1 to 2 days
- White blood cells have nuclei and are also made in the bone marrow.

PLATELETS - Responsible for clotting

Platelets are the cells that circulate within our blood and bind together when they recognize damaged blood vessels.

Study of blood is called HEMATOLOGY.

THE CIRCULATORY SYSTEM

HUMAN HEART

The human heart is an organ that pumps blood throughout the body via the **circulatory system**, supplying oxygen and nutrients to the tissues and removing carbon dioxide and other wastes.

The human heart has four chambers:

- The right atrium and right ventricle together make up the "**right heart**"
- The left atrium and left ventricle make up the "**left heart**"
- A wall of muscle called the **septum** separates the two sides of the heart
- **Valves prevent backflow,** keeping the blood flowing in one direction through the heart.

A double-walled sac called the ***pericardium*** encases the heart, which serves to protect the heart and anchor it inside the chest.

Between the outer layer, the **parietal pericardium**, and the inner layer, the **serous pericardium**, runs pericardial fluid, which lubricates the heart during contractions and movements of the lungs and diaphragm.

The heart's outer wall consists of three layers:-

- The outermost wall layer or **epicardium,** is the inner wall of the pericardium.
- The middle layer or **myocardium,** contains the muscle that contracts.
- The inner layer or **endocardium,** is the lining that contacts the blood.

The **Sinoatrial node** produces the electrical pulses that drive heart contractions.

HUMAN HEART FUNCTION

The heart circulates blood through two pathways:

1. The pulmonary circuit
2. The systemic circuit

In the pulmonary circuit, deoxygenated blood leaves the right ventricle of the heart via the pulmonary artery and travels to the lungs, then returns as oxygenated blood to the left atrium of the heart via the **pulmonary vein.**

In the systemic circuit, oxygenated blood leaves the body via the left ventricle to the aorta, and from there enters the arteries and capillaries where it supplies the body's tissues with oxygen. Deoxygenated blood returns via veins to the **vena cava,** re-entering the heart's right atrium.

The ***cardiovascular system*** circulates blood from the heart to the lungs and around the body via blood vessels.

Blockage of any artery can cause a heart attack, or damage to the muscle of the heart. A heart attack is distinct from cardiac arrest, which is a sudden loss of heart function that usually occurs as a result of electrical disturbances of the heart rhythm.

The heart contains electrical "pacemaker" cells, which cause it to contract — producing a heartbeat. The aorta is the main artery leaving the heart.

The pulmonary artery is the only artery that carries oxygen-poor blood. The pulmonary artery carries deoxygenated blood to the lungs.

The veins have valves that prevent backflow of blood.

Important Points:

- **Aorta**

The largest artery in the body. It carries oxygen-rich blood away from the heart to vessels that reach the rest of the body.

- **Atria**

The chambers of the heart, to which the blood returns from the circulation.

Capillaries

The smallest of the body's blood vessels. Oxygen and glucose pass through capillary walls and enter the cells. Waste products such as carbon dioxide pass back from the cells into the blood through capillaries.

Cardiac Valves (Heart Valves)

Any of the four heart valves that regulate the flow of blood through the chambers of the heart.

Oxygenated Blood - Oxygen-rich blood.

Deoxygenated Blood - Oxygen-poor blood.

Heart Ventricles - The lower right and left chambers of the heart.

Interventricular Septum

Interventricular septum is the stout wall separating the lower chambers (the ventricles) of the heart from one another.

Lungs

One of a pair of organs in the chest that supplies the body with oxygen, and removes carbon dioxide from the body.

Myocardium

The muscular substance of the heart; the middle of the three layers forming the outer wall of the human heart.

Pulmonary Artery

The pulmonary artery and its branches deliver blood rich in carbon dioxide (and lacking in oxygen) to the capillaries that surround the air sacs.

Pulmonary Circulation

The circulation of the blood through the lungs.

Pulmonary Veins

The veins that return the oxygenated blood from the lungs to the left atrium of the heart.

Superior Vena Cava

The large vein that carries blood from the head, neck, arms, and chest to the heart.

Vena Cava

A large vein which returns blood from the head, neck and extremities to the heart.

- Endothelium is the innermost layer of blood vessels that consists of just a single layer of cells.
- Veins are blood vessels that carry blood to the heart in an even flow. They have thin walls large lumens and valves.
- A pulse is the alternate contraction and relaxation of an artery as blood passes through it.
- Blood pressure is the force blood exerts on the walls of blood vessels.
- A Sphygmomanometer is used for measuring blood pressure(normally 120/80 mm Hg)
- Atherosclerosis is the hardening of artery walls due to a build-up of fatty deposits.
- Smoking causes heart rate and blood pressure to increase. Diet high in saturated fats increase blood pressure and atherosclerosis. Exercise helps lower blood pressure.

Blood Groupings

- Father of Blood Grouping : Karl Landsteiner
- He discovered A, B and O blood groups
- Decastello and Sturli discovered AB blood groups

RH factor

- It is a blood antigen found in RBC
- A person can be Rh+ or Rh- depending upon the presence of Rh factor in RBC
- Rh+ can receive blood from both Rh+ and Rh- but Rh- can receive blood only from Rh- only

Blood transfusion techniques was developed by Dr. James Blundell.

THE REPRODUCTIVE SYSTEM

Asexual Reproduction

- Asexual reproduction allows an organism to rapidly produce many offspring without the time and resources committed to courtship, finding a mate, and mating.
- The hydra produces buds; starfish can regenerate an entire body from a fragment of the original body.

Sexual Reproduction

- In sexual reproduction new individuals are produced by the fusion of haploid gametes to form a diploid zygote.
- Sperm are male gametes, ova (ovum singular) are female gametes.
- Meiosis produces cells that are genetically distinct from each other.
- Fertilization is the fusion of two such distinctive cells.

Human Reproduction and Development

- Gonads are sex organs that produce gametes. Male gonads are the testes, which produce sperm and male sex hormones. Female gonads are the ovaries, which produce eggs (ov(a) and female sex hormones.

The Male Reproductive System

- Sperm production begins at puberty and continues throughout life, with several hundred million sperm being produced each day. Once sperm form they move into the epididymis, where they mature and are stored.

External Genitals

- The female external genitals are collectively known as the vulva.

Sexually Transmitted Diseases

STDs can affect the sex partners, fetus, and newborn infants. STDs are grouped into three categories.

Category One

STDs that produce inflammation of the urethra, epididymis, cervix, or oviducts. Gonorrhea and chlamydia are the most common STDs in this category. Both diseases can be treated and cured with antibiotics, once diagnosed.

Category Two

STDs that produce sores on the external genitals. Genital herpes is the most common disease in this class. Symptoms of herpes can be treated by antiviral drugs, but the infection cannot be cured. Syphilis is a bacterially caused infection, and can, if left untreated, cause serious symptoms and death. However, the disease is curable with antibiotics.

Category Three

This class of STDs includes viral diseases that affect organ systems other than those of the reproductive system. AIDS and hepatitis B are in this category. Both can be spread by sexual contact or blood. Infectious individuals may appear symptom-free for years after infection.

The separation of intercourse from pregnancy uses methods blocking one of the three stages of reproduction

- release and transport of gametes
- fertilization
- implantation

PLANT REPRODUCTION

Flowers

Reproductive parts of the flower are the stamen (male, collectively termed the androecium) and carpel (often the carpel is referred to as the pistil, the female parts collectively termed the gynoecium).

Pollen

Pollen grains contain the male gametophyte (microgametophyt(e) phase of the plant. They are produced by meiosis of microspore mother cells that are located along the inner edge of the anther sacs (microsporangi(a).

