CLASS-XI

Work Book Cum Question Bank with Answers

ZOOLOGY

SCHEDULED CASTES & SCHEDULED TRIBES
RESEARCH & TRAINING INSTITUTE (SCSTRTI)
ST & SC DEVELOPMENT DEPARTMENT
BHUBANESWAR

WORK BOOK CUM
QUESTION BANK WITH ANSWERS

ZOOLOGY

CLASS - XI

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BHUBANESWAR – 751OO3

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Contents

ZOOLOGY (1st Year)

I. Diversity in Living World

(a) **What is living ?**, Biodiversity; Need for classification; Three domains of life; Taxonomy and Systematics; Concept of species and taxonomical hierarchy; Binomial nomenclature; Tools for study of Taxonomy- Museum, Zoos, herbaria, Botanical gardens.

(d) **Salient features and classification of animals-** non-chordates up to phyla level and chordates up to classes level (three to five salient features and at least two examples).

II. Structural Organization in Animals and Plants

(b) **Animal tissues** (epithelial, connective, muscular, nervous); Morphology, anatomy and f unctions of diff erent systems (digestive, circulatory, respiratory, nervous and reproductive) of an insect (cockroach). (Brief account only).

V. Human Physiology

(a) **Digestion and Absorption :** Alimentary canal and digestive glands; Role of digestive enzymes and gastrointestinal hormones; Peristalsis, digestion, absorption and assimilation of proteins, carbohydrates and fats; Calorific value of proteins, carbohydrates and fats (brief account); Egestion; Nutritional and digestive disorders - PEM, indigestion, constipation, vomiting, jaundice, diarrhea.

(b) **Breathing and Respiration :** Respiratory organs in animals (tracheal, brancheal, cutaneous, pulmonary); Respiratory system in humans; Mechanism of respiration (breathing) and its regulation in humans- Exchange of gases, transport of gases, Respiratory volumes; Disorders related to respiration- Asthma, Emphysema, Occupational respiratory disorders.

(c) **Body fluids Circulation :** Compositon of blood, blood groups, coagulation of blood; Composition of lymph and its function; Human circulatory system- Structure and working of human heart, blood vessels; Cardiac cycle, cardiac output, ECG; Double circulation; Regulation of cardiac activity. Disorders of circulatory system- Hypertension, Coronary artery diesease, Angina pectoris, Heart failure.

(d) **Excretory products and their elimination :** Modes of excretion- Ammonotelism, ureotelism, uriocotelism; Human excretory system- structure and function; Mechanism of Urine formation, Osmoregulation: Regulation of kidney function- Reninangiotensin, Artial Natriuretic Factor, ADH and Diabetes insipidus; Role of other organs in excretion; Disorders- Uraemia, Renal failure, Renal calculi, Nephritis; Dialysis and artificial kidney.

(e) **Locomotion and Movement :** Types of movement- ciliary, flagellar, muscular; Skeletal muscle- contractile proteins and muscle contraction; Skeletal system and its functions (To be dealt with the relevant practical of Practical Syllabus); Joints; Disorders of muscular and skeletal system- Myasthenia gravis, Tenany, Muscular dystrophy, Arthritis, Osteoporosis, Gout.

(f) **Neural control and Coordination:** Neuron and nerves; Nervous system in humans- central nervous system (brain, spinal cord), peripheral nervous system and visceral nervous system; Generation and conduction of nerve impulse; Reflex action; Sensory perception; Sense organs; Elementary structure and function of eye and ear.

(g) **Chemical Coordination and Regulation :** Endocrine glands and hormones; Human endocrine system- Hypothalamus, Pitutary, Pineal, Thyroid, Parathyroid, Adrenal, Pancreas, Gonads; Mechanism of hormone action (Elementary Idea); Role of hormones as messengers and regulatror, Hypo- and hyperactivity and related disorders (Common disorders e.g. Dwarfism, acromegaly, cretinism, goiter, exopthlmic goiter, diabetes, Addison's disease).

QUESTION PATTERN OF CHSE

Theory : 35 marks

Practical : 15 marks

Total: 50 marks

Group - A : Objective Type Compulsory

1. Multiple choice / One word answer [1 x 5 = 5 marks]

2. Correct the sentences / Fill up the blanks [1 x 5 = 5 marks]

Group - B : Short Answer Type

3. Answer within three sentences [2.5 x 3 = 7.5 marks]
   (3 bits to be answered out of 5 bits)

4. Difference between (3 important differences) [3.5 x 1 = 3.5 marks]
   (1 bit to be answered out of 3 bits)

Group - C : Long Answr Type

5. Answer two questions out of four [7 x 2 = 14 marks]

TOTAL **35 marks**

SUMMARY

Chapter - I

DIVERSITY IN LIVING WORLD

The living organisms are those, who possess such as growth, movement or locomotion, digestion, respiration, excretion, circulation, nervous, reproduction and response to stimuli and adaptation to the changing environment. These also have metabolic reactions, enzyme and hormonal actions, functioning of immune system etc.

The defining features of organisms are :

1. Metabolic reactions, which are essential for survival.
2. Different types of physiological features carrying out diverse functions.
3. In multi-cellular organisms, growth in cell numbers and body mass takes place, where as in unicellular organisms, growth in body mass only take place.
4. Both asexual and sexual mode of reproduction takes place.
5. Responds to external stimuli.

Biodiversity

The variety of life forms existing in nature is termed as 'Biodiversity'. It refers to genetic diversity, i.e. a diversity of genes among individuals of a species and also among different species of organisms. W. G. Rosen (1985) coined the term 'Biodiversity'.

Binomial nomenclature

An organism is always given a scientific name, consisting of two distinct parts; the first part is the genus or generic name, while the second part is the species or specific name. This system of assigning names of two parts is called *Binomial nomenclature*. This was proposed by Swedish Naturalist, Carl Linnaeus (1707-1778). He was referred to as the **Father of Taxonomy**.

Three Domains of Life

Carl Woese proposed the three domains system of Biological classification in 1977. The three domains are : *archaea*, *bacteria* and *eukaryote*. Under each domain, there are one or more kingdoms. The three domain system is designated with an emphasis on evolutionary line of descent.

Scheme of Classification

1. **Species -** Species is defined as a group of individuals, which have the capacity to interbreed amongst themselves to produce fertile offspring. This is the basic unit of classification and helps us to understand taxonomy and evolution. A few animals have the third name, i.e. sub-species. The scientific name of Asiatic Lion is *Panthera leo persica*.

2. **Genus -** A genus is a group of related species with common ancestry. In binominal nomenclature, a species cannot be named unless it is assigned to a genus. The genus may be **Monotypic** or **Polytypic**. Monotypic has one species, e.g. *Homo sapiens* (Man) where as polytypic has many species, e.g. *Panthera leo* (Lion), *Panthera tigris* (Tiger), *Panthera pardus* (Leopard) etc.

3. **Family -** Family includes one or more related genera and is separated from other related families by important and characteristics differences. Panthera (Lion, Tiger, Leopard etc.) and Felis (Cat) are included in the **same family, Felidae**. Family Carnivora (Dog, Fox, Wolf etc.) is different from Felidae.

4. **Order -** It is the next higher taxonomic category and includes related families. The order Carnivora includes related families e.g. Felidae (Cat), Canidae (Dog), Ursidae (Bear), Hyaenidae (Hyena).

5. **Class -** This category includes two or more related orders. Orders like Chiroptera (Bats), Primates (Monkeys and Man) Rodentia (Hare and Squirrels), Carnivora (Cat and Dog), Cetacea (Whale and Dolphin etc.)

6. **Phylum -** Classes of different organisms having some common features are included under a phylum. The phylum Chordata includes many classes such as Cyclostomata, Osteichthyses, Chordrichthyses, Amphibia, Reptilia, Aves and Mammalia.

7. **Kingdom -** This is the highest taxonomic category. All plants come under Kingdom, Plantae and all animals under Kingdom Animalia.

Tools for Study of Taxonomy

For taxonomic study, procedures and techniques have been formulated for identification, preservation of the biological specimens. The biologists need the help of some taxonomical tools or aids for carrying out such studies. Some of these tools include museums, zoos, herbaria and botanical gardens.

(a) **Museums :** Museums contain many preserved specimens of animals and plants. Complete skeletons, skulls, disarticulated bones, skin and other parts of some animals are also preserved. Natural History Museums have collections and exhibits of animals, plants and ecosystem.

(b) **Zoos (Zoological Parks) :** Here valid animals remain in enclosures under human care. The main objectives are to display animals to the public, study their behaviour and breed the endangered species for increasing their number. Fishes and other aquatic forms are kept in aquaria and water bodies.

(c) **Herbaria :** A herbaria is a collection of plant specimens and data relating to them, which are preserved for future taxonomic studies of plants and research.

(d) **Botanical Gardens :** These gardens are dedicated to the collection, cultivation and display of a variety of living plants, labelled with their botanical names and families. There may be special collections of rare and exotic plants as well as greenhouses and shade houses.

Chapter - II

CLASSIFICATION OF ANIMAL KINGDOM

Methods of Classification

Animals differ in their structure and form. There are some common basic features, which are used for basic classification. There are body symmetry, types of coelom, patterns of digestive, circulatory, reproductive and nervous systems.

(a) Levels of body organisation

(1) Cellular level, tissue level, organ and organ system level.

(2) Open and closed type circulation

(3) Body symmetry - Radial, bilateral

(b) Diploblastic and Triploblastic Organisation

(1) Diploblastic - Ectoderm, Mesoglea and Endoderm

(2) Triploblastic - Ectoderm, Mesoderm and Endoderm

(c) Coelom

(1) Acoelomata - Body cavity absent, e.g. Platyhelminthes

(2) Pseudocoelomata - A muscle - like cells present, e.g. Nemathelminthes.

(3) Coelomata - Body cavity lined by mesoderm present, e.g. Annelida etc.

(d) Segmentation

Metamerism - Body is externally and internally segmented with a serial repetition of the most organs - metamere.

(e) Notochord and Vertebral Column -

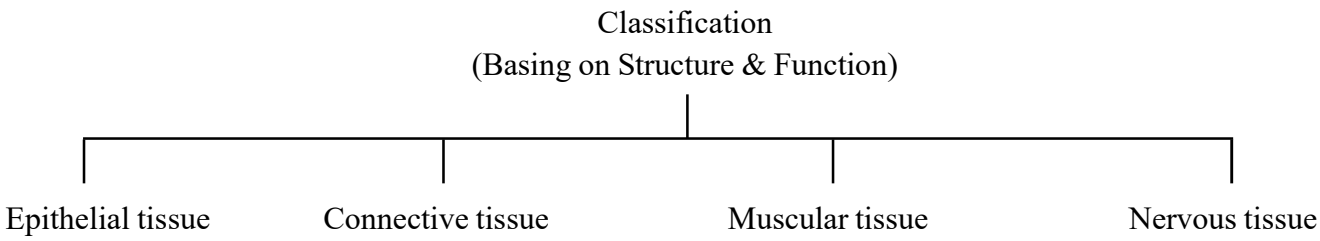
(1) Chordates - Animals having notochord

(2) Non-chordates - Animals without notochord, e.g. Phylum Porifera to Hemichordata

Chapter - III

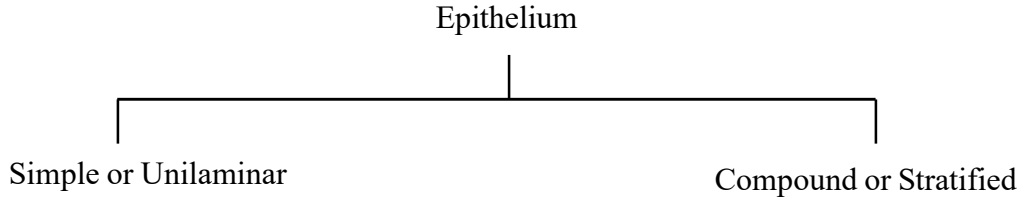
ANIMAL TISSUES

A tissue is defined as an organized layers or masses of structurally similar cells of common embryonic origin and performing a particular function. French Surgeon, Xavier Bichat (1771-1802) is known as **Father of Histology**.



EPITHELIAL TISSUE

This forms a protective covering over the body & organs. It is highly regenerative and helps in secretion of various substances.



Simple Epithelium

It is formed of a single layer of cells. It is classified into following types basing on shape, size, cilia and seoretion etc.