Pollination

The transfer of pollen from the anther to the female stigma is termed pollination. This is accomplished by a variety of methods:

- Entomophyly is the transfer of pollen by an insect.

- Anemophyly is the transfer of pollen by wind.

Other pollinators include birds, bats, water, and Humans.

Double Fertilization

The process of pollination being accomplished, the pollen tube grows through the stigma and style toward the ovules in the ovary.

Fruit

The ovary wall, after fertilization has occurred, develops into a fruit. Fruits may be fleshy, hard, multiple or single.

Note:- Seeds germinate, and the embryo grows into the next generation sporophyte.

THE DIGESTIVE SYSTEM

Stages in the Digestive Process

1. MOVEMENT : propels food through the digestive system

2. SECRETION : release of digestive juices in response to a specific stimulus

3. DIGESTION : breakdown of food into molecular components small enough to cross the plasma membrane

4. ABSORPTION: passage of the molecules into the body's interior and their passage throughout the body

5. ELIMINATION: removal of undigested food and wastes

The human digestive system, is a coiled, muscular tube (6-9 meters long when fully extende(d) stretching from the mouth to the anus.

The Mouth and Pharynx

Chemical breakdown of starch by production of salivary amylase from the salivary glands into glucose. This mixture of food and saliva is then pushed into the pharynx and oesophagus.

The Stomach

Gastric juice in stomach contains:

- Hydrochloric acid(HCl),
- Pepsinogen and
- Mucus

Functions of Hydrochloric acid(HCl) :

- It kills microorganisms
- It lowers the stomach pH to between 1.5 and 2.5
- It lowers pH of the stomach so pepsin is activated

Pepsinogen is an enzyme that starts protein digestion and controls the hydrolysis of proteins into peptides.

Chyme, the mix of acid and food in the stomach, leaves the stomach and enters the small intestine.

Alcohol and aspirin are absorbed through the stomach lining into the blood. Epithelial cells secrete mucus that forms a protective barrier between the cells and the stomach acids.

ULCERS

Peptic ulcers result when these protective mechanisms fail. Bleeding ulcers result when tissue damage is so severe that bleeding occurs into the stomach.

Perforated ulcers are life-threatening situations where a hole has formed in the stomach wall.

At least 90% of all peptic ulcers are caused by Helicobacter pylori.

Other factors, including stress and aspirin, can also produce ulcers.

THE SMALL INTESTINE

- The small intestine is the major site for digestion and absorption of nutrients.
- It is about 22 feet (6.7 meters) long.

Parts of small intestine:

1. Duodenum
2. Jejunum
3. Ileum

- Sugars and amino acids go into the bloodstream via capillaries in each villus.
- Glycerol and fatty acids go into the lymphatic system.
- Starch and glycogen are broken down into maltose by small intestine enzymes.
- **Maltose, sucrose, and lactose** are the main carbohydrates present in the small intestine; they are absorbed by the microvilli.
- Enzymes in the cells convert these disaccharides into monosaccharides that then leave the cell and enter the capillary.
- **Gluten enteropathy** is the inability to absorb gluten, a protein found in wheat.
- Fat digestion is usually completed by the time the food reaches the ileum (lower thir(d) of the small intestine. Bile salts are in turn absorbed in the ileum and are recycled by the liver and gall bladder.

LIVER

The liver produces and sends bile to the small intestine via the hepatic duct.

Bile contains cholesterol, phospholipids, bilirubin and a mix of salts.

In addition to digestive functions, the liver plays several other roles:

(1) detoxification of blood

(2) synthesis of blood proteins

(3) destruction of old erythrocytes and conversion of haemoglobin into a component of bile

(4) production of bile

(5) storage of glucose as glycogen, and its release when blood sugar levels drop

(6) production of urea from amino groups and ammonia.

GALL BLADDER

It **stores excess bile** for release at a later time. We can live without our gall bladders, in fact many people have had theirs removed. The drawback, however, is a need to be aware of the amount of fats in the food they eat since the stored bile of the gall bladder is no longer available.

Glycogen is a polysaccharide made of chains of glucose molecules.

In plants starch stored in the form of glucose, while animals use glycogen for the same purpose.

Low glucose levels in the blood cause the release of hormones, such as glucagon, that travel to the liver and stimulate the breakdown of glycogen into glucose, which is then released into the blood(raising blood glucose levels). When no glucose or glycogen is available, amino acids are converted into glucose in the liver.The process of deamination removes the amino groups from amino acids. Urea is formed and passed through the blood to the kidney for export from the body. Conversely, the hormone insulin promotes the take-up of glucose into liver cells and its formation into glycogen.

Liver Diseases -

Jaundice occurs when the characteristic yellow tint to the skin is caused by excess hemoglobin breakdown products in the blood, a sign that the liver is not properly functioning.

Hepatitis A, B, and C are all viral diseases that can cause liver damage.

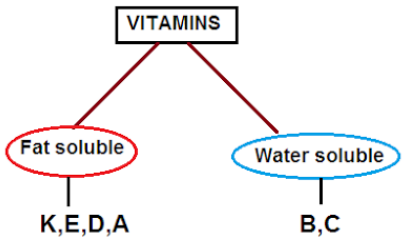
Cirrhosis: Cirrhosis of the liver commonly occurs in alcoholics, who place the liver in a stress situation due to the amount of alcohol to be broken down. Cirrhosis can cause the liver to become unable to perform its biochemical functions. **Chemicals responsible for blood clotting are synthesized in the liver, as is albumin, the major protein in blood.**

(D) The Large Intestine

The large intestine is made up by the colon, cecum, appendix, and rectum.

VITAMINS

Vitamins: Vitamins are organic molecules required for metabolic reactions. They usually cannot be made by the body and are needed in trace amounts. Vitamins may act as enzyme cofactors or coenzymes.



VITAMIN K (Phylloquinon(e)
Source - Green leafy vegetables, soya beans. The human body can also produce Vitamin K through germs in the colon(part of small intestin(e).
Function -
- Helps blood clotting, prevent over bleeding
- Maintains health of the liver

Symptoms of deficiency- Uncontrol bleeding from wounds due to clotting difficulty
Symptoms of Excess- Can lead to liver damage.

VITAMIN E (Tocopherol)=Beauty Vitamin
It is also known as Antisterility Vitamin.
Source - Green leafy vegetables, whole-wheat cereals, nuts, sprouts, egg yolk.
Function -
- Maintains normal conditions of cells, and healthy skin and tissues
- Protects red blood cells
- Antioxidation
- Enhance immunity

Symptoms of deficiency - New born infants: haemolytic anaemia, Adults: weakness.
Symptoms of Excess -
- Low Thyroxine level
- Fertility Disease
- Headache, dizziness, fatigue
- Stomach discomfort, poor appetite

VITAMIN D (Calciferol)=(Sunshine Vitamin)
Source - Egg yolk, liver, cod liver oil, fish. Our skins also produces Vitamin D when exposed to sunlight.
Function -
- Helps body absorb and utilize calcium and phosphorus, so as to maintain bones, teeth and brain healthy
- Maintains normal calcium level in blood

Symptoms of deficiency- Children: Rickets, Adults: Osteomalacia, Osteoporosis.
Symptoms of Excess -
- Calcified cartilage
- High calcium level in the blood causes abnormal heart beat and damage to organs such as kidneys
- Vomiting, diarrhea
- Sore eyes
- Itchy skin