(a) Squamous epithelium
(b) Cuboidal epithelium
(c) Columnar epithelium
(d) Ciliated epithelium
(e) Glandular epithelium
(f) Germinal epithelium
(g) Pigmented epithelium
(h) Sensory epithelium
(i) Pseudestratified epithelium

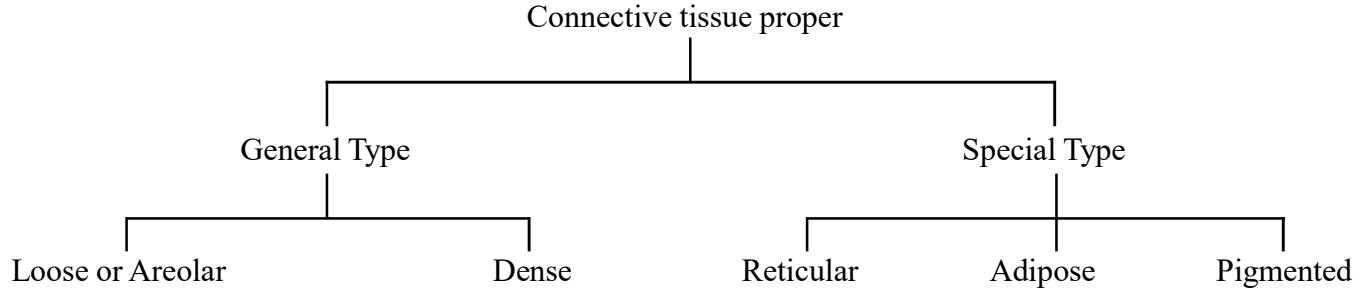
Compound Epithelium

It has two or more layers of epithelial cells. It is classified basing on the shape of cells on the surface layer.

(a) Stratified Squamous epithelium : (i) Non-Keratinized, (ii) Keratinized
(b) Stratified Cuboidal epithelium
(c) Stratified Columnar epithelium
(d) Stratified Columnar (Ciliated)
(e) Transitional epithelium

CONNECTIVE TISSUE

Connective tissue binds, anchors and supports various types of cells, tissues and organs in the body. Along with skeletal elements, it binds to all parts of the body into an integrated structure. It develops from embryonic mesoderm. It is of three types : (1) Connective tissue proper, (2) Skeletal connective tissue and (3) Fluid connective tissues.



Loose or Areolar

It contains different types of Cells and Fibers.

The cells are : (i) Fibroblasts, (ii) Macrophages, (iii) Mast Cells, (iv) Plasma Cells, (v) Adipose Cells

The Fibres are : (i) Collagen, (ii) Elastic, (iii) Reticular Fibres.

Dense Connective Tissue :

It contains more densely packed collagen fibres. It is of two types : Irregular and Regular.

Reticular Connective Tissue :

It is characterised by the presence of reticular cells and reticular fibers.

Adipose Tissue :

This tissue is an aggregate of fat cells or adipocytes. It is primarily of two types : White and Brown.

Pigmented Connective Tissue :

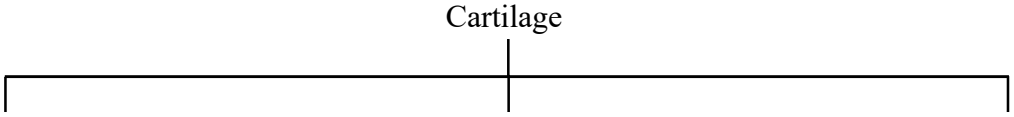
The cells are filled with black or brown pigment, melanin.

SKELETAL CONNECTIVE TISSUE

This is another type of connective tissue called **Skeletal (hard or solid) connective tissue**. It is divided into cartilage and bone.

Cartilage

Cartilage is a special connective tissues. It consists of **cartilage cells (Chordroblasts and Chordrocytes)** and an **inter-cellular substance or matrix**.



(a) **Hyaline cartilage :** It is most common type. It undergoes ossification or calcification and changes into bones. Looks bluish - white and translucent.

(b) **Elastic cartilage :** It appears yellowish and opague and highly flexible.

(c) **Fibro cartilage :** It is characterised by the presence of a large amount of irregular and dense bundles of collagen fibers in its matrix.

BONE

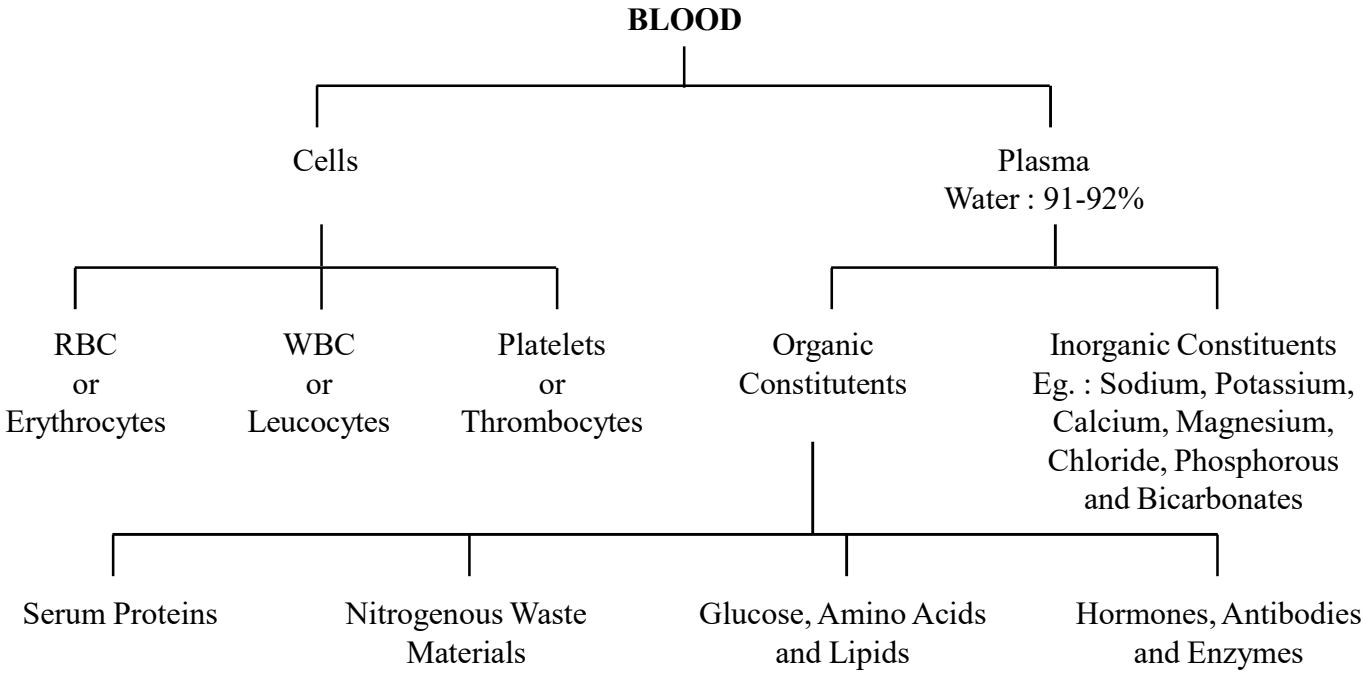
Bone is a special connective tissue. Two types of bones have been recognised : - **Cancellous or Spongy and Compact or Woven.**

(a) Canclous (spongy) bone - Cells called **Osteocytes** and **red bone marrow** are present.

(b) Compact (woven) bone - **Yellow bone marrow** containing **adipose cells** present. **Osteoblasts** and **Osteoclass** are present. **Haversian system** and **Bone matrise** are there.

FLUID CONNECTIVE TISSUE

This is a special type of connective tissue, which includes blood and lymph. Different type of corpuscles (Cells) are suspended in a fluid matrix called plasma. Fibers are absent.



OUTLINE CLASSIFICATION OF BLOOD INTO ITS CONSTITUENTS

1. **Plasma -** The plasma contains 91-92% of water with dissolved **Colloids** and **Crystalloids**. The colloids are proteins such as **prothrombin, fibrinogen, serum albumins, serum globulins & hormones.** The cystalloids are **ions of sodium, potassium, calcium, magnesium.** Glucose, Amino acids, lipids, urea, uric acids etc. are also present. The yellow colour of the plasma is due to bilirubin and carotene.
2. **Cells -** The cells are suspended in the plasma and are of three types : RBC or Erythrocytes, WBC or Leucocytes, Platelets on Thrombocytes.
3. **Lymph -** Lymph is a colourless fluid fittrate. Both B- and T- lymphocytes and other WBCs are the predominant cells of the lymph.

MUSCULAR TISSUE

Muscular tissue is composed predominantly of muscle cells or myocytes. Muscular tissues are of three types :

1. Smooth Muscle - Involuntary, Nonstriated and Unstriped
2. Skeletal Muscle - Voluntary, Striated and Striped
3. Cardiac Muscle - Involuntary, Striated and Striped

(1) **Smooth Muscle -** Made up of long, spindle shaped muscle cells, each with a broad central part with tapering ends. The nucleus is oval or elongated. These donot exhibit striated appearance, e.g. wall of alimentary canal, urinary bladder etc.

(2) **Skeletal Muscle -** A skeletal muscle is surrounded by a connective tissue sheath, the *epimysium*. It is made up of bundles of elongated muscle fibers called *fasciculi*. Each fasciculus is surrounded by a sheath known as *perimysium* and each muscle fiber is surrounded by an *endomysium*. A muscle fiber consists of two types of protein myofilaments - myosin and actin.

(3) **Cardiac Muscle -** Cardiac muscle is present in the wall of the heart, myocardium and large blood vessels that we attached to the heart. It is similar to the skeletal muscle in most of its structural organisation.

NERVOUS TISSUE

The nervous tissue is specialised for conducting impulses rapidly from one part of the body to the other. These cells are called nerve cells or neurons. A neuron consists of a **cell body** that gives off a number of processes called neurites. The body is otherwisely called as **soma** or **perikaryon**. The cytoplasm contains **nissl bodies.**

The neurites are of two types - **axon** and **dendrites**. There is formation of distinct **nodes** and **internodes** along the length of the axon. The myelin insulated part is the internode, while the myelin free part is the node called **Node of Ranvier**. These myelin-sheathed nerve fiber are known as a **myelinated** or **medullated** nerve fibers, while those without myelin sheaths are **un-myelinated** or **non-myelinated** fibers.

Neurons are classified on the basis of the number of neurites : **unipolar, pseudounipolar, bipolar & multipolar**. Neurons are also classified on the basis of their functions : (i) **Sensory or afferent neurons,** (ii) **Motion or efferent neurons** and (iii) **Interneurons - Sensory neurons** carry impulses from sense organs to CNS and **motor neurons** carry impulses from the CNS to the effectors (muscles and glands. **Interneurons** maintain connections between the neurons of the CNS.

Chapter - IV
DIGESTION AND ABSORPTION

The food material provides energy and iorganic and organic materials required fro growth, repair of tissues and other purposes. The major biomolecules present in our food are carbohydrates, proteins and lipids. Minerals and vitamins are also present in the food. We eat the food material by the process called **ingestion**. The complex biomolecules have hydrolysed into simple absorbabte products by a process called **digestion**. The digested materials pass into the blood a body fluid for distribution to all parts of the body by a process called **absorption**. Cells and tissues of the body pick up the required amount of nutrients by a process called, **assimilation**. Finally the residual undigested food is eliminated by **defaecation** or **egestion**. The sum total of all the above mentioned five processes is known as **nutrition**.

Types of digestion

Basing on place of occurence, it is of following 2 types :

1. **Intra-cellular digestion -** This ocours entirely inside the cell. The food material forms a food vacuole, where lysosomes containing digestive enzymes digest the food, e.g. all protozoa, sponges and Hydra.

2. **Extra - cellular digestion -** The food is digested in the extra-cellular, i.e. inside the alimentary canal. This type of digestion is the characteristic features of animals except phylum protozoa and porifera.

Alimentary Canal of Man

The alimentary canal of human being is a long coiled tube having distinct regional parts. It consists of **(1) Mouth, (2) Buccal cavity, (3) Pharynx, (4) Oesophagus, (5) Stomach, (6) Small intestine, (7) Large intestine, (8) Rectum, (9) Anal canal and (10) Anus**. There are two associated glands, i.e. **Liver and Pancreas.**

The mouth is bounded by two movable lips, which is meant for ingestion of food. The buccal cavity is closed and opened by a pair of jaws - upper jaw and lower jaw bearing different types of teeth. There is a tongue inside the buccal cavity, which bears taste buds on its upper surface. **Filiform, Fungiform and Circumvallate Papillae** are present on the tongue. The tongue functions as a gustatory organ and helps in the act of chewing and mastication of the food. Teeth are present on both jaws. **Teeth are thecodont, disphyodont and heterodont.** There are three pairs of salivary glands - **parotid, sublingual and submaxillary or submandibular.**

The buccal cavity and pharynx together constitute bucco-pharyngeal cavity. It is divided into **nasopharynx, orophavynx** and **laryngopharynx**. The nasopharynx serves for the passage of the inspired and expired air. The middle ear opens into the nasopharynx through as **eustachian tube**. Oropharynx serves as the passage of food. The laryngopharynx opens into the food pipe through **gullet** and into the sound box through a **glottis**.

The Oesophagus is a narrow muscular tube. The food material passes throught he oesophgus by the process of **peristalsis.** The stomach is a large J-shaped distensible sac - like muscular organ. It has 4 regions **- cardiac region, fundus, body** and **pyloric region.** There are **cardiac and pylovic sphincter,** which regulates the passage of food into the duodenum. The stomach acts as a store house of food, mechanical mixing of food and partial digestion of food material.

The small intestine is the longest part of the alimentary canal. It is divided into 3 parts - **duodenum, jejunum** and **ileum** representing the proximal, middle and distal part respectively. It helps in the complete digestion of food and absorption of nutrients.