VITAMIN A (Retinol)
Source - Dairy products, cod liver oil,liver, dark green and yellow vegetables and fruits
Function -
- Maintains eye health
- Promotes growth and development, maintains healthy bones and teeth
- Enhances the protection and regeneration of cells and mucous membrane
- Maintains healthy respiratory and intestinal tracts
- Maintain healthy hair, nails and skin

Symptoms of Deficiency -
- Night blindness, dry eyes
- Dry skin
- Stomach discomfort
- Poor growth
- Weak bones and teeth

Symptoms of excess -
- Dry, scaly, peeling, and itchy skin, rash
- Hair loss
- Poor appetite, fatigue
- Vomiting, stomach discomfort
- Liver injury
- Headache, bone pain
- Nervousness, irritability

VITAMIN B

VITAMIN B1 (Thymin(e)
Source - Sprouts, yeast
Deficiency disease - Beri-beri

VITAMIN B2 (Riboflabin)
Source - Sprout, present in cow's milk(yellowish)
Deficiency disease - Cheilosis, ulceration

VITAMIN B6 (Pyridoxin(e)
Function - Vitamin B6 helps the body make several neurotransmitters, chemicals that carry signals from one nerve cell to another. It is needed for normal brain development and function, and helps the body make the hormones serotonin and norepinephrine, which influence mood, and melatonin, which helps regulate the body clock.
Symptoms of Deficiency - Anaemia, Nervousness, insomnia, depression, Muscle cramps

VITAMIN C (Ascorbic aci(d)
Source - Citrus fruits (orange, grapefruit, lemon), strawberry, black current, kiwi fruit, tomato, green leafy vegetables, green pepper.
Function -
- Helps synthesize collagen; promotes the growth and repair of cells, gum, teeth, blood vessels and bones
- Helps healing after operation and injury
- Helps calcium and iron absorption
- Enhances immunity

Symptoms of Deficiency -
- Scurvy
- Gum
- Inflammation and bleeding, fall of teeth
- Susceptibility to skin bleeding, burst of capillary vessels
- Weakness, fatigue
- Bone pain, swollen and aching joints.

Symptoms of Excess -
- Abdominal pain
- Diarrhea
- Kidney stone.

TYPES OF VITAMINS:

Vitamin	Chemical Name	Food Sources	Deficiency Diseases
A	Retinol	Milk, eggs, fish, butter, cheese and liver	Night blindness, Skin dryness
B1	Thiamine	Legumes, whole grain, nuts	Beri-beri
B2	Riboflavin	Egg, milk, cheese, nuts, bread products	Inflammation of tongue, sores in the corners of the mouth
B3	Niacin or Nicotinic acid	Meat, fish, pea nuts, whole grain	Skin disease, diarrhoea, depression, dementia
B5	Pantothenic acid	Eggs, liver, dairy products	Fatigue, muscle cramp, Pellagra
B6	Pyridoxine	Organ meats, cereals, corn	Anaemia, kidney, stones, nausea, depression
B12	Cyanocobalamin	Meat, fish	Pale skin, constipation, fatigue
C	Ascorbic acid	Oranges, tomatoes, sweet and white potatoes	Scurvy, anaemia, ability to fight infections decreases
D	Calciferol	Direct sunlight, fish oils, eggs	Rickets, osteomalacia
E	Tocopherol	Vegetable oils, olives, tomatoes, almonds, meat, eggs	Neurological problems, problems of reproductive system
K	Phylloquinone or Naphthoquinone	Soyabeans, green leafy vegetables, dairy products, meat.	Failure to clot blood.

Minerals: Iron(for hemoglobin), iodine (for thyroxin), calcium (for bones), and sodium (nerve message transmission) are examples of minerals.

Digestion in Animals Facts

- Starfish feeds on animals covered by half shells of calcium carbonate.
- The saliva breakdown the starch into sugar.
- Liver situated in the upper part of the abdomen on the right side. It is the largest gland in the body.
- In the process of digestion carbohydrates get broken down into simple sugars such as glucose. Fats into fatty acid and glycerol. Proteins into amino acid.
- The grass is rich in cellulose a type of carbohydrates human cannot digest cellulose.
- Amoeba is a microscopic single celled organism found in pond water. When it sense food, it pushes out one or more finger like projection (pseudopodi(a) around the food particles and engulf it and then the food becomes trapped in a food vacuole.

THE EXCRETORY SYSTEM

Excretory Systems in Various Animals

Components of this system in vertebrates include the kidneys, liver, lungs, and skin.

Water and Salt Balance

The excretory system is responsible for regulating water balance in various body fluids.

Osmoregulation refers to the state aquatic animals are in: they are surrounded by freshwater
and must constantly deal with the influx of water.

The Human Excretory System

The urinary system is made-up of the kidneys, ureters, bladder, and urethra. The Nephron, an evolutionary modification of the nephridium, is the kidney's functional unit.

The Nephron has three functions:

1. Glomerular filtration of water and solutes from the blood.
2. Tubular reabsorption of water and conserved molecules back into the blood.
3. Tubular secretion of ions and other waste products from surrounding capillaries into the distal tubule.

Kidney Stones

In some cases, excess wastes crystallize as kidney stones. They grow and can become a painful irritant that may require surgery or ultrasound treatments.

Kidney Functions

1. Maintain volume of extracellular fluid
2. Maintain ionic balance in extracellular fluid
3. Maintain pH and osmotic concentration of the extracellular fluid.
4. Excrete toxic metabolic by-products such as urea, ammonia, and uric acid.

Kidneys, The Fascinating Filters

Nephron is the filteration unit of kidney.

- Excessive eating (polyphagi(a), excessive drinking (polydipsi(a) and too much of urine (polyusi(a) are three cardinal symptoms of diabetes. The 'hypothesis' produces a chemical substance called 'antidivretic hormone (ADH)'.

- The Adrenal gland maintains the regulating salt in the body and is located in an organ lying just over the kidney. As soon as the salt (sodium) concentration become just a little less than normal, it release into the blood stream a substance called 'aldosterone'.
- Renal transplantation or dialysis (artificial kidney) are the supportive measure when the damage to kidney reaches a certain point.

Hormone Control of Water and Salt

Water reabsorption is controlled by the Antidiuretic hormone (ADH) in negative feedback.

ADH is released from the pituitary gland in the brain. Dropping levels of fluid in the blood signal the hypothalamus to cause the pituitary to release ADH into the blood. ADH acts to increase water absorption in the kidneys.

Aldosterone, a hormone secreted by the kidneys, regulates the transfer of sodium from the nephron to the blood. When sodium levels in the blood fall, aldosterone is released into the blood, causing more sodium to pass from the Nephron to the blood. This causes water to flow into the blood by osmosis. Renin is released into the blood to control aldosterone.

PHOTOSYNTHESIS

- The raw materials of photosynthesis, water and carbon dioxide, enter the cells of the leaf, and the products of photosynthesis, sugar and oxygen leave the leaf.
- Water enters the root and is transported up to the leaves through specialized plant cells known as xylem.
- Carbon dioxide cannot pass through the protective waxy layer covering the leaf (cuticl(e), but it can enter the leaf through an opening flanked by two guard cells.
- Likewise, oxygen produced during photosynthesis can only pass out of the leaf through the opened stomata.

- **Chlorophyll and Accessory Pigments**
- Chlorophyll, the green pigment common to all photosynthetic cells absorbs all wavelengths of visible light except green, which it reflects to be detected by our eyes.
- Black pigments absorb all of the wavelengths that strike them.

DIVERSITY IN LIVING ORGANISMS

Biodiversity refers number and types of wide variety of plants and animals present on earth.

- In 1773, Swedish botanist Carolus Linnaeus formulated the system of Binomial Nomenclature in his book 'Species plantarum'. In binomial system, each name is expressed in
  - two parts i.e., generic name and specific name.
- Taxonomy is the branch of biology that deals with the framing of laws and principles for classifying the organisms on the basis of their characteristics and evolutionary relationships.
- The hierarchial system of classification was introduced by Linnaeus.
- Kingdom→Phylum or Division→Class→Order→Family→Genus→Species
- Species is defined as "the smallest real basic unit of taxonomy which is reproductively isolated from other group of individuals".
- Genus is a group of closely related species that are alike in broad features of their organisation.
- Family is a group of related genera having several common characters.
- Generally, Order and other higher taxonomic categories are identified based on the aggregates of characters.
- A Class is made of one or more related orders.
- The term Phylum is used for animals while Division is commonly employed for plants.
- Kingdom is the highest taxonomic category. All plants are included in Kingdom Plantae. All animals are included in Kingdom Animalia.
- Herbarium is a collection of pressed and dried plant specimens that are preserved on paper sheets.
- In Botanical garden, various plants groups are grown for scientific study, conservation, public education, aesthetics, and recreation. The famous botanical gardens are at Kew (Englan(d), Indian Botanical Garden, Howrah (Indi(a) and National Botanical Research Institute, Lucknow (Indi(a).
- Museum is a building used for the preservation, storage and exhibition of inanimate objects.
- Zoological park or zoological garden or zoo is a place where wild animals are kept in protected environment under human care. These animals are kept for public exhibition.

History of Classification

- Biological classification was first proposed by Aristotle who used simple morphological characters to classify plants and animals.
- Linnaeus initially separated plants and animals in two Kingdoms i.e., Kingdom Plantae and Kingdom Animalia.
- Most accepted System of classification is Five system classification which was given by Whittaker.

Kingdom Monera

The bacteria are categorized underneath the Kingdom Monera. Bacteria occur everywhere and they are microscopic in nature. They possess cell wall and are prokaryotic. The cell wall is formed of amino acids and polysaccharides. Bacteria can be heterotrophic and autotrophic. The heterotrophic bacteria can be parasitic or saprophytic.The autotrophic bacteria can be chemosynthetic or photosynthetic.

Kingdom Protista

They are unicellular and eukaryotes. Some of them have cilia or flagella for mobility. Sexual reproduction is by a process of cell fusion and zygote formation.

Kingdom Fungi

The fungi are filamentous; excluding yeast (single celle(d). Their figure comprises of slender, long thread-like constructions; called hyphae. The web of hyphae is called mycelium. Some of the hyphae are unbroken tubes which are jam-packed with multi nucleated cytoplasm. Such hyphae are labelled Coenocytic hyphae. The other type of hyphae has cross-walls or septae. The cell wall of fungi is composed of polysaccharides and chitin.

Most of the fungi are saprophytes and are heterotrophic. Some of the fungi also survive as symbionts. Some are parasites. Some of the symbiont fungi live in association with algae, like lichens. Some of the symbiont fungi live in association with roots of higher plants, as mycorrhiza.

Kingdom Plantae

The kingdom is filled with all eukaryotes which have chloroplast. Most of them are autotrophicin nature, but some are heterotrophic as well. The Cell wall mainly comprises of cellulose.

Plants have two distinctive phases in their lifecycle. These phases alternate with each other. The diploid saprophytic and the haploid gametophytic phase. The lengths of the diploid and haploid phases vary among dissimilar groups of plants. Alternation of Generation is what this phenomenon is called.

Kingdom Animalia

All multicellular eukaryotes which are heterotrophs and lack cell wall are set aside under this kingdom. The animals are directly or indirectly dependent for food on plants. Their mode of nutrition is holozoic. Holozoic nutrition encompasses ingestion of food and then the use of internal cavity for digestion of food. Many of the animals are adept for locomotion. Sexual reproduction is by copulation of male and female which is followed by embryological development.

Viruses

- The term 'virus' has been derived from latin, which means poison or venom or viscous fluid. They are obligate parasites, i.e., can live inside living host only. They have either RNA or DNA. They have character of both living and non-living.

Plant Kingdom

Bryophytes -

- Bryophytes are also called amphibians of the plant kingdom because these plants can live in soil but are dependent on water for sexual reproduction. They usually occur in damp, humid and shaded localities.
- Species of Sphagnum, a moss, provide peat that have long been used as fuel, and because of their capacity to hold water as packing material for trans-shipment of living material.

Pteridophytes -

- Evolutionarily, they are the first terrestrial plants to possess vascular tissues – xylem and phloem.
- The main plant body is a sporophyte which is differentiated into true root, stem and leaves. These organs possess welldifferentiated vascular tissues. Examples are Psilotum, Equisetum, Dryopteris, Marsilea, etc.

Gymnosperms -

- Gymnosperms are plants which bear naked seeds i.e., the ovules and the seeds that develop from these ovules after fertilization are not enclosed in fruit wall.
- Roots in some genera have fungal association in the form of mycorrhiza (Pinus), while in some other (Cycas) small specialised roots called coralloid roots are associated with Nitrogen fixing cyanobacteria.

Angiosperms (Flowering Plants) -

- Angiosperms are seed bearing, flowering vascular plants in which seeds are enclosed in fruits.
- The flower is the most characteristic structure of the angiosperms. The male sex organ in a flower is the stamen.
- Each stamen consists of a slender filament with an anther at the tip. The anthers, following meiosis, produce pollen grains.
- The female sex organ in a flower is the pistil or the carpel. Pistil consists of an ovary enclosing one to many ovules.

- Within ovules are present highly reduced female gametophytes termed embryo sacs.
- Each embryo-sac has a seven-celled egg apparatus – one egg cell and two synergids, three antipodal cells and two polar nuclei. The polar nuclei eventually fuse to produce a
- diploid secondary nucleus.
- Pollen grain, after dispersal from the anthers, are carried by wind or various other agencies to the stigma of a pistil. This is termed as pollination.
- The pollen tubes enter the embryo-sac where two male gametes are discharged. One of the male gametes fuses with the egg cell to form a zygote (syngamy). The other male gamete fuses with the diploid secondary nucleus to produce the triploid primary endosperm nucleus(PEN). Because of the involvement of two fusions, this event is termed as double fertilisation, and event unique to angiosperms.

Animal Kingdom

- Animals are the most diverse groups of organisms.

Multicellular, heterotrophs characterised by mobility, sensory and nervous systems.

Phylum-Porifera

- Sponges are aquatic, mostly marine, solitary or colonial and sessile.
- Examples of some sponges are : Sycon (scyph(a), Spongilla (fresh water spong(e) and Euspongia (bath spong(e).

Phylum-Coelenterata (Cnidari(a)

- All are aquatic and are mostly marine (exception-Hydra are found in fresh-water), solitary or colonial, sessile, or freeswimming and radially symmetrical animals.
- Example-Physalia (Portuguese man of war), Adamsia (Sea anemon(e), Pennatula (Sea-pen), Gorgonia (Sea-fan) and Meandrina (Brain coral).

Phylum-Ctenophora

- These are diploblastic, radial symmetrical animals with tissue level of organization.
- Examples–Hormiphora (sea walnut), Pleurobranchia (sea gooseberry), Cestum (venus girdl(e), Beroe.

Phylum-Platyhelminthes

- These are mostly endoparasites, bilateral symmetrical, triploblastic and acoelomate animals with organ level of organisation.
- Examples– Taenia (Tape worm), Fasciola (liver fluk(e).