The large intestine is shorter than small intestine. It is divided into three parts - **caecum, colon** and **rectum**. The caecum is extended as a small and finger shaped tubular structure called **vermiform appendix**. The colon is the longest part of the large intestine. Rectum is concerned with temporary storage of the faecal matter. The large intestine helps in absorption of water and salts.

General Histology of Alimentary Canal

Histologically, the alimentary canal consists of four primary layers : (a) outermost serosa, (b) muscular layer, (c) submucusa and (d) innermost lining of mucosa.

Digestive glands

The digestive glands secrete digestive juices for digestion of food. The glands and their secretions are mentioned below :

(1) Salivary glands (Oral cavity) - Saliva, (2) Gastric glands (Stomach) - Gastric juice, (3) Intestional glands (Small intestine) - Succus entericus, (4) Brunner's glands - Mucous, (5) Liver - Bile.

1. **Salivary glands -** There are three pairs of salivary glands in humans - **Parotid glands, Sublingual glands** and **Sub-mandixbular/Sub-maxillary glands.** The salivary glands secrete saliva containing salivary amylase or Ptyalin. The functions of these glands is mechanical, digestive, bacteriolytic, maintenance of water balance, excretory and contains antibody, which is the first line of defence of the body.
2. **Gastric glands -** These are of three types - **Cardiac glands, pyloric glands** and **fundic glands.** Cardiac glands secrete mucus, pepsinogen and Hcl in traces. Pyloric glands serete gastrin, and pepsinogen. Fundic glands are of three types of cells - chief or peptic cells, oxyntic cells and Goblet cells.
3. **Intestinal glands -** These are of two types : (1) **Crypts of Lieberkuhn or intestinal glands** and (2) **Brunner's glands on duodenal glands.**
4. **Liver -** This is the largest gland of the body. It is larger in males than females. It is divided into two lobes - a larger **right lobe** and a small **left lobe**. The rigth lobe consists of rigth lobe proper, quadrate lobe and caudate lobe. A gall bladder is present on the lower surface of the right lobe. It stores bile secreted by liver. The bile helps in emulsification of fact, absorption of fact soluble vitamins A, D, E and K, iron and calcium. It also stimuates peristaltic movement, neutralizes the acidic chyme of the stomach, prevents food from bacterial contamination, as it kills germs

Functions of Liver -

1. The liver secrets bile.
2. It converts excess gluclose into glycogen by **glycogenesis**.
3. It also converts glycogen into glucose by **glycogenolysis**.
4. It detoxifies toxic substrances and destroys bacteria by phagocytosis.
5. It helps in formation of haparin, blood clotting and deaminatoin of amino acids.
6. It manufactures RBCs in embryos, stores B_{12}, iron and copper.
7. It helps in **gluconeogenesis, lipogenesis and angiotensinogen**.

Chapter - V

PHYSIOLOGY OF DIGESTION

Digestion is a combination of mechanical and chemical processes, in which complex macromoleculs are converted into simplex, easily diffusible products for easy absorption. The alimentary canal is divided into four zones such as Ingressive zone, Progressive zone, Digressive zone and Egressive zone. The entire process includes the digestion in the following and the detailed mechanism can be studied from text book.

1. Digestion in the buccal cavity
2. Digestion in the stomach
3. Digestion in the small intestine
4. Digestion in the large intestine

Absorption of food

Absorption is the passage of end products of digestion into the blood and lymph through intestinal epithelsum and one of the following :

(a) Monosaccharides

(b) Amino acids

(c) Fatty acids and glycerol

(d) Water and electrolytes

(e) Vitamins and minerals.

Assimilation

A part of assimilatory product undergoes biological oxidation to meet the energy requirement during work. Another part is used for building the extra organic mater during growth and repair of the body. Any excess product is stored as reserve food for exigency.

Amino acids are not stored in the body. Proteins are used for growth, repair of tissues, enzymes or hormones and act as antibodies. Monosaccharides constitute a ready source of energy for cells & tisues. Lipids are used for function of biological membranes.

EGESTION

The elimination of undigested residual food is called egestion or defaecation. Stool is formed and its yellow colour is due to the excretion of bile pigments, especially billirubin. Methanogenic bacteria act upon the residue to generate methane that gives the stool a characteristic foul smell.

Chapter - VI

BREATHING & RESPIRATION

Respiration is a catabolic process of biological oxidation that occurs either in the absence of oxygen (anaerobic respiration) or presence of oxygen (aerobic respiration).

Modes of Respiration

Respiration is of the following types :

(a) Cutaneous respiration - through body surface (skin).

(b) Tracheal respiration - through trachea

(c) Branchial respiration - through gills

(d) Pulmonary respiration - through lungs.

Respiratory system in Human

This comprises a pair of lungs and air ways leading to and from the lungs. The respiratory tract includes external nostrils, larynx, trachea, bronchi, bronchioles and alveoli. The sites of gaseous exchange take place in the alveoli.

Mechanism of Breathing

The mechanism has 2 phases - **inspiration**, by which air is taken into the lungs and **expiration**, by which the used air is expelled out. Both inspiration and expiration together constitute **breathing** and **external respiration.**

Transport of Respiratory Gases

(a) **Transport of Oxygen :** Oxygen is transported by the blood in two forms - As dissolved oxygen and as oxyhaemoglobin. The haemoglobin and oxygen association / dissociation curve is observed during oxygen transport. There are effects of Po_2 on haemoglobin saturation and effects of Pco_2, temperature and diphosphoglyaerate concentaton on oxygen - haemoglobin dissociatoin. The effect of pH on oxygen-haemoglobin dissociaton is described as **Bohr's effect**.

(b) **Transport of Carbon dioxide :**

Transport of Co_2 occurs in three major forms :

(i) As dissolved carbon dioxide, (ii) As carbahaemoglobin and (iii) As bicarbonate

Gaseous exchanges at tissue and alveolar levels

Two processes, such as **Chloride Shift (Hamburger shift) and Haldane Effect** explains about gaseous exchanges at the tissue and alveolar levels respectively.

(a) Gaseous exchange at the tissue level

(b) Gaseous exchange at the alveolar level

Common Respiratory Disorders

The following are the common respiratory disorders :

(1) Asthma

(2) Emphysema

(3) Cystic fibrosis

(4) Pulmonary fibrosis

(5) TB, Diptheria, Whooping Cough and Pneumonia

(6) Carbon monoxide poisoning.

Chapter - VII

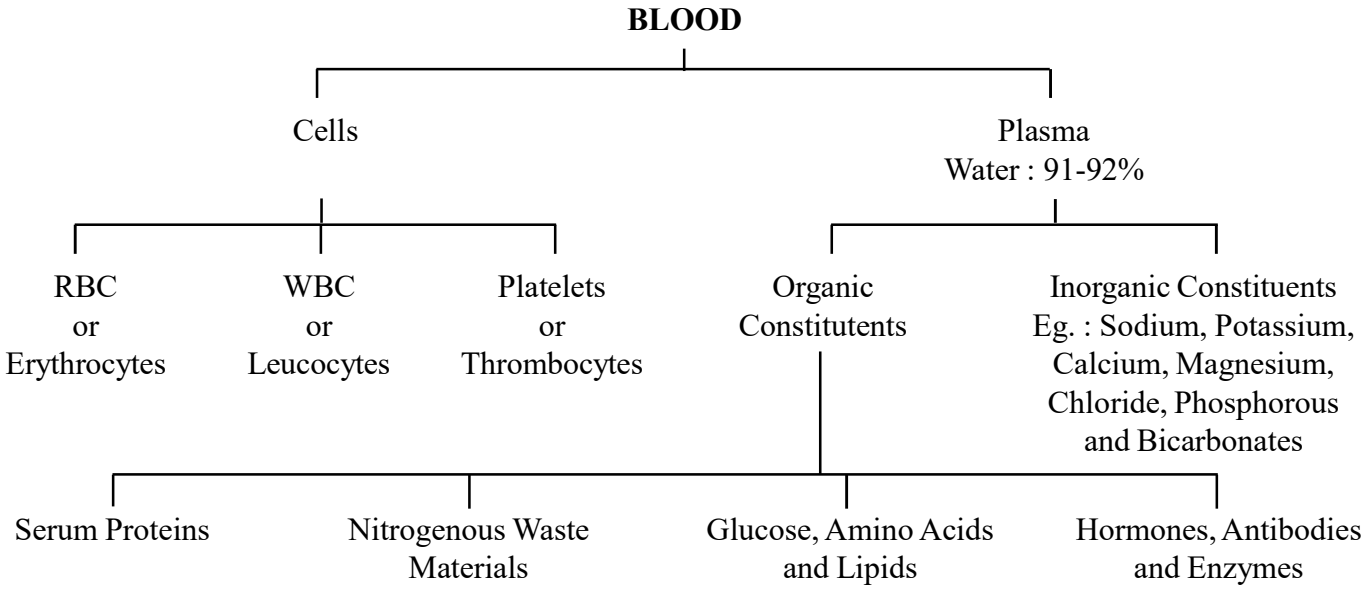
BODY FLUID & CIRCULATION

The Circulatory System performs the following functions : The body bluids are of two types - **extracellular** and **intracellular.**

(1) Transport of nutrients, respiratory gases and excretory wastes

(2) Regulation of hormones, tempeature etc.

(3) Protection from blood clotting and immunity.



Schematic Classification of blood into its elements

BLOOD GROUPS

Blood Group	Red Cell Surface Antigen	Serum Antibody	Allelic Combination (Genotype)
A	A	Anti - B	I^AI^A and I^Ai
B	B	Anti - A	I^BI^B and I^Bi
AB	Both A and B	None	I^AI^B
O	None	Both Anti-As Anti-B	ii

ABO System

Karl Landsteiner found and described ABO System. From agglutination reaction, it is evident that a person possessing the blood group O is a **universal donor**, while a person with blood group AB is a **universal recipient.**

Rh factor

Alexander S. Wiener (1937) discovered another group of antigens, named as Rh factor. Rh is derived from Rhesus monkey, in which these antigens were discovered.

Blood Clotting (Coagulation)

When blood is shed, the platelets (thromboplasts) disintegrate and liberate **thromboplastin**. Some amount of thromboplastin is also derived from the damaged tissues. Thromboplastin then converts prothrombin into active thrombin with the help of Ca^{++} ions. Then the thrrombin interacts with fibrinogess forming fibrin, which is the clot.

(1) Thromboplastin + Prothrombin $\xrightarrow{Ca^{++}}$ Thrombin

(2) Thrombin + Fibrinogen $\longrightarrow$ Fibrin (Clot)

Double Circulation

In human beings, the oxygenated blood does not mix with deoxygenated blood. The two remain separate. The right half of the heart is concerned with deoxygenated blood and left half with the oxygenated blood. Thus, there are wo types of circulation, namely **Systemic circulation** and **pulmonary circulation.**

Disorders of Circulatory System

(1) Hypertension

(2) Artherosclerosis

(3) Arteriosclerosis

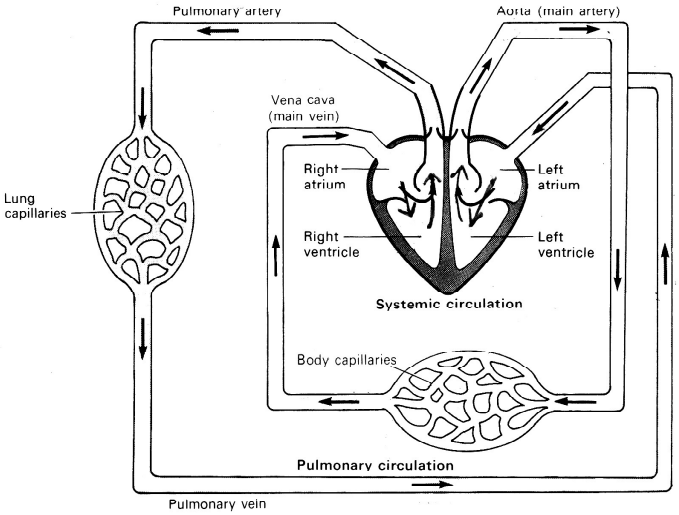


Diagram of Double Circulation in a mammal

Chapter - VIII

EXCRETORY PRODUCTS & THEIR ELIMINATION

Excretion is the process by which waste products of metabolism are removed from the body. These include carbon dioxide, excess of water and salts, a number of nitrogenous waste products such as ammonia, urea and uric acid and bile pigment.

Types of Nitrogenous Waste Products

(1) Ammonotelism - Ammonia is excreted

(2) Ureotelism - Urea is eliminated

(3) Uricotelism - Uric acid is eliminated

Excuetory System in Human

(A) **Organs of excretion**

(1) Pair of Kidneys

(2) Pair of Ureteus

(3) Urinary bladder

(4) Urethra

(B) **Functions of Kidney**

(1) Regulation of water and inorganic ion balances

(2) Removal of metabolic wastes

(3) Acid-Base balance

(4) As a major homeostatic organ

(5) Secretion of hormone for other metbolic activities.