Phylum-Aschelminthes

- They may be free-living, aquatic and terrestrial or parasitic in plants and animals.
- Examples: Ascaris(Round worm), Wuchereria (filarial worm), Ancylostoma (Hook worm), Enterobius (Pin worm).

Phylum-Annelida

- It is characterised by metameric segmentation forming ring like segments.
- Example: Neries, Pheretima (Earthworm) and Hirudinaria (Blood sucking leech).

Phylum-Arthropoda

- They are bilateral symmetry, triploblastic animals, which have organ-system level of organisation.
- Example: Apis (Honey be(e), Bombyx (Silkworm), Laccifer (Lac insect).

Phylum-Mollusca

- They are aquatic (marine or fresh water), or terrestrial having an organ-system level of organisation.
- Ex. Pila, Octopus (devil fish), Loligo (sea squi(d).
- Phylum-Echinodermata
- All existing echinoderms are marine, generally live at sea bottom.
- Ex. Asterias (star fish), Cucumaria (commonly called as sea cucumber), Antedon (water lily or feather star).
- Phylum-Hemichordata
- They are bilaterally symmetrical, triploblastic, and entrocoelous animals.
- Ex. Balanoglossus (acorn worm or tongue worm), Saccoglossus.

Phylum-Chordata

- The fundamental four characters of phylum chordata are presence of notochord, a dorsal hollow nerve cord, paired pharyngeal gill slits and post anal tail either in the embryonicor adult stage.
- Examples: Herdmania (sea squirt), Branchiostoma.

Subphylum vertebrata is divided into two sections:

Section 1 Agnatha (The jawless vertebrates)

Class : Cyclostomata

- Mouth jawless suctorial and round.
- All living members are ectoparasites on some fishes.

Ex. Petromyzon (lamprey), Myxine (hag fish).

Section 2 Gnathostomata (The jawed vertebrates)

Superclass : Pisces (Bear fins)

Class : Chondrichthyes

- They have a cartilagenous skeleton.
- Some of them possess electric organs e.g. Torpedo.
- Examples: Scoliodon (Dog fish), Trygon (Sting ray).

Class : Osteichthyes

- They have a bony skeleton.
- Examples : Marine – Exocoetus (Flying fish), Hippocampus(Sea hors(e), Lophius (Angler fish), Fresh water fishes – Labeo (Rohu), Catla (Katl(a).

Superclass : Tetrapoda (Bear Limbs)

Class : Amphibia

- Adapted for both water and land life.
- They are oviparous and development indirect through distinct larval stage called tadpole. Exambles : Bufo (Toa(d), Rana (Frog), Hyla (Tree frog), Salamandra (Salamander),

Ichthyophis (Limbless amphibi(a).

Class: Reptilia

- The class name refers to their creeping or crawling mode of locomotion.
- They are oviparous ; Development direct.

Examples: Crocodilus (Crocodil(e), Bangarus (Krait)

Class: Aves

- Birds are bipedal feathered animals.
- Endoskeleton is fully ossified (bony) and the long bones are hollow with air cavities (pneumati(c).

Examples : Corvus (crow), Pavo (Peacock).

Class: Mammalia

- These are warm blooded (homiothermous) animals having hair and mammary glands.
- They are viviparous with few exceptions and development is direct.

Example : Oviparous – Tachyglossus = Echidna (spiny Anteater). Viviparous – Pteropus(Flying fox), Camelus (Camel), Macaca (Monkey).

MICRO ORGANISMS

Micro organisms are classified into four major groups. These groups are bacteria, fungi, protozoa and algae.

- Micro organisms may be single celled like bacteria, Some algae and protozoa. Multicellular such as algae and fungi.
- Micro organisms like amoeba can live alone, while fungi and bacteria may live in colonies.

Advantages of Micro Organisms

- Making of curd and bread :-Milk is turned into curd by bacteria. The bacterium "lactobacillus" promotes the formation of curd.
- Yeast reproduces rapidly and produces CO_2 during respiration. Bubbles of the gas fill the dough and increase its volume.
- Yeast is used for commercial production of alcohol and wine. For this purpose yeast is grown as natural sugars present in grains like barley, wheat, rice, crushed fruit juice etc.
- This process of conversion of sugar into alcohol is known as fermentation. Lewis Pasteur discovered fermentation.

Medicinal Use of Micro Organisms

- The medicine which kills or stops the growth of diseases causing microorganism is called antibiotics.
- Streptomycin, tetracycline and Erythromycin are some of the commonly known antibiotics. Which are made from fungi and bacteria.
- Alexander Fleming discovered penicillin.
- Antibiotics are not effective against cold and flu as these are caused by virus.

Vaccine

- Edward Jenner discovered the vaccine for small pox.

Harmful Microorganisms

- Disease-causing microorganisms are called pathogens.
- Microbial diseases that can spread from an infected person to a healthy person through air water, food, or physical contact are called communicable diseases. i.e.- cholera, common cold, chicken pox and TB.
- Female anopheles mosquito which carries the parasite of malaria.
- Female Aedes mosquito acts as carrier of dengue virus.
- Robert Koch discovered the bacteria (bacillus anthracis) which causes anthrax disease.

Common Methods of Preserving Food in our Homes

- **Chemical method:** Salt and Edible oils are the common chemical generally used.
- Sodium benzoate and sodium metabisulphite are common preservatives. These are also used in the Jams and squashes to check their spoilage.

Preservation by sugar :

- Sugar reduces the moisture context which inhibits the growth of bacteria which spoil food.
- Use of oil and vinegar prevents spoilage of pickles become bacteria cannot live in such an environment.
- Pasteurized milk : the milk is heated to about 70˚C for 15 to 30 seconds and then suddenly chilled and stored.
- This process was discovered by Louis Pasteur. It is called pasteurization.

SOME IMPORTANT TABLES

Important Facts About Human Body:

Largest and strongest Bone in the body:	Femur (thigh bon(e)
Smallest Bone in the body:	Stapes in ear
Volume of Blood in the body:	6 litres (in 70 kg body)
Number of Red Blood Cells(R.B.C.):	1. In male: 5 to 6 million/cubic mm
	2. In female: 4 to 5 million/cubic mm
Life span of Red Blood Cells(R.B.C.):	100 to 120 days
Life span of White Blood Cell(W.B.C.):	3-4 days
Time taken by R.B.C. to complete one cycle of circulation:	20 seconds
Other name of Red Blood Cell (R.B.C.):	Erythrocytes
Largest White Blood Cells:	Monocytes

Smallest White Blood Cells:	Lymphocyte
Who discovered Blood Group:	Karl Landsteiner
Blood Platelets count:	150,000 - 400,000 platelets per micro litre
Haemoglobin (H(b):	1. In male: 14-15 gm/100 c.c. of blood
	2. In female: 11-14 gm/100 c.c. of blood
Hb content in body:	500-700 gm
pH of Urine:	6.5-8
pH of Blood:	7.36-7.41
Volume of Semen:	2-5 ml/ejaculation
Normal Sperm Count:	250-400 million/ejaculation
Menstrual cycle:	28 days
Menopause age:	45-50 years
Blood clotting time:	3-5 minutes
Weight of Brain:	1300-1400 gm in human adult
Normal Blood Pressure (B.P.):	120/80 mm Hg
Universal blood donor:	O
Universal blood recipient:	AB
Average body weight:	70 kg
Normal body temperature:	37 degree Celsius
Breathing Rate at rest:	12-16/minute
Number of Spinal Nerves:	31 pairs
Largest Endocrine Gland:	Thyroid gland
Normal Heart Beat at rest:	72 beats per minute
Largest Gland:	Liver
Largest Muscle in the body:	Gluteus Maximus or Buttock Muscle
Smallest Muscle in the body:	Stapedius
Largest Artery:	Aorta
Largest Vein:	Inferior Vena Cava
Largest and longest Nerve:	Sciatic Nerve
Longest Cell:	Neurons (nerve cells)
Minimum distance for proper vision:	25 cm
Pulse rate:	72 per minute
Thinnest Skin:	Eyelids
Weight of Heart:	200-300 gm