(C) **Formation of Urine**

(1) Ultrafiltration

(2) Selective reabsorption

(3) Tubular secretion

Role of other organs in excretion

(1) Role of Lungs

(2) Role of Skin

(3) Role of Liver

Disorders related to excvetion

(1) Uremia

(2) Renal failure

(3) Renal Calculi (Kidney Stone)

(4) Nephritis

(5) Diabetes insipidus

(6) Dialysis

Chapter - IX

LOCOMOTION AND MOVEMENT

The phenomenon of changing displacement with time is known as locomotion. The purpose of locomotion is threefold :

(1) Animal performs locomotion in search of new food sources.

(2) It defends itself from its enemies and indement weather.

(3) It breads to give rise to offsprings of its own species, which are displaced to another place to avoid overcrowding and shortage of food and shetter.

Types of Movement

(1) Ciliary movement, (2) Flagellar movement, (3) Muscular movement

Structure of Skeletal muscle

(1) Structure of Myofibril

(2) Structure of myofilaments

(a) Myosin

(b) Actin

Mechanism of Muscle Contraction

The mechanism of muscle contraction is known as sliding filament theory proposed by **H. E. Huxley and J. Hanson, A. F. Huxley and R. Niedergerke**.

(1) Biochemical events, (2) Energy sources

Human Skeletal System

(1) Axial Skeleton, (2) Appendicular Skeleton

Joints

The site, where two skeletal elements come together is known as a joint. Two types of joints have been recognised.

(1) Synovial or diarthrose, (2) Solid or Synarthrose

Movement at joints may be of the following :

(a) Movements at joints of the arm

(b) Movements at joints of the leg

Disorders of Muscular and Skeletal System

(1) Myasthenia gravis, (2) Tetany, (3) Muscular dystrophy, (4) Arthritis, (5) Osteoporosis, (6) Gout

Chapter - X

NEURAL CONTROL & COORDINATION

The nervous system along with the endocrine system services as a communication system of the body.

Neural tissue

The fundamental unit of the nervous system are the nerve cells or neurons. Neurons help to communicate from all parts of the body to the brain and vice versa.

(a) Structure of typical neuron

(1) Cell body

(2) Neurites - 2 types i.e. (a) axon and (b) Dendrites

Classification of neurons : (Basing on Structure and Function)

(a) **Structurl classification**

(1) Pseudounipolar, (2) Bipolar, (3) Multipolar

(b) **Functional Classification**

(1) Afferent neuron, (2) Efferent reuron, (3) Interneurons

Synapse

The neurons are joined and to end or terminate in target tissues or organs forming specialized functions called **synapses**. In a neuron-neuron synapse, the preceeding neurn is called as **pre-synaptic**, while the succeedig as **post-synaptic**. Synapses are of two types : **electrical** and **chemical**.

Brain

Human brain has three major parts :

(1) **Fore brain (prosencephalon) -** Cerebral hemispheres and a diencephalon.

(2) **Mid brain (mesencephalon) -** Corpora quadrigemina.

(3) **Hind brain (rhomben cephalon) -** Metencephalon and Myelencephalon.

Reflex action

The functions of the sensory and motor divisions of the Peripheral Nervous System (PNS) is explained by considering **reflex action**.

Conduction of Nerve Impulse

The conduction of nerve impulse is **partly electrical and partly chemical.** When it is along an axon, it is carried by an electrical phenomenon, but when it is carried from one neuron to the next across a functional junction (synapse) it is a chemical phenomenon. The origin and propagation of action potential takes place in three steps : (1) depolarisation, (2) repolarization, (3) reorientation.

Sense Organs

There are five receptors : (1) Sense of touch, (2) Sense of taste, (3) Sense of smell, (4) Sense of equilibrium (balancing and hearing) and (5) Sense of Vision.

Chapter - XI

CHEMICAL COORDINATION AND REGULATION

There are two principal types of glands in the body - (1) Exocrine and (2) Endocrine. Exocrine glands are ducted glands, while endocrine glands are ductless glands. Endocrine glands release their secretions directly into the blood and are known as **hormones**.

Classes of hormones

(1) Amine hormones

(2) Glycoprotein hormones

(3) Polypeptide and Potein Hormones

(4) Steroid hormones

Major Hormones of Human Endocrine System

Gland/Tissue	Hormone	Function	Secretion Control Mechanism
Hypothalamus	Releasing and inhibiting factors of hormones Posterior pituitary hormones	Control of anterior pituitary hormones.	Feedback mechanisms involving metabolic and hormone levels
Posterior pituitary gland	Receives hormones from hypothalamus, no hormones synthesized here, stores and secretes : Oxytocin Antidiuretic Hormone (ADH) (vasopressin)	 Ejection of milk, contraction of uterus during birth, reduction of urine secretion.	Feedback mechanisms involving hormones and nervous system Blood solute potential
Anterior pituitary gland	Follicle Stimulating Hormone (FSH) Luteinizing Hormone (LH) Prolactin Thyroid Stimulating Hormone (TSH) Adrenocorticotropic Hormone (ACTH or corticotrophin) Growth Hormone (GH)	Stimulates spermatogenesis and growth of ovarian follicles. In male, testosterone secretion. In female, secretion of oestrogen and progesterone, ovulation and maintenance of corpus luteum. Stimulates milk production and secretion Synthesis and secretion of thyroid hormones. Synthesis and secretion of adrenal cortex hormones, growth of gland protein synthesis, especially of bones of limbs.	Blood oestrogen and testosterone level via hypothalamus and pituitary gland. Blood oestrogen levels via hypothalamus and pituitary gland. Hypothalamus hormones blood levels of thyroxine via hypothalamus and pituitary gland, blood ACTH via hypothalamus hormones. Hypothalamus hormones
Parathyroid gland	Parathormone (Calcitonin)	Increases blood calcium level decreases blood phosphate level.	Blood Ca^{2+} level and blood PO_4^{3-} level
Thyroid gland	Tri-iodothyronine (T_3) Calcitonin	Regulation of basal metabolic rate, growth and development. Decreases blood calcium level.	TSH Blood Ca^{2+} level
Adrenal cortex	Glucocorticoids (cortisol) Mineralocorticoids (aldosterone)	Protein breakdown, glucose/glycogen synthesis, adaptation to stress, anti-inflammatory/allergy effects. Na^+ retention in kidney, Na^+ and K^+ ratios in extracellular and intracellular fluids, rises blood pressure.	ACTH Blood Na^+ and K^+ levels and low blood pressure.

Gland/Tissue	Hormone	Function	Secretion Control Mechanism
Adrenal medulla	Adrenaline (epinephrine)	Increases rate and force of heartbeat, constriction of skin and gut capillaries dilation of arteorioles of heart and skeletal muscles, rises blood glucose level.	Sympathetic nervous system
	Nor-adrenaline (norepinephrine)	General constriction of small arteries, rising of blood pressure.	Nervous system
Islets of Langerhans	Insulin (beta cells)	Decreases blood glucose level, increases glucose and amino acid uptake and utilization by cells.	Blood glucose and amino acid levels.
	Glucagon (alpha cells)	Increases blood glucose level, break down of glycogen to glucose in liver.	Blood glucose levels.
Stomach Duodenum	Gastrin	Secretion of gastric juice	Food in stomach
	Secretin	Secretion of pancreatic juice inhibits gastric secretion	Acidic food in duodenum
	Cholecystokinin (pancreozymin)	Emptying of gall bladder and release of pancreatic juice into duodenum	Fatty acids and amino acids in duodenum
Kidney	Rennin	Conversion of angiotensionogen into angiotensin	Blood Na^+ level, decreased blood pressure
Ovary	Oestrogen (17 β-oestradiol)	Female secondary sex characteristics, oestrous cycle	FSH and LH
	Progestrone	Gestation, inhibition of ovulation	LH
Corpus luteum	Progesterone and oestrogen	Growth and development of uterus and foetal development.	LH Developing foetus
Placenta	Chorionic gonadotrophin	Maintenance of corpus futeum	Developing foetus
	Human placental lactogen	Stimulates mammary glands gowth	Developing foetus
Testis	Testosterone	Male secondary sexual characteristics	LH and FSH

GROUP - A

OBJECTIVE TYPE QUESTIONS

1. Choose the correct answer from the choices given under each bit/give the answer in one word only.

Unit-I

(a) Diversity in Living World

1. According to Evolution theory, since how may years back, the life was originated on earth ?
   (a) 2.6 billion (b) 3.6 billion
   (c) 4.5 billion (d) 5 billion

2. Who is referred to as the Father of Taxonomy.
   (a) W. G. Rosen (b) E. O. Wilson
   (c) John Ray (d) Carolus Linnaeus

3. Who proposed three domain system of biological classification ?
   (a) Carl Woese (b) R. H. Whittaker
   (c) Charles Darwin (d) Robert Hooke

4. Under which domain does the kingdom protista come ?
   (a) Archaea (b) Bacteria
   (c) Eukaryota (d) None of the above

5. In the scientific name, sapiens represents name of the :
   (a) Genus (b) Species
   (c) Scientist (d) Place

6. The oldest herbaria in the world which one more than 300 years old are found in :
   (a) China (b) USA
   (c) Australia (d) Europe

7. Which of the following about organisms is not dealt with in Taxonomy ?
   (a) Nomenclature (b) Identification
   (c) Classification (d) Evolution history

8. Which chemical solution is used for the preservation of organisms ?
   (a) Nitric acid (b) Formalin
   (c) Chloroform (d) Sodium hydroxide

(d) Classification of Animals

9. In which Phylum, spicules are present as endoskeleton ?
   (a) Protozoa (b) Porifera
   (c) Coelenterata (d) Annelida

10. Asexual reproduction through gemmule formation takes place in :
    (a) Arthropoda (b) Annelida
    (c) Mollusca (d) Porifera

11. Choanocytes are present in animals belonging to Phylum :
    (a) Annelida (b) Coelenterata
    (c) Mollusca (d) Porifera

12. Setae or Chetae are present as locomotory structures in animals which belong to Phylum.
    (a) Annelida (b) Arthropoda
    (c) Mollusca (d) Echinodermata

13. In the animals of Phylum Arthropoda, Coelom is reduced and there is presence of spacious blood filled cavity termed as :
    (a) Haemocoel (b) Schizocoel
    (c) Enterocoel (d) Nephrocoel

14. Malpighian tubules are present in animals of Phylum Arthropoda whose function is :
    (a) Digestion (b) Respiration
    (c) Excretion (d) Circulation

15. The animals of which Phylum are exclusively marine ?
    (a) Annelia (b) Arthropoda
    (c) Mollusca (d) Echinodermata

16. Which of the following sets belong to class Cyclostomata ?
(a) Amphioxus and Herdmania
(b) Amphioxus and Balanoglossus
(c) Petromyzon and Amphioxus
(d) Petromyzon and Myxine

17. How many pairs of cranial nerves are present in amphibians ?
(a) Eight (b) Ten
(c) Twelve (d) Fourteen

18. Pinna is present in
(a) Amphibians (b) Reptiles
(c) Aves (d) Mammals

19. What type of scale is present in cartilaginous fish ?
(a) Cycloid (b) Ctenoid
(c) Placoid (d) Ganoid

20. Find out the odd member in the group ?
(a) Crocodile (b) Dolphin
(c) Lizard (d) Turtle

21. Segmented body is a characteristic of :
(a) Coelenterates (b) Protozoans
(c) Poriferans (d) Annelids

22. The members of which of the following groups of animals occur in two basic forms like Polyp and Medusa ?
(a) Annelida (b) Nematohelminthes
(c) Echinodermata (d) Coelenterata

23. Members of which of the following phyla are diploblastic ?
(a) Arthropoda (b) Mollusca
(c) Coelenterata (d) Echinodermata

24. Members of which of the following phyla are triploblastic ?
(a) Porifera (b) Mollusca
(c) Coelenterata (d) Protozoa

25. The excretory system of members of which phylum consists of flame cells ?
(a) Coelenterata (b) Platyhelminthes
(c) Annelida (d) Arthropoda

26. Excretion occurs by nephridia in :
(a) Platyhelminthes (b) Annelida
(c) Porofera (d) Mollusca

27. A wheel-organ for feeding is found among :
(a) Annelids (b) Urochordates
(c) Cephalochordates (d) Molluscs

28. True-jaws are absent among :
(a) Cephalochordates
(b) Cyclostomes
(c) Cartilaginous fish
(d) Snakes

29. Who are homiothermic animals ?
(a) Amphibians (b) Reptiles
(c) Fishes (d) Mammals

30. Swim bladder is present in :
(a) Cartilaginous fish (b) Dolphin
(c) Bony fish (d) Amphibia

31. Platypus is a :
(a) Fish (b) Reptile
(c) Mammal (d) Amphibian

32. What is the name of the lateral paddle - like structures of Nereis ?

33. Cockroach belongs to which class ?

34. The adult animals of which phylum have pentamerous radial symetry ?

35. In which chordates notochord is absent in adult but present in tail of larva ?

36. What is the term used for summer sleep ?

37. Fore limbs are modified into which organ in birds ?

38. The egg layings mammals belong to which sub-class of class Mammalia ?

39. Dinosaurs belong to which class ?

Unit-II

(b) Animal Tissues & Cockroach

40. Ciliated epithelium is found in :
(a) Trachea (b) Urinary bladder
(c) Intestine (d) Stomach

41. Junction between two neurons is called :
(a) Synapse (b) Synapsis
(c) Junction (d) Synapticula

42. Ear pinnae contain a hard, flexible structure composed of :
(a) Bone (b) Cartilage
(c) Ligament (d) None

43. Bone is distinguished from cartilage by the presence of :
(a) Collagen (b) Blood Vessel
(c) Lymph Vessels (d) Haversian canals