Common Drugs and Their Usage:

Drugs/Medicine	Use
Anaesthetics	It is a drug that induces insensitivity to pain.
Antiflatulent	It is a drug that reduces intestinal gas
Antipyretics	It is a drug used to lower body temperature.
Analgesics	It is a drug that is used to prevent or relieve pain. Eg. Aspirin.
Antibiotics	It is a drug that inhibits the growth of or destroys micro-organisms. Eg. Penicillin.
Antihistamines	It is a drug used to relieve symptoms of cold and allergies.
Antispasmodic	It is a drug used to relieve spasm of involuntary muscle usually in stomach.
Antacid	It is a drug used for preventing or correcting acidity, especially in the stomach.
Diuretics	It is a drug that promotes the production of urine.
Laxative	It is a drug used to provide relief in constitpation.

TYPES OF DISEASES

List of Diseases caused by Virus, Bacteria, Protozoa and Worm:

Disease caused by Viruses:

1. Chicken pox - It is caused by Varicella-zoster virus.
2. Small Pox - It is caused by Variola virus.
3. Common Cold -It is caused by Rhinovirus.
4. AIDS (Acquired Immunono Deficiency Syndrom(e) - It is caused by Human Immunodeficiency Virus (HIV).
5. Measles -It is caused by Measles virus.
6. Mumps -It is caused by Mumps virus.
7. Rabies - It is caused by Rabies virus (Rhabdoviridae family).
8. Dengue fever -It is caused by Dengue virus.
9. Viral encephalitis - It is an inflammation of the brain. It is caused by rabies virus, Herpessimplex, polio virus, measles virus, and JC virus.

Disease caused by Bacteria:

1. Whooping Cough - It is caused by a bacterium called Bordetella pertussis.
2.Diphtheria - It is caused by Corynebacteriumdiphtheriae.
3. Cholera - It is caused by Vibrio cholerae.
4. Leprosy - It is caused by Mycobacterium leprae.
5. Pneumonia-It is caused by Streptococcus pneumoniae.
6. Tetanus -It is caused by Clostridium tetani.
7. Typhoid - It is caused by Salmonella typhi.
8. Tuberculosis -It is caused by Mycobacterium tuberculosis.
9. Plague - It is caused by Yersinia pestis.

DISEASE CAUSED BY PROTOZOANS:

1. Malaria	It is spread by Anopheles mosquitoes.The Plasmodium parasite that causes malaria is neither a virus nor a bacteria. It is a single celled parasite that multiplies in red blood cells of humans.
2.Amoebic dysentery	It is caused by Entamoebahistolytica.
3.Sleeping sickness	It is caused by Trypanosomabrucei.
4.Kala azar	It is caused by Leishmaniadonovani.

DISEASE CAUSED BY WORMS:

1.Tapeworm	They are intestinal parasites. It cannot live on its own. It survives within the intestine of an animal including human.
2. Filariasis	It is caused by threadlike filarial nematode worms. Most cases of filaria are caused by the parasite known as Wuchereriabancrofti.
3. Pinworm	It is caused by small, thin, white roundworm called Enterobiusvermicularis.

VITAMINS AND MINERAL DEFICIENCY DISEASES:

1. Anaemia	It is caused due to deficiency of mineral Iron.
2. Ariboflavinosis	It is caused due to deficiency of Vitamin B2.
3. BeriBeri	It is caused due to deficiency of Vitamin B.
4. Goitre	It is caused due to deficiency of Iodine.

5. Impaired clotting of the blood	It is caused due to deficiency of Vitamin K.
6. Kwashiorkor	It is caused due to deficiency of Protein.
7. Night Blindness	It is caused due to deficiency of Vitamin A.
8. Osteoporosis	It is caused due to deficiency of mineral Calcium.
9. Rickets	It is caused due to deficiency of Vitamin D.
10. Scurvy	It is caused due to deficiency of Vitamin C.

COMMON HUMAN DISEASES AND AFFECTED BODY PART:

Disease	**Affected Body Part**
AIDS	Immune system of the body
Arthritis	Joints
Asthma	Bronchial muscles
Bronchitis	Lungs
Carditis	Heart
Cataract	Eye
Cystitis	Bladder
Colitis	Intestine
Conjunctivitis	Eye
Dermatitis	Skin
Diabetes	Pancreas and blood
Diphtheria	Throat
Eczema	Skin
Goitre	Thyroid gland
Glossitis	Tongue
Glaucoma	Eye
Gastritis	Stomach
Hepatitis	Liver
Jaundice	Liver
Malaria	Spleen
Meningitis	Brain and spinal cord
Myelitis	Spinal cord
Neuritis	Nerves
Otitis	Ear
Osteomyelitis	Bones
Paralysis	Nerves and limb
Pyorrhoea	Teeth
Peritonitis	Abdomen
Pneumonia	Lungs
Rhinitis	Nose
Rheumatism	Joints
Tuberculosis	Lungs
Tonsillitis	Tonsils
Trachoma	Eye

BLOOD GROUP AND ITS CLASSIFICATION :

K.Landsteiner : Classified human beings (1900) in four groups on the basis of the reaction of their blood:A,B,AB and O.

Blood group	*Carries antigen*	*Carries antibody*	*Can donate blood to*	*Can receive blood from*
A	**A**	**B**	**A,AB**	**A,O**
B	**B**	**A**	**B,AB**	**B,O**
AB	**A,B**	**None**	**Only AB**	**Universal Acceptor**
O	**None**	**A,B**	**Universal donor**	**Only O**

Questions

Q1. Which cell disorder in our body is responsible for colour blindness?
(a) WBC
(b) Cone cell
(c) Rod Cell
(d) Neuron

Q2. Blood is red in colour due to the presence of _____.
(a) Cytochrome
(b) Chlorophyll
(c) Hemocyanin
(d) Haemoglobin

Q3. Which one of the following events in a botanical garden is never directly influenced by light?
(a) Flowering
(b) Photosynthesis
(c) Transpiration
(d) Fertilization

Q4. Which of the following is a fish?
(a) Jelly fish
(b) Lobster
(c) Salmon
(d) Whale

Q5. Which is used as an Air pollution indicator?
(a) Algae
(b) Fungi
(c) Bacteria
(d) Lichens

Q6. The part of brain which controls emotional reactions in our body is -
(a) Hypothalamus
(b) Cerebrum
(c) Meninges
(d) Thalamus

Q7. An organism that transmits disease from one individual to another is called -
(a) Hybrid
(b) Fragment
(c) Vector
(d) Clone

Q8. The function of trypsin in the digestive system is to -
(a) Breakdown fats
(b) Synthesise proteins
(c) Breakdown proteins
(d) Breakdown carbohydrates

Q9. Which of the following is the hardest substance in the human body?
(a) Bone
(b) Enamel
(c) Dentine
(d) Nail

Q10. The blood vessel supplying blood to the kidney is the -
(a) Renal artery
(b) Hepatic artery
(c) Pulmonary artery
(d) Carotid artery

Q11. The human heart is enclosed in the membrane-
(a) Pericardium
(b) Pleura
(c) Dura mater
(d) Conjunctive

Q12. Bile is stored in the -
(a) Gall bladder
(b) Duodenum
(c) Liver
(d) Spleen

Q13. Which of the following is not a gland?
(a) Thyroid
(b) Stomach
(c) Pituitary gland
(d) Pancreas

Q14. Chromosomes found in cell which are responsible for characters other than sex are called?
(a) Genome
(b) Autosome
(c) Plasmagen
(d) Tonoplast

Q15. In plants food is stored in the form of starch, in animals it is generally stored in the form of -
(a) Maltose
(b) Glycogen
(c) Sucrose
(d) None of the above

Q16. Which one of the following is also called the 'Power House' of the cell?
(a) Golgi body
(b) Mitochondria
(c) Ribosome
(d) Lysosome

Q17. Which one of the following is not a part of small intestine?
(a) Caecum
(b) Duodenum
(c) Jejunum
(d) Ileum

Q18. Cell or tissue death within a living body is called as -
(a) Neutrophils
(b) Nephrosis
(c) Necrosis
(d) Neoplasia

Q19. Which of the following blood cells is compulsory for blood coagulation?
(a) Platelets
(b) Red blood corpuscles
(c) White blood corpuscles
(d) Lymphocytes

Q20. All of the following diseases are caused by virus except
(a) Dengue
(b) Influenza
(c) Mumps
(d) Typhoid

Q21. The disease in which high levels of uric acid in the blood are characteristic is
(a) Arthritis
(b) Gout
(c) Rheumatism
(d) Rheumatism heart

Q22. When the left ventricle in the human heart contracts, the blood moves to the -
(a) Brain
(b) Pulmonary artery
(c) Aorta
(d) Lungs

Q23. Which of the following is NOT a constituent of xylem?
(a) Tracheid's
(b) Companion cells
(c) Vessels
(d) Xylem parenchyma

Q24. The swollen bottom part of the carpel in a flower is _____.
(a) Ovary
(b) Style
(c) Stigma
(d) Anther

Q25. Which of the following is the CORRECT decreasing order of intercellular space in various simple permanent tissues?
(a) Parenchyma > Sclerenchyma > Collenchyma
(b) Collenchyma > Parenchyma > Sclerenchyma
(c) Parenchyma > Collenchyma > Sclerenchyma
(d) Sclerenchyma > Parenchyma > Collenchyma

Q26. Which cells in pancreas produce Insulin?
(a) Thymus
(b) Estrogen
(c) Corpus epididymis
(d) Islets of Langerhans

Q27. Eustachian Tube is located in which part of human body?
(a) Nose
(b) Ear
(c) Eyes
(d) Throat

Q28. Which one of the following organs converts glycogen into glucose and purifies the blood?
(a) Liver
(b) Kidney
(c) Lungs
(d) Spleen

Q29. The Saliva helps in the digestion of -
(a) Proteins
(b) Starch
(c) Fibres
(d) Fats

Q30. The tissue in man where no cell division occurs after birth is -
(a) Epithelial
(b) Nerves
(c) Connective
(d) Germinal

Q31. Which one of the following cells produce antibodies?
(a) Eosinophil
(b) Monocyte
(c) Basophil
(d) Lymphocytes

Q32. Which among the following is respiratory pigment in human beings?
(a) Melanin
(b) Haemoglobin
(c) Rhodopsin
(d) Bilirubin

Q33. Which of the following is NOT a feature found in almost every cell?
(a) Cell wall
(b) Plasma membrane
(c) Nucleus
(d) Cytoplasm

Q34. Green ear disease is related with the crop
(a) Mustard
(b) Paddy
(c) Bajara
(d) Groundnut

Q35. The 'blue baby' pollution disease is due to the excessive presence of which of the following in drinking water?
(a) Fluoride
(b) Chloride
(c) Nitrate
(d) Arsenic

Q36. Which of the following vitamins contain nitrogen?
(a) Vitamin A
(b) Vitamin B
(c) Vitamin C
(d) Vitamin D

Q37. Darwin theory of natural selection is based on
(a) Over production
(b) Struggle for existence and variation
(c) Survival of the fittest
(d) All of the above

Q38. Pulses are a rich source of which of the following?
(a) Carbohydrates
(b) Proteins
(c) Minerals
(d) Vitamin A

Q39. Which tissue provides support to plants and also stores food?
(a) Parenchyma
(b) Collenchyma
(c) Sclerenchyma
(d) No option is correct.

Q40. Which of the following vitamins is essential for the coagulation of blood?
(a) Vitamin A
(b) Vitamin C
(c) Vitamin K
(d) Vitamin D

Q41. Five Kingdom classification was given by
(a) Whittaker
(b) Heackel
(c) Linneus
(d) Copeland

Q42. Which of the following is effective against tuberculosis?
(a) Penicillin
(b) Chloromycetin
(c) Terramycin
(d) Streptomycin

Q43. A blood vessel that carries blood away from the heart is called-
(a) A vein
(b) An artery
(c) A capillary
(d) Nerve

Q44. Which of the following glands is a source of the enzyme Ptyalin?
(a) Pancreas
(b) Thyroid Gland
(c) Pituitary Gland
(d) Salivary Glands

Q45. Who expanded the cell theory and suggested that all the cells arise from pre-existing cells?
(a) T. Schwann
(b) M.Schleiden
(c) J. E. Purkinje
(d) Rudolf Virchow

Q46. Sphygmomanometer measures the blood pressure in the
(a) Veins
(b) Arteries
(c) Eyes
(d) Synovial

Q47. The disease "African Sleeping Sickness" is caused by which of the following parasite?
(a) Paramoecium
(b) Tapeworm
(c) Mosquito
(d) Trypanosoma

Q48. Which of the following is a structural and functional unit of kidneys?
(a) Renette Cells
(b) Flame Cells
(c) Nephrites
(d) Nephrons

Q49. Pungency in chillies is due to the present of:
(a) Lycopene
(b) Capsaicin
(c) Carotene
(d) Anthocyanin

Q50. _____ is a hormone that regulates the amount of glucose in the blood.
(a) Insulin
(b) Thyroxine
(c) Oxytocin
(d) None of these

Solution:

S1. Ans.(b)
Sol. The retina of the eye has two types of light sensitive cells called rods and cones, both are found in the retina. Rods work in low light conditions to help night vision, but cones work in daylight and are responsible for colour discrimination.

S2. Ans.(d)
Sol. Blood is red in colour due to the presence of Haemoglobin.

S3. Ans.(d)
Sol. Fertilization is the fusion of haploid gametes, egg and sperm, to form the diploid zygote. Sunlight has no direct relation with Fertilization.

S4. Ans.(c)
Sol. Salmon is the common name for several species of ray-finned fish in the family Salmonidae.

S5. Ans.(d)
Sol. Lichens are widely used as environmental indicators or bio-indicators. Because of their sensitivity lichens are particularly significant biological indicators of air pollution.

S6. Ans.(a)
Sol. The brain's limbic system controls emotional expression through the hypothalamus, which has control over the body's emotional responses systems. The hypothalamus is responsible for regulating hunger, thirst, response to pain, levels of pleasure, sexual satisfaction, anger and aggressive behavior, etc.

S7. Ans.(c)
Sol. An organism that transmits a disease agent from an infected to a non-infected animal or plant is known as vector.

S8. Ans.(c)
Sol. Trypsin is one of the three principal digestive proteinases, the other two being pepsin and chymotrypsin. In the digestive process, trypsin acts with the other protein as to break down dietary protein molecules to their component peptides and amino acids.