44. Fibrous tissue, which connects the bones is :
(a) Epithelial tissue (b) Tendon
(c) Adipose tissue (d) Ligament

45. Basic unit of muscle contraction is :
(a) Sarcomere (b) Tropomysin
(c) Myosin (d) Actin

46. Nissl's granules are characteristics of :
(a) Muscle Cell (b) Epithelium
(c) Neuron (d) Bone

47. Areolar connective tissue connect :
(a) Bone to bone (b) Bone to muslce
(c) Skin to muscle (d) All the above

48. Voluntary muscle is present in :
(a) Lung (b) Liver
(c) Heart (d) Hind limb

49. The male cockroach is identified by the presence of :
(a) Anal cerci (b) Long antennae
(c) Anal styles (d) Wingless body

50. In cockroach the chief excretory organs are :
(a) Malpighian corpuscles
(b) Malpighian tubules
(c) Nephridia
(d) Flame cells

51. Mouth parts of cockroach are of
(a) Sponging type
(b) Piercing type
(c) Sucking type
(d) Biting and chewing type

52. In cockroach, the number of spiracles is
(a) 8 pairs (b) 10 pairs
(c) 12 pairs (d) 14 pairs

53. The respiratory system of cockroach consists of :
(a) Cuticle (b) Lungs
(c) Trachea (d) Book lung

54. Cockroach is :
(a) Insectivorous (b) Carnivorous
(c) Omnivorous (d) Sanguivorous

55. The tubular heart of cockroach is composed of :
(a) 6 chambers (b) 9 chambers
(c) 10 chambers (d) 13 chambers

56. The blood-filled cavity of cockroach is called:
(a) Coelom (b) Haemocoel
(c) Enteron (d) Pseudocoel

57. Muscles associated with heart of cockroach are :
(a) Pericardial muscles
(b) Striped muscles
(c) Tergo-sternal muscles
(d) Alary muscles

58. Which of the following serves as the tongue of cockroach ?
(a) Labium (b) Maxillae
(c) Mandible (d) Hypopharynx

59. Each ovary of cockroach is composed of :
(a) 4 ovarioles (b) 6 ovarioles
(c) 8 ovarioles (d) 16 ovaioles

60. In cockroach olfactory receptors are present on:
(a) Mandibles (b) Antennae
(c) Maxillae (d) Anal cerci

61. Which muscle of body works non-stop till death ?

62. What is the name of the cytoplasm of a muscle cell ?

63. Which type of epithelium lines alveoli of lungs ?

64. Which cells are fat storing cells ?

65. Which are the thick protein myofilaments ?

66. Which cells breakdown the bone cells ?

67. Which cell of fat bodies in cockroach store the uric acid without being discharged out ?

Unit-V

(a) Human Physiology

68. In adult human, how much saliva is secreted everyday ?
(a) 300-400 ml (b) 500-700 ml
(c) 1-1.5 lit (d) 2.5 lit

69. Bile is a product of :
(a) Secretion (b) Excretion
(c) Both a & b (d) None

70. Which is the carbohydrate digesting enzyme of pancreatic juice ?
(a) Lysozyme (b) Steapsin
(c) Amylopsin (d) Trypsin

71. Enterokinase is present in :
(a) Saliva (b) Gastric juice
(c) Parcreatic juice (d) Succus entericus

72. Amylase is not present in the pancreatic juice of infants upto the age of :
(a) 3 months (b) 6 months
(c) 9 months (d) one year

73. Liver is characterised by the presence of phagocytic cells called as :
(a) Erythrocytes (b) Alpha Cells
(c) Beta Cells (d) Kupffer Cells

74. Peyer's Patches are :
(a) Lymph Nodules
(b) Mucus Cells of gastric gland
(c) Gastric pits of stomach
(d) None of the above

75. Which of the following is produced from Pancras ?
(a) 3 types digestive enzymes and 3 hormones
(b) 2 types digestive enzymes and 1 hormone
(c) 3 types digestive enzymes and 2 hormones
(d) 3 types digestive enzymes and 1 hormone

76. Succus entericus is the name given to :
(a) Junction between ileum and colon
(b) Intestinal juice
(c) Swelling in the gut
(d) Appendix

77. Which protein can not be digested in human ?
(a) Albumin (b) Globulin
(c) Caseinogen (d) Elastin

78. A good source of lipase is :
(a) Saliva (b) Bile
(c) Pancreatic juice (d) Gastric juice

79. The oxyntic cells (parietal cells) of fundic glands secrete :
(a) Pepsinogen (b) Mucus
(c) Trypsin (d) HCl

80. Which one of these carbohydrates is a monosaccharide ?
(a) Glucose (b) Starch
(c) Sucrose (d) Lactose

81. The crypts of Liberkuhn are present in :
(a) Pancreas
(b) Oesophagus
(c) Large intestine
(d) Between the villi of small intenstine

82. Kupffer's Cells in the liver are :
(a) Fat cells (b) Phagocytic cells
(c) Blod cells (d) Regenerative cells

83. Digestion of starch takes place in :
(a) Stomach and duodenum
(b) Buccal cavity and duodenum
(c) Buccal cavity and oesophagus
(d) Duodenum only

84. Emulsification of fat is done by :
(a) Bile salts (b) Bile pigments
(c) Lecithin (d) HCl

85. In human, Cholecystokinin stimulates the contraction of :
(a) Stomach (b) Salivary gland
(c) Gall bladder (d) Brunner's gland

86. Kwashiorkor, a nutritional disorder, caused due to the deficiency of :
(a) Carbohydrates (b) Lipids
(c) Vitamins (d) Proteins

87. Brunner's glands are present in the mucosa of :
(a) Ileum (b) Jejunum
(c) Duodenum (d) Colon

88. Sodium glycocholate is a / an :
(a) Bile pigment
(b) Bile salt
(c) Enzyme
(d) Gastrointestinal hormone

89. Which gland is the largest gland of the body?

90. Name the term used for the presence of different types of teeth.

91. Name the Phagocytic Cells in the liver.

92. What the non-digestive enzyme released in the small intestine ?

93. Name the lymph vessel to which end products of fat digestion are absorbed.

(b) Breathing and Respiration

94. The oxygen carrying capacity of blood is :
(a) 10 ml (b) 15 ml
(c) 20 ml (d) 25 ml

95. The amount of CO_2 is carried constantly in 100 ml of blood is :
(a) 28 ml (b) 38 ml
(c) 48 ml (d) 52 ml

96. When the whole blood is saturated with CO_2, the changes are :
(a) The chloride content of plasma and RBC increses
(b) The chloride content of plasma and RBC decreases
(c) The chloride content of plasma increases and that of RBC decreases.
(d) The chloride content of plasma decreases and that of RBC increases.

97. How many alveoli (air sacs) are present in the lungs of an average sized man ?
(a) 1 million (b) 3 million
(c) 5 million (d) 7 million

98. At the time of inspiration in mammals, the diaphragm shall :
(a) Contract (b) Expand
(c) Relax (d) Shows no change

99. Carbonic anhydrase is found in :
(a) WBC (b) RBC
(c) Blood plasma (d) All

100. Expiration after full inspiration is called :
(a) Vital capacity (b) Lung capacity
(c) Tidal volume (d) Residual volume

101. Respiratory mechanism is controlled by :
(a) Central Nervous System
(b) Sympathetic Nervous System
(c) Parasympathetic Nervous System
(d) Autonomic Nervous System

102. In which form the CO_2 is carried in the blood.
(a) Sodium carbonate
(b) Sodium bicarbonate
(c) Potassium carbonate
(d) Magnesium bicarbonate

103. Asthma is a respiratory disease caused due to:
(a) Infection of trachea
(b) Infection of lungs
(b) Bleeding in pleural cavity
(d) Spasm in bronchial muscles

104. The relative proportion between the volume of CO_2 released and O_2 absorbed in respiration is termed as :
(a) Respiratory exchange
(b) Respiratory phase
(c) Respiratory quotient
(d) None of the above

105. The metal associated with haemoglobin is :
(a) Copper (b) Magnesium
(c) Iron (d) Manganese

106. Which of the following prevents collapsing of trachea ?
(a) Muscles (b) Diaphragm
(c) Ribs (d) Cartilaginous rings

107. The covering of lungs is :
(a) Pericardium (b) Peritoneum
(c) Pleural membrane (d) Glisson's capsule

108. Respiratory centre is :
(a) Cerebrum
(b) Cerebellum
(c) Medulla oblongata
(d) Bigemina

109. Which muscular partition separates the thorax from the abdominal cavity ?

110. Which muscles extend from ribs to ribs ?

111. The condition of decreased oxygen supply to the lungs because of extrinsic reasons is called:

112. The disease due to severe infection of alveoli of lungs by a bacteria *Streptococcus pneumoniae* is :

(c) Bodyfluid and Circulation

113. The proportion of WBC to RBC is :
(a) 1 : 7 (b) 1 : 70
(c) 1 : 700 (d) 1 : 7000

114. The most abundant granulocytes in human body is :
(a) Monocytes (b) Eosinophils
(c) Neutrophils (d) Basophils

115. Which is correct ?
(a) blood has WBC and lymph has RBC
(b) Blood has WBC, RBC and lymph has nothing
(c) Blood has RBC, WBC and lymph has WBC
(d) Blood has RBC and lymph has WBC, RBC

116. Which of the following has least constancy in shape ?
(a) RBC (b) WBC
(c) Mast Cell (d) Bone Cells

117. The type of leucocytes which attack and engulf bacteria in blood are :
(a) Neutrophils (b) Acidophils
(c) Basophils (d) Monocytes

118. Blood is :
(a) A tissue of red fibres
(b) A tissue of white fibres
(c) A liquid connective tissue
(d) None

119. What is the life span of the erythrocytes in mammalian blood ?
(a) 120 days (b) 100 days
(c) 190 days (d) 220 days

120. Which of the following is not a granulocyte ?
(a) Neutrophil (b) Monocyte
(c) Eosinophil (d) Basophil

121. Which one of the following is not a coagulation factor ?
(a) Factor IV (b) Factor XIV
(c) Factor X (d) Factor VII

122. Heparin is :
(a) Antiallergic (b) Antibody
(c) Antiseptic (d) Anticoagulant

123. Which one of the following is a blood coagulation factor-I in humans ?
(a) Prothrombin (b) Thrombin
(c) Thromboplastin (d) Fibrinogen

124. The haemophilia results due to the absence of
(a) Platelets (b) Factor-VIII
(c) Calcium (d) Factor-XIII

125. Marriage which one of the following may cause child death due to marriage ?
(a) Rh-ve man and Rh+ve woman
(b) Rh+ve man and Rh+ve woman
(c) Rh-ve man and Rh-ve woman
(d) Rh+ve man and Rh-ve woman

126. Rh factor is named after a type of :
(a) Drosophila (b) Monkey
(c) Rat (d) Man

127. A person with 'O' blood group is called universal donor because its blood has :
(a) 'A' antigen (b) 'A' and 'B' antigen
(c) 'B' antigen (d) No antigen at all

128. Agglutination is due to :
(a) Antitoxin - antibody reaction
(b) Antigen - antibody reaction
(c) Haemolysis
(d) Blood coagulation

129. Which of the following blood group has the least frequencies ?
(a) O (b) A
(c) B (d) AB

130. A person with blood group 'O' requires blood-transfusion from :
(a) 'A' only (b) 'B' only
(c) 'AB' only (d) 'O' only

131. Coagulation of blood in the vessels is prevented during normal condition by :
(a) Prothrombin (b) Heparin
(c) Plasminogen (d) None

132. A person without A and B antibodies belongs to blood group :
(a) A (b) B
(c) AB (d) O

133. The chief function of lymph nodes in mammalian body is to :
(a) Destroy the old and worn out RBCs
(b) Produce a hormone
(c) Produce white blood cells
(d) Collect and destroy pathogens

134. The first sound of heart is
(a) 'Lub' sound at the beginning of atrial systole
(b) 'Lub' sound at the beginning of ventricular systole
(c) 'Dup' sound at the beginning of atrial systole
(d) 'Dup' sound at the beginning of ventricular systole

135. 'Dup' sound is produced due to the closure of
(a) Aurico-Ventricular Valves
(b) Semilunar Valves
(c) Both (d) None

136. How many internodal pathways extend from S. A. node to A. V. node ?
(a) Two (b) Three
(c) Four (d) One

137. Which of the following is called pace maker of the heart ?
(a) Bundle of His (b) Purkinje fibres
(c) A. V. node (d) S. A. node

138. At rest in a normal condition adult human heart beat lasts for about :
(a) Iminute (b) 0.2 sec
(c) 0.5 sec (d) 0.8 sec

139. Tricuspid valve is present in between:
(a) Right Atrium and Ventricle
(b) Ureter and Kidney
(c) Both Auricles
(d) Left Atrium and Ventricle

140. A portal system is one in which :
(a) A vein starts from an organ and ends up in the heart
(b) An artery braks up in an organ and restarts by the union of its capillaries
(c) The blood from the gut is brought into kidneys before it is poured into post caval
(d) A vein breaks up in an organ into capillaries and restarts by their union as a new vein in the same organ.

141. A high systemic arterial pressure is termed as:

142. Which cardiovascular disorder is due to abnormal growths called plaques develop on the inner walls of the arteries resulting in narrowing of lumen of arteries ?

143. In which disorder arteries get hardened due to deposition of calcium salts in their wall ?

144. Angina pectoris results from arteriosclerosis of which arteries ?

(d) Excretory products and their elimination

145. Effective filtration pressure in human kidney is :
(a) 25 mm Hg (b) 40 mm Hg
(c) 80 mm Hg (d) 120 mm Hg

146. Which of the following is not a normal constituent of urine ?
(a) Urea (b) Lipoproteins
(c) Uric acid (d) Creatinine

147. The reabsorption of water in the distal convoluted tubule under the influence of ADH is called :
(a) Diffusion
(b) Active reabsorption
(c) Obligatory reabsorption
(d) Facultative reabsorption

148. Podocytes are the epithelial cells present in:
(a) Loop of Henle (b) Ureters
(c) Bowman's capsule (d) Proximal tubule

149. The pituitary hormone that increases the water permeability of distal tubular epithelium is:
(a) Aldosterone (b) Angiotensin
(c) Vasopressin (d) Relaxin

150. Renin is a :
(a) Hormone (b) Enzyme
(c) Steroid (d) Lipoprotein

151. Blood in urine is called :
(a) Glycosuria (b) Haematuria
(c) Oligouria (d) Anuvia

152. Entire glucose content of the filtrate is reabsorbed in :
(a) Loop of Henle (b) Proximal tubule
(c) Collecting tubule (d) Distal tubule

153. A person passes much urine and drinks much water but his blood glucose level is normal. This condition may be the result of :
(a) A reduction in insulin secretion from pancreas
(b) A reduction in vasopressin secretion from posterior pituitary
(c) A fall in urine sugar level
(d) An increase in secretion of glucose

154. Which of the following component of blood does not enter into the nephron ?
(a) Water (b) Plasma protein
(c) Glucose (d) Urea

155. Urea is synthesized in :
(a) Kidney (b) Spleen
(c) Liver (d) Gall bladder

156. Which group of animals are uricotelic ?
(a) Fishes and fresh water prozoans
(b) Frogs and toads
(c) Birds, reptiles and insects
(d) Birds and mammals

157. Which of the following hormones increases Na^+ reabsorption in the kidney ?
(a) ADH
(b) Aldosterone
(c) Angiotensin-II
(d) Parathyroid hormone

158. Human kidney is :
(a) Pronephros (b) Mesonephros
(c) Metanephros (d) Opisthonephros

159. Artificial kidney machine can cleanse the blood through the process of :
(a) Osmosis (b) Dialysis
(c) Plasmolysis (d) Haemolysis

160. Which of the following is not found in the renal medulla ?
(a) Glomerulus
(b) Bowman's Capsule
(c) Loop of Henle
(d) Both (a) and (b)

161. The motive force for ultrafiltration is :
(a) Glomerular osmotic pressure
(b) Glomerular hydrostatic pressure
(c) Capsular hydrostatic pressure
(d) Diastolic pressure

162. Which one of the following substances is completely reabsorbed from the filtrate in the renal tubule under noral conditions ?
(a) Salt (b) Urea
(c) Glucose (d) Water

163. In Ornithine Cycle, which one pair of the following wastes are removed from the blood?
(a) CO_2 and Urea
(b) Ammonia and Urea
(c) CO_2 and Ammonia
(d) Urea and Sodium Salts

164. How much of blood flows through human kidneys each day ?
(a) 50-60 lit. (b) 100-500 lit.
(c) 600-1000 lit. (d) 1100-2000 lit.

165. In the kidney, the filtrate moving downward from the cortex to the medulla within the loop of Henle (descending limb) it
(a) Gains water (b) Loses water
(c) Gains salt (d) Loses salt

166. In the ascending limb of loop of Henle, when the filtrate moves upward from the medulla to the cortex, it
(a) Gains water (b) Loses water
(c) Gains salt (d) Loses salt

167. What is the osmotic concentration of human blood ?
(a) 100 mOsml/lit. (b) 200 mOsml./Lit.
(c) 300 mOsml/lit. (d) 400 mOsml./lit.

168. Reabsorption of useful substances back into the blood from the filtrate in a nephron occurs in :
(a) Proximal convoluted tubule
(b) Loop of Henle
(c) Distal convoluted tubule
(d) Collecting duct

169. Reabsorption of glucose from the glomerular filtrate in the kidney tubule is carried out by:
(a) Diffusion
(b) Active transport
(c) Brownian movement
(d) Osmosis

170. The basic functional unit in human kidney is:
(a) Nephron (b) Pyramids
(c) Nephridia (d) Henle's loop

171. Which one of the four parts mentioned below does not constitute a part of a single uriniferous tubule :
(a) Loop of Henle
(b) Bowman's capsule
(c) Collecting ducts
(d) Stomach

172. Renin is secreted from :
(a) Juxtaglomerular cells
(b) Podocytes
(c) Nephridia
(d) Stomach

173. Bowman's capsule contains :
(a) Concentrated urine
(b) Plasma minus blood proteins
(c) Glycogen and water
(d) Sulphates and water

174. Presence of higher proportion of urea in the blood is called :

(e) Locomotion and Movement

175. Flagella are the locomotory structures of :
(a) Amoeba (b) Euglena
(c) Paramecium (d) Earthworm

176. Cilia are the locomotory structures of :
(a) Trypanosoma (b) Paramecium
(c) Fasciola (d) Eugleria

177. A cilium is internally made up of :
(a) Seven microtubules
(b) Nine microtubules
(c) Eleven microtubules
(d) Thirteen microtubules

178. Muscular movements are found :
(a) Only in mammals
(b) Only in humans
(c) In all animals
(d) In all animals except protozoans and poriferans

179 In immovable joints, the bones are joined firmly by :
(a) White collagen fibres
(b) Ligaments
(c) Fibrocartilage
(d) Synovial membrane

180. In which of the following, the articular surfaces are joined together by ligaments ?
(a) Immovable joints
(b) Slightly movable joints
(c) Synovial joints
(d) All the above

181. Elbow joint is a :
(a) Ball and socket joint
(b) Hinge joint
(c) Gliding joint
(d) Pivotal joint

182. Which of the following is a pivotal joint ?
(a) Joint between radius and ulna
(b) Joint between atlas and axis vertebra
(c) Joint between metacarpals of thumb and corresponding carpals
(d) Joint between metacarpals and phalanges

183. In which joint the movement occurs in a circular plan ?
(a) Pivotal joint (b) Saddle joint
(c) Candyloid joint (d) Hinge joint

184. In which joint the movement is back-and-forth and side to side ?
(a) Gliding joint (b) Pivotal joint
(c) Saddle joint (d) Candyloid joint

185. The type of protein present in the muscle fibre :
(a) Actin and Myosin
(b) Actin and Tropomysin
(c) Myosin and Tropomyosin
(d) Actin, Myosin and Tropomyosin

186. Only myosin is present in which region of sarcomere ?
(a) H-Zone (b) O-Zone
(c) I-band (d) A-band

187. Excess deposition of uric acid crystals in the joints is called :
(a) Arthritis (b) Gout
(c) Osteoporosis (d) Rickets

188. Number of floating ribs in human body is :
(a) 6 pairs (b) 5 pairs
(c) 3 pairs (d) 2 pairs

189. Number of vertebrae in human skeleton is :
(a) 30 (b) 32
(c) 33 (d) 35

190. Ribs are attached to :
(a) Scapula (b) Sternum
(c) Clavicle (d) Ileum

191. A muscle that bends one part over anothr is:
(a) Flexor (b) Extensor
(c) Abductor (d) Adductor

192. Ankle joint is a :
(a) Pivot joint
(b) Ball and socket joint
(c) Hinge joint
(d) Gliding joint

193. Astragalus and calcaneum occur in :
(a) Shoulder (b) Hip
(c) Fore limb (d) Hind limb

194. Source of energy in muscle contraction is :
(a) ADP (b) ATP
(c) GTP (d) Creatine phosphate

195. The longest bone of human body is :
(a) humerus (b) tibia
(c) radius (d) femur

196. ATpase of the muscle is located in :
(a) Actin (b) Troponin
(c) Myosin (d) Actinin

197. Which one of the following is not a disorder of bone ?
(a) Arthritis (b) Osteoporosis
(c) Rickets (d) Atherosclerosis

198. Biceps muscle of upper arm is a :
(a) Extensor muscle (b) Abductor muscle
(c) Pronator muscle (d) Flexor muscle

(f) Neural Control and Coordination

199. Cerebrum is the centre of :
(a) Thinking (b) Taste
(c) Smell (d) Balance

200. The membrane which closely invests the brain is known as :
(a) duramater (b) piamater
(c) grey matter (d) pericardium

201. Voluntary muscular co-ordination is under control of :
(a) Cerebrum (b) Hypothalamus
(c) Cerebellum (d) Medulla oblongata

202. The thermoregulatory centre in the human body is found in :
(a) diencephalon (b) hypothalamus
(c) pituitary (d) skin

203. Heart is innervated by :
(a) trigeminal (b) facial
(c) vagus (d) occulomotor

204. From which part of spinal cord, motor root originates ?
(a) ventral root (b) dorsal root
(c) grey matter (d) white matter

205. Which one of the following is not a reflex action ?
(a) caughing (b) eye lid closing
(c) knee jerk (d) boxing

206. Which of the following is purely a motor nerve ?
(a) Facial (b) Vagus
(c) Trochlear (d) Trigeminal

207. The iris of the eye is an extension of :
(a) Cornea (b) Sclerotic
(c) Retina (d) Choroid

208. Cerebrospinal fluid is secreted by :
(a) cerebellum (b) choroid plexus
(c) olfactory lobe (d) cerebrum

209. In human eye, at the blind spot :
(a) Only rods are present
(b) Only cones are present
(c) Both rods and cones are present
(d) Neither rods nor cones are present

210. Which ion causes action potential in a nerve?
(a) K^+ (b) Cl^-
(c) Na^+ (d) Ca^{+2}

211. The nature of conduction of nerve impulse is :
(a) mechanical (b) thermal
(c) electrochemical (d) chemical

212. How many cranial nerves are present in humans ?
(a) 5 pairs (b) 10 pairs
(c) 12 pairs (d) 31 pairs

213. Axon of a neuron and muscle fibres innervate together to form a :
(a) sensory unit (b) motor unit
(c) axon unit (d) none

214. Functions of iris is to :
(a) move lens forward and backward
(b) refract light rays
(c) alter the size of the pupil
(d) bring about movement of eyelids

215. The limiting line between brain and spinal cord is :
(a) Foramen of Monro
(b) Foramina of Luschka
(c) Foramen of Magendie
(d) Foramen Magnum

216. Corpus callosum connects together the :
(a) cerebral hemispheres
(b) cerebellar hemispheres
(c) thalamus and hypothalamus
(d) pons and medulla

217. Cerebrum is made of :
(a) Outer white matter and inner grey matter
(b) Outer grey matter and inner white matter
(c) Only grey matter
(d) Only white matter

218. The conduction velocity of nerve impulse in mammals at 37^0C is about :
(a) 100 m/sec (b) 120 m/sec
(c) 150 m/sec (d) 180 m/sec

219. The lungs, heart, intestine etc. are supplied with:
(a) Trigeminal (b) Vagus
(c) Abducens (d) Oculomotor

220. A motor nerve carries impulses from :
(a) Central nervous system to the effectors
(b) Effectors to central nervous system
(c) Cranial nerves to the effectors
(d) Effectors to the cranial nerves

221. During transmission of nerve impulse the potential inside the membrane has the following type of change :
(a) First positive, then negative and back positive
(b) First negative, then positive and back negative
(c) First positive, then negative and remain negative
(d) First negative, then positive and remain positive

222. Foramen of monro provides a passage connecting :
(a) Brain and spinal cord
(b) Lateral ventricles with third ventricle in brain
(c) IV ventricle with optic ventricle
(d) None

223. Which is the correct order of arrangement of ear ossicles in humans ?
(a) Stapes, Incus and Malleus
(b) Incus, Stapes and Malleus
(c) Malleus, Stapes and Incus
(d) Malleus, Incus and Stapes

224. The lateral ventricles of the brain open into the third ventricle via :
(a) Foramen Magendie
(b) Foramen magnum
(c) Foramen of Monro
(d) None of these