S9. Ans.(b)
Sol. Enamel is the hardest substance in the human body and contains the highest percentage of minerals, 96%, with water and organic material composing the rest.

S10. Ans.(a)
Sol. Renal artery blood vessel supply blood to kidney.

S11. Ans.(a)
Sol. Pericardium is the membrane enclosing the heart, consisting of an outer fibrous layer and an inner double layer of serous membrane.

S12. Ans.(a)
Sol. Bile is stored in the Gall bladder.

S13. Ans.(b)
Sol. Stomach is not a gland.

S14. Ans.(b)
Sol. Chromosomes found in cell which are responsible for characters other than sex are called Autosome.

S15. Ans.(b)
Sol. Glycogen is a multibranched polysaccharide of glucose that serves as a form of energy storage in humans, animals, fungi, and bacteria.

S16. Ans.(b)
Sol. Mitochondria are tiny organelles inside cells that are involved in releasing energy from food. This process is known as cellular respiration. It is for this reason that mitochondria are often referred to as the power houses of the cell.

S17. Ans.(a)
Sol. The small intestine consists of three parts. The first part, called the duodenum, connects to the stomach. The middle part is the jejunum. The third part, called the ileum, attaches to the colon.

S18. Ans.(c)
Sol. Necrosis is the death of most or all of the cells in an organ or tissue due to disease, injury, or failure of the blood supply.

S19. Ans.(a)
Sol. Platelets are tiny cell fragments that are found within our blood. whenever there is a cut the activated platelets continue to arrive on the scene through the bloodstream. They stick together and become caught in the web of fibrin. Platelets are compulsory for blood coagulation

S20. Ans.(d)
Sol. Typhoid is caused by Salmonella Typhi bacteria. Other three are viral diseases.

S21. Ans.(b)
Sol. Gout is a disease caused by high level of uric acid in the blood (hyperuricemia). It causes an attack of sudden burning pain, stiffness and swelling in a joint.

S22. Ans.(c)
Sol. When the left ventricle in the human heart contracts, the blood moves to the Arota. Blood leaves the heart through the aortic valve, into the aorta and to the body.

S23. Ans.(b)
Sol. Companion cell A type of cell found within the phloem of flowering plants. Each companion cell is usually closely associated with a sieve element. Its function is uncertain, though it appears to regulate the activity of the adjacent sieve element and to take part in loading and unloading sugar into the sieve element.

S24. Ans.(a)
Sol. The swollen bottom part of the carpel in a flower is called Ovary.

S25. Ans.(c)
Sol. Simple permanent tissues are of three types—parenchyma, collenchyma and sclerenchyma. Parenchyma are more intercellular space then collenchyma and ollenchyma are more intercellular space then sclerenchyma.

S26. Ans.(d)
Sol. The hormone insulin is a main regulator of the glucose (sugar) levels in the blood. Insulin is produced in the pancreas. To be more specific, it's produced by the beta cells in the islets of Langerhans in the pancreas.

S27. Ans.(b)
Sol. The Eustachian tube, also known as the auditory tube or pharyngotympanic tube, is a tube that links the nasopharynx to the middle ear. It is a part of the middle ear.

S28. Ans.(a)
Sol. Liver converts glycogen into glucose and purifies the blood.

S29. Ans.(b)
Sol. Saliva contains the enzyme amylase, also called ptyalin, which is capable of breaking down starch into simpler sugars such as maltose and dextrin that can be further broken down in the small intestine.

S30. Ans.(b)
Sol. In the nerve cell no division occurs after the birth.

S31. Ans.(d)
Sol. Antibodies are produced by specialized white blood cells called lymphocytes.

S32. Ans.(b)
Sol. Hemoglobin or Haemoglobin is the respiratory pigment in human beings.

S33. Ans.(a)
Sol. A cell wall is a structural layer surrounding some types of cells, just outside the cell membrane. Cell walls are present in plant cell but absent in animal cell.

S34. Ans.(c)
Sol. The green ear disease of Bajra is a common disease and has been reported from several countries including India, Iran, Israel, China, Fiji, Japan and the countries wherever Bajra crop is grown.

S35. Ans.(c)
Sol. Blue baby syndrome is an illness that begins when a large amount of nitrates in water are ingested by an infant and converted to nitrite by the digestive system.

S36. Ans.(b)
Sol. Vitamins B contains Nitrogen.

S37. Ans.(d)
Sol. Darwinism is an evolutionary theory proposed by Charles Robert Darwin, an English Naturalist. He believed that evolution is a gradual, rather than a sudden biological event. His theory was based on several facts, observations and inferences. They are 1) overproduction, 2) constancy in population, 3) struggle for existence, 4) natural selection.

S38. Ans.(b)
Sol. Pulses are a rich source proteins.

S39. Ans.(a)
Sol. This tissue which provides support to plants and also stores food. In some situations, a parenchyma contains chlorophyll and performs photosynthesis, in which case it is called a chlorenchyma. In aquatic plants, large air cavities are present in parenchyma to give support to them to float on water.

S40. Ans.(c)
Sol. Vitamin K is a fat-soluble vitamin that is most well-known for the important role it plays in blood clotting. However, vitamin K is also absolutely essential to building strong bones, preventing heart disease, and crucial part of other bodily processes.

S41. Ans.(a)
Sol. Robert Whittaker was the first to propose the five-kingdom taxonomic classification of the world's biota into the Animalia, Plantae, Fungi, Protista, and Monera in 1969.

S42. Ans.(d)
Sol. Streptomycin is an antibiotic drug, the first of a class of drugs called aminoglycosides to be discovered, and it was the first antibiotic remedy for tuberculosis.

S43. Ans.(b)
Sol. Blood vessel which carries blood (oxygenated) away from the heart, except pulmonary artery are called artery and blood vessel which carry blood (deoxygenated) towards heart except pulmonary vein are called veins.

S44. Ans.(d)
Sol. Salivary gland is a source of enzyme Ptyalin. The enzyme ptyalin or salivary amylase acts on starches and converts them to maltose. It helps in the predigestion of starches.

S45. Ans.(d)
Sol. Rudolf Virchow expanded the cell theory and suggested that all the cells arise from pre-existing cells.

S46. Ans.(b)
Sol. Blood pressure is measured by instrument called sphygmomanometer also called as blood pressure meter; it is used to measure the pressure of blood in Arteries.

S47. Ans.(d)
Sol. Sleeping Sickness:-

- Sleeping sickness is a tropical disease that can prove fatal if not treated properly.
- It spreads through the bite of the Tsetse fly, a species that is native to the African continent.
- The people living in the rural parts of Africa are more at risk of contracting this disease.
- The fly bite develops into a red sore and the person soon experiences fever, muscle and joint ache, swelling in the lymph glands, irritation and headache.

- Sleeping Sickness or African trypanosomiasis is a parasitic disease that is caused by the parasite named Trypanosoma brucie.

S48. Ans.(d)
Sol. A nephron is the structural and functional unit of the kidney. A nephron is used separate to water, ions and small molecules from the blood, filter out wastes and toxins, and return needed molecules to the blood.

S49. Ans.(d)
Sol. Speed is the distance travelled by object in a certain interval of time.Speed is not dependent on direction hence it is a scalar quantity. While Displacement, Momentum and Torque has both magnitude and direction, so they are vector quantity.

S50. Ans.(a)
Sol. Insulin is a hormone made by the pancreas that allows body to use sugar (glucose) from carbohydrates in the food that for energy or to store glucose for future use.