225. Name the mixed cranial nerve that controls swallowing.

226. Name the exposed, transperent part of the eye ball.

227. Through which aperture light enters the eye?

228. Name the pigment that enables us to see in the dark.

229. What is the organ of Corti meant for ?

(g) Chemical Coordination and Regulation

230. Graafian follicles of ovary secretes :
(a) Progesterone (b) Relaxin
(c) Estrogen (d) Cortisone

231. Cretinism results due to hyposecretion of :
(a) Adrenal (b) Thyroid
(c) Pineal (d) Parathyroid

232. Which gland secretes emergency (3F) hormones ?
(a) Adrenal Cortex (b) Adrenal Medulla
(c) Pituitary (d) Thyroid

233. Blood sugar level is regulated by :
(a) Insulin (b) Glucagon
(c) Adrenaline (d) All

234. Addison's disease is caused by hyposecretion of :
(a) Thymus (b) Thyroid
(c) Adrenal Cortex (d) Adrenal Medulla

235. Which of the following gland secretes androgens ?
(a) Thyroid (b) Pituitary
(c) Adrenal (d) Parathyroid

236. Parthormone deficiency produces tetany as a result of :
(a) Enhance blood glucose
(b) Enhanced blood Ca^{+2}
(c) Lowered blood Ca^{+2}
(d) Enhanced blood Na+

237. Ovulation in mammals in caused by
(a) FSH & TSH (b) FSH & LH
(c) FSH & LTH (d) LTH & LH

238. Pituitary gland is regulated by :
(a) Pineal gland (b) Thyroid
(c) Adrenal (d) Hypothalamus

239. Goiter is associated with :
(a) Glucagon (b) Thyroxine
(c) Progesteron (d) Testosterone

240. Islets of Langerhans are present in :
(a) Spleen (b) Liver
(c) Pancreas (d) Pituitary

241. Maximum iodine is stored in :
(a) Pituitary (b) Thyroid
(c) Parathyroid (d) Thymus

242. The hormone which regulates calcium and phosphorus metabolism in the body is secreted by :
(a) Thyroid (b) Parathyroid
(c) Thymus (d) Pancreas

243. Glycogen is converted into glucose by :
(a) Insulin
(b) Glucagon
(c) Both insulin and glucagon
(d) Galactose

244. Glucagon hormone is secreted by :
(a) Pituitary
(b) Adrenal
(c) Beta cells of Islets of Langerhans
(d) Alfa cells of Islets of Langerhans

245. Term hormone was coined by :
(a) W. M. Baylis (b) E. H. Schally
(c) E. H. Starling (d) G. W. Harris

246. Continued secretion of milk is maintained by:
(a) Prolactin (b) Progesteron
(c) Estrogen (d) Aldosterone

247. Hormone releasing factors are secreted by :
(a) Pineal body (b) Anterior pituitary
(c) Thalamus (d) Hypothalamus

248. Which hormone is produced by the pineal gland ?
(a) Serotonin (b) Somatostatin
(c) Melatonin (d) Thyrotrophin

249. Receptors for protein hormones are located :
(a) In cytoplasm
(b) On cell surface
(c) In nucleus
(d) On endoplasmic reticulum

250. An endocrine gland which atrophies in the adult human is :
(a) Thyroid (b) Thymus
(c) Parathyroid (d) Pineal

251. Failure of release of ADH leads to :
(a) Coronary thrombosis
(b) Diabetes insipidus
(c) Diabetes mellitus
(d) Hepatitis

252. Gigantism and acromegaly result from hypersecretion of :
(a) ADH (b) GH
(c) STH (d) None of these

253. The fight, flight and fright hormone is called
(a) Insulin (b) Adrenaline
(c) Oxytocin (d) Glucagon

254. Which of the following is not a hormone of anterior pituitary origin ?
(a) Growth hormone
(b) Follicle stimulating hormone
(c) Oxytocin
(d) Adreno corticotrophic hormone

255. In the mechanism of action of a protein hormone, one of the second messenger is :
(a) Cyclic AMP (b) Insulin
(c) T3 (d) Gastrin

2. Fill in the blanks with correct answer(s) / correct the underlined portion of the sentence.

Unit-I

(a) Diversity in Living World

1. The different biochemical reactions within the body constitute _____.

2. _____ comprises the totality of genes, species and ecosystems of a region.

3. The category in the biological classification higher than the kingdom is _____.

4. The intermediate categoy between sub-phylum and class is _____ in taxonomic hierarchy.

5. A group of interbreeding individuals producing fertile offsprings are designated as _____.

6. _____ are protected places where wild animals live in enclosures under human care.

7. A aquarium is a collection of plant specimens preserved for future taxonomic studies and research.

8. Binomial system of Nomenclature was proposed by R. H. Whittaker.

(d) Classification of Animals

9. Sponges exhibit _____ level of organisation.

10. The type of circulation where blood is pumped out of the heart into a cavity by which the tissues are directly bathed is called _____ circulation.

11. Animals having no vertebral column but with _____ are called chordates.

12. In coelenterates, the tentacles are armed with stinging cells called _____.

13. In platyhelminthes excretory system consists of _____ cells.

14. In annelids the circulatory system is of _____ type.
15. Jointed appendages are the characteristic features of phylum _____.
16. In mollusca, the visceral mass is covered by a fold of the body wall is known as _____.
17. In gastropods due to _____ the mouth and anus come close to each other at the anterior end.
18. Ambulacral system is a characteristic feature of Phylum _____.
19. Osphradium is a _____ sense organ found in Mollusca.
20. In echinoderms, ambulacral system is with _____ which helps in locomotion.
21. In vertebrates, the vertebral column is a modification of _____.
22. In animals of class _____, mouth is circular and have no jaws.
23. In crocodiles heart is _____ chambered.
24. A voice box _____ is present in birds.
25. The _____ is a fossil bird which possesses both Reptilian and Avian characters.
26. In adult frog kidney is _____ type.
27. The animals with many surface openings belong to the phylum _____.
28. In Mollusca the mouth contains a chitinous ribbon having small teeth is called _____.
29. An olfactory organ called _____ is present at the base of gills in mollucs.
30. Heart of fishes is _____ chambered.
31. In Amphibians the chief excretory product is _____.
32. Limbs are absent in _____ which belong to class reptilia.
33. In reptiles the chief excretory product is _____.
34. In _____ only one ovary (left side) is present in females and eggs are cledoic.
35. In mammals the mature erythrocytes are _____ and biconcave.
36. The voice box in mammals is called as _____.
37. In hemichordates circulatory system is of _____ types.
38. Round worms belong to the Phylum platyhelminthes.
39. Canal system is present in animals which belong to Phylum coelenterata.
40. The mammary glands are modified sweat glands.

Unit-II

(b) Animal Tissues & Cockroach

41. In epithelial tissue the cells are placed upon a non-cellular gelatinous _____ membrane.
42. Simple Squamous epithelium is often known as _____ epithelium.
43. Unicellular glands are modified _____ epithelial cells.
44. Germinal epithelium is a modified _____ epithelium.
45. The wall of distended urinary bladder where the number of layers of cells changes with time is called as _____ epithelium.
46. _____ fibers are also known as yellow fibers having less tensile strength.
47. Blood is a fluid _____ tissue.
48. The contraction and relaxation of muscles not under the control of their will are called _____ muscles.

49. Each myofibril is surrounded by an extensive network of endoplasmic reticulum is known as _____ reticulum.

50. _____ muscles are involuntary, striated and striped.

51. Axon arises from a conical extension of the cell body called _____.

52. The part of axon without myelin sheath is the node called _____.

53. The nerve fibers which terminate near the cell body as known as _____.

54. Pneumatic bones are found in _____.

55. Bones are joined by _____.

56. The marrow cavity of compact (woven) bone is filled with _____ bone marrow containing adipose cells.

57. In cockroach _____ is used for storing food.

58. In cockroach chitinous teeth are present in the _____.

59. In cockroah gizzard helps in _____ the food particles.

60. In cockroach hepatic caeca secretes _____ containing different enzymes.

61. Spiracles are the openings of _____ in cockroach.

62. The opening and closing of spiracles are regulated by the _____ in cockroach.

63. In cockroach the blood circulates in a large spacious cavity known as schizocoel.

64. In cockroach olfactory receptors are present in maxilla.

65. Both the vasa differentia meet and open into haemocoelomic duct in male cockroach.

66. In cockroach taste receptors are located on mandible.

67. In cockroach the anal cerci contain thigmo receptors.

68. In cockroach the heart is situated in perineural sinus.

Unit-V

(a) Human Physiology

69. The distal end of _____ is guarded by Pyloric Sphincter.

70. The common bile duct and pancreatic duct jointly open into the duodenum through _____.

71. In the tongue two types of special structures are there known as papillae and _____.

72. The glottis is guarded above by a lid called _____.

73. Food travels in the oesophagus through a type of movement called _____.

74. In the stomach the mucus membrane is thrown into large folds called _____.

75. Cardiac glands of stomach secrete _____.

76. In the small intestine each villus consists of blind lymph vessel called the _____.

77. The _____ of the alimentary canal has no role in digestive process and considered to be a vestigeal organ.

78. Sublingual gland opens at the floor of the buccal cavity through several fine ducts called _____.

79. _____ duct connects the common bile duct and gall bladder.

80. The enzyme strepsin is present in _____ juice.

81. _____ of succus entericus converts inactive trypsinogen into active trypsin.

82. Duodenal mucosa secretes a hormone called _____ that stimulates gall bladder to secrete bile by contracting it.

83. The enzyme sucrase (invertase) hydrolyses sucrose producing one molecule of glucose and one molecule of _____.

84. Inactive pepsinogen is converted to active pepsin in presence of _____.

85. Trypsin activates trypsinogen into trypsin and the process is called _____.

86. The chief protein of milk is _____.

87. Goitre is the enlargement of the _____ gland due to the deficiency of iodine.

88. When faeces become loose, fluid-like, and defecation is more frequent, the condition is called _____.

89. Protrusion of intestine into inguinal canal is called _____.

90. Removal of _____ is called egestion.

91. Calorific value for one gram of lipid is _____.

92. Marasmus is a type of disease in which there is deficiency of _____ and calories

93. In the stomach the fundic area is separated from the Pylorus by a well marked curvature called Pyloric antrum.

94. Argentaffin cells of fundic glands secrete pepsinogen.

(b) Breathing and Respiration

95. In insects Oxygen is directly supplied to the cells by _____.

96. In insects the tracheae open to the outside through _____.

97. Gaseus exchange through skin in known as _____ respiration.

98. In aquatic animals gaseous exchange through blood gills is known as _____ respiration.

99. Within the lungs, there are microscopic chambers surrounded by many blood capillaries called as _____.

100. The entire frame work of larynx is formed of _____ cartilages moved by muscles.

101. Larynx consists of two folds of mucous membrane with embeded fibrous, elastic ligaments which are called _____.

102. The inner wall of trachea is formed of _____ epithelium.

103. The space between the visceral pleura and parietal pleura is filled with a lubricating fluid called _____.

104. At the resting stage the intrapleural pressure is _____.

105. Venous blood contains about _____ volume of CO_2 per 100 ml.

106. The abundant bicarbonate formed in the RBC is _____ for carries of CO_2.

107. NH_2 of _____ part of haemoglobin combines with one molecule of CO_2 to form carbamino compound.

108. Respiration by _____ is pulmonary respiration.

109. The muscles that connect adjacent ribs are called _____ muscles.

110. The affinity of deoxyhaemoglobin (containing Fe^{2+}) for _____ is about 250 times greater than that of oxygen.

111. The amount of air which remains in the lungs after maximal respiration is termed as dead space air.

112. In human the volume of air that the lung can hold after a maximum possible inspiration is termed as vital capacity.

113. One gram of haemoglobin when fully saturated will combine with 8.34 ml. of O_2.

114. Any rise in the quantity of air breathed per minute is called Asphyxia.

115. Asthma is a chronic lung disease, characterised by a damage to the air sacs (alveoli) in the lungs.

(c) Bodyfluid and Circulation

116. All the blood cells are pluripotent stem cells in the _____.

117. One group of important proteins in plasma are _____ which destroy the foreign bacteria and viruses.

118. The number of red cells in the blood of adult males is _____ than adult females.

119. The red cells have short life span of nearly 120 days since they have no _____.

120. _____ and _____ of leucocytes are called as mobile bodyguards or microscopic policemen of the body.

121. Intrinsic thromboplastin is released by _____ when blood oozes out.

122. The plasma proteins prothrombin and fibrinogen help in blood _____.

123. The _____ colour of the plasma is due to the presence of bilirubin and carotene.

124. Following the coagulation of blood, a clear watery fluid, know as _____, oozes out from the wound.

125. Thymus maturing lymphocytes are known as _____.

126. Individuals containing antigen (agglutinogen) _____ are termed Rh+ve.

127. When a Rh-ve woman marries a Rh+ve man and conceives a Rh+ve child, the foetus may die or if born alive, suffers from severe anaemia called as _____.

128. _____ blood group system have no importance for blood transfusion but have got medicolegal importance i.e. paternity test.

129. The blood contains a self-sealing material called _____ in inactive form which is converted to its active form during formation of plug (= Coagulation).

130. _____ initiate the process of coagulation by releasing a coagulation factor.

131. The thromboplastin converts prothrombin into thrombin with the help of _____ ions.

132. In Haemophilia the defect is due to the absence of _____ factor.

133. _____ blocks conversion of prothrombin into thrombin.

134. Haemostatic plug is formed by the aggregation of numerous _____ in the injured site of blood vessel caused due to formation of ADP.

135. Sometimes a clot is formed inside the blood vessel and such a clot is called _____.

136. _____ is called as reserve pace maker.

137. Impulses of _____ nerve slows the heart rate by releasing acetylcholine.

138. Impulses of _____ nerve increse the heart rate by releasing sympathin.

139. The brief interval during which both the valves remain closed and ventricles are relaxing as closed cavities, is called _____ relaxation period.

140. The stretching of the wall of the arteries is called as _____ which is produced passively by the pressure changes during ventricular systole and distole.

141. An increase in systemic atrial pressure is called _____.

142. If a coronary artery is paratially blocked by atherosclerosis, there may be occasional chest pains, a condition known as _____.

143. The free surface of each papillary muscle of the wall of the right ventricle and the free edges of the cusps of tricuspid valves are attached by tendon like fibrous cords known as _____.

144. The left atrium receives _____ blood from the pulmonary veins.

145. The enzyme thrombin with Ca^{2+} catalyses the formation of cross-links between fibrin monomers to form fibrin polymers (Haemostatic Clot).

(d) Excretory products and their elimination

146. Reabsorption in the proximal convoluted tubule is called _____ reabsorption.

147. The metabolic cycle involving formation of urea is called _____.

148. Absorption of water in the distal convoluted tubule is influenced by _____ hormone.

149. The epithelium of ascending limb of loop of Henle is freely permeable to _____.

150. The descending limb produces _____ Osmotic filtrate.

151. Increased urination is called _____.

152. Renin is secreted by _____.

153. The condition where albumin and globulin are frequently present in abnormally high concentration is called _____.

154. Absence of aldosterone leads to _____ disease.

155. Degenerative changes both in glomeruli and tubules is called _____.

156. Absence or less secretion of ADH leads to _____ (disease).

157. _____ is used as a semipermeable membrane in a dialyzer.

158. Urine is acidic due to presence of _____.

159. Reptiles and birds excrete nitrogenous waste in the form of _____.

160. If bile pigments are discharged in urine, the disease is _____.

161. Abnormal secretion of _____ through urine is called glycosuria.

162. Renin catalyses angiotensinogen to _____.

163. _____ is completely reabsorbed in the first half of the proximal tubule.

164. The efferent vessel in juxtamedullary glomeruli breaks up into a number of straight vessels called _____.

165. Kidneys are the sites of urine formation and _____.

166. The blood vessels, ureter and the nerves pass through the _____ of the kidney.

167. On composition the capsular filtrate is called as _____ plasma.

168. The tubular cells can synthesize hippuric acid by combining benzoic acid with _____.

169. Urethra in males carries both urine and _____ but in females it carries only urine.

170. About _____ litres of filtrate is formed by both the kidneys per day.

171. Kidney stones are formed due to precipitation of amino acid.

172. A condition of pus in urine is known as diptheria.

(e) Locomotion and Movement

173. The flagella / cilia contract and relax rhythmically in response to external stimuli and this rhythmic beating is known as _____.

174. A skeletal muscle is surrounded by a connective tissue sheath, the _____.

175. The dark staining bands of myofibrils are known as _____ bands.

176. Within the hip joint there is a _____ round the inside of the joint which holds a lubricating liquid.

177. The joints between the articular facets (Zygapophyses) of the vertebrae belong to _____ joint category.

178. The articulation at the elbow joint is between the humerus and _____.

179. The fragment _____ of myosin has ATPase activity.

180. The muscle fibres contain three types of proteins : myosin, actin and _____.

181. When muscle activity needs energy at a faster rate _____ transfers its energy to ATP which supplies energy for muscle activity.

182. During muscle activity Ca^{+2} ions are released from _____ which forms chemical links between the distal end of the cross-bridge and the adjacent actin filament.

183. During muscle activity Ca^{+2} ions released from sarcoplasmic reticum forms chemical links between the distal end of cross-bridge and the adjacent _____ filament.

184. There is a brief period of muscle lengthening before its contraction, which is called _____.

185. In _____ contraction there is no physical shortening of muscle fibres but the work is done.

186. Excess deposition of uric acid crystals in the joints is called _____.

187. The proximal end of humerus articulates with the olecranon process of the pectoral girdle.

188. The proximal end of femur articulates with the glenoid of pelvic girdle.

189. Body muscles, which by their contraction produce opposite movements at the same joint, are known as reflexon muscles.

190. Accumulation of acetic acid makes muscle fibres unable to contract and this state is called muscle fatigue.

191. The human body contains 108 bones.

(f) Neural Control and Coordination

192. The conduction velocity of nerve impulse is directly proportional to the _____ of the nerve fibre.

193. Core of white matter in cerebellum is called _____.

194. The term used for the lower pointed end of the spinal card is _____.

195. _____ pairs of spinal nerves occur in man.

196. A nerve having both sensory and motor nerve fibres is called as a _____ nerve.

197. _____ is the passage between middle ear and Pharynx.

198. _____ muscles of Iris control the size of pupil.

199. _____ is a close proximity of an axon of one neuron and dendrites or cyton of another neuron with a microscopic gap in between.

200. Animal's intelligence is directly proportional to the thickness of the _____ of brain.

201. _____ is the tree-like branching pattern of white matter in the cerebellum of mammalian brain.

202. _____ root of spinal nerve is composed of somatic motor and visceral motor fibres.

203. The neurotransmitter for _____ nervous system is Noradrenaline (norepinephrine).

204. Axon of a neuron and the muscle fibres it innervates together form _____ unit.

205. In parasympathetic nervous system the neurotransmitter is _____.

206. The optic lobes in humans are represented by the Corpora _____.

207. Of the three perforations at the roof of the fourth ventricle, the central perforation is called _____.

208. The source of energy during nervous conduction is _____.

209. Knee jerk is an example of _____ reflex.

210. The spinal cord comes out of the skull through foramen of Monro.

211. The nature of nerve impulse conduction is mechanical.

212. Node of Ranvier is a place where Axolemma is discountinuous.

213. Sense of smell is perceived by hypothalamus of brain.

214. In mammals, the brain centre, which regulates body temp is situated in cerebellum.

215. The part of internal ear responsible for hearing is utriculus.

(g) Chemical Coordination and Regulation

216. Nervous system and endocrine system correlate at the _____ level.

217. Removal of parathyroids results in parathyroid _____ and death.

218. _____ hormone acts on lymphocytes.

219. Alfa-cells or A_2-Cells of Islets of Langerhans secrete _____ hormone.

220. In some diseases an excess insulin in produced resulting in drastic reduction in the blood sugar level which is known as _____.

221. Adrenal cortex produces several hormones which are all _____.

222. Glucocorticoids breakdown lipids to form _____ in the liver.

223. The sex hormone produced by adrenal gland is _____.

224. _____ cells of leydig of Testes secrete the male hormone (Androgens).

225. _____ of ovary secrete estrogen.

226. _____ hormone stimulates the growth of adrenal cortex and the synthesis of cortisol.

227. _____ is a composite organ consisting of an exocrine element and an endocrine element.

228. _____ gland secretes a hormone called melatonin.

229. _____ hormone causes concentration of pigment granules in the mealnocytes, making the skin colour lighter in certain animals.

230. Osteoporosis is caused by the hypersecretion of the hormone, _____.

231. _____ disease is caused by deficiency of mineralocorticoids.

232. _____ are known as the 'glands of emergency'.

233. The Leydig's cells are stimulated to secrete testosterone by the _____ hormone from the anterior pituitary.

234. The molecules of hormones that are amino acid derivatives, _____ or proteins bind to specific receptor molecules located on the surface of the cell membrane.

235. Steroid hormones have their receptors in the _____ of the target cells.

236. Pars distalis secrete MSH which affects melanin synthesis.

237. Thyroid is stimulated to secrete its hormones by calcitonin a hormone from the anterior pituitary.

238. Grave's Disease (Exopthalmic Goitre) is caused by hypersecretion of adrenal hormones due to its enlargement.

239. Progesterone is secreted by the corpus callosum.

240. C-AMP molecules act as first chemical messengers.

241. Cretinism is caused by hyposecretion of parathyroid hormones in infants.

242. Excess of growth hormone after adolescene causes disease gigantism.

GROUP - A

ANSWERS

1. Choose the correct answer from the choices given under each bit/give the answer in one word only.

Unit-I

(a) Diversity in Living World

1. (b) 3.6 billion
2. (d) Carolus Linnaeus
3. (a) Carl Woese
4. (c) Eukaryota
5. (b) Species
6. (d) Europe
7. (d) Evolution history
8. (b) Formalin

(d) Classification of Animals

9. (b) Porifera
10. (d) Porifera
11. (d) Porifera
12. (a) Annelida
13. (a) Haemocoel
14. (c) Excretion
15. (d) Echinodermata
16. (d) Petromyzon and Myxine
17. (b) Ten
18. (d) Mammals
19. (c) Placoid
20. (b) Dolphin
21. (d) Annelids
22. (d) Coelenterata
23. (c) Coelenterata
24. (b) Mollusca
25. (b) Platyhelminthes
26. (b) Annelida
27. (c) Cephalochordates
28. (b) Cyclostomes
29. (d) Mammals
30. (c) Bony fish
31. (c) Mammal
32. Parapodia
33. Pterygota
34. Echinodermata
35. Urochordates
36. Aestivation
37. Wings
38. Prototheria
39. Reptilia

Unit-II

(b) Animal Tissues & Cockroach

40. (a) Trachea
41. (a) Synapse
42. (b) Cartilage
43. (d) Haversian canals
44. (d) Ligament
45. (a) Sarcomere
46. (c) Neuron
47. (c) Skin to muscle
48. (d) Hind limb
49. (c) Anal styles
50. (b) Malpighian tubules
51. (d) Biting and chewing type
52. (b) 10 pairs
53. (c) Trachea
54. (c) Omnivorous

55. (d) 13 chambers
56. (b) Haemocoel
57. (d) Alary muscles
58. (d) Hypopharynx
59. (c) 8 ovarioles
60. (b) Antennae
61. Cardiac muscle
62. Sarcoplasm
63. Squamous epithelium
64. Adipose cells
65. Myosin
66. Osteoclast
67. Urate cells

Unit-V

(a) Human Physiology

68. (c) 1-1.5 lit
69. (c) Both a & b
70. (c) Amylopsin
71. (d) Succus entericus
72. (b) 6 months
73. (d) Kupffer's Cells
74. (a) Lymph Nodules
75. (c) 3 types digestive enzymes and 2 hormones
76. (b) Intestinal juice
77. (d) Elastin
78. (c) Pancreatic juice
79. (d) HCl
80. (a) Glucose
81. (d) Between the villi of small intenstine
82. (b) Phagocytic cells
83. (b) Buccal cavity and duodenum
84. (a) Bile salts
85. (c) Gall bladder
86. (d) Proteins
87. (c) Duodenum
88. (b) Bile salt
89. Liver
90. Heterodont
91. Kupffer Cell
92. Enterokinase
93. Lacteal

(b) Breathing and Respiration

94. (c) 20 ml
95. (c) 48 ml
96. (d) The chloride content of plasma decreases and that of RBC increases.
97. (b) 3 million
98. (a) Contract
99. (b) RBC
100. (a) Vital capacity
101. (a) Central Nervous System
102. (b) Sodium bicarbonate
103. (d) Spasm in bronchial muscles
104. (c) Respiratory quotient
105. (c) Iron
106. (d) Cartilaginous rings
107. (c) Pleural membrane
108. (c) Medulla oblongata
109. Diaphragm
110. Intercostal muscles
111. Anoxia (or Hypoxia)
112. Pneumonia

(c) Bodyfluid and Circulation

113. (c) 1 : 700
114. (c) Neutrophils
115. (c) Blood has RBC, WBC and lymph has WBC
116. (b) WBC
117. (a) Neutrophils

118. (c) A liquid connective tissue
119. (a) 120 days
120. (b) Monocyte
121. (b) Factor XIV
122. (d) Anticoagulant
123. (d) Fibrinogen
124. (b) Factor-VIII
125. (d) Rh+ve man and Rh-ve woman
126. (b) Monkey
127. (d) No antigen at all
128. (b) Antigen - antibody reaction
129. (d) AB
130. (d) 'O' only
131. (b) Heparin
132. (c) AB
133. (d) Collect and destroy pathogens
134. (b) 'Lub' sound at the beginning of ventricular systole
135. (b) Semilunar Valves
136. (b) Three
137. (d) S. A. node
138. (d) 0.8 sec
139. (a) Right Atrium and Ventricle
140. (d) A vein breaks up in an organ into capillaries and restarts by their union as a new vein in the same organ.
141. Hypertension
142. Atherosclerosis
143. Arteriosclerosis
144. Coronary

(d) Excretory products and their elimination

145. (a) 25 mm Hg
146. (b) Lipoproteins
147. (d) Facultative reabsorption
148. (c) Bowman's capsule
149. (c) Vasopressin
150. (b) Enzyme
151. (b) Haematuria
152. (b) Proximal tubule
153. (b) A reduction in vasopressin secretion from posterior pituitary
154. (b) Plasma protein
155. (c) Liver
156. (c) Birds, reptiles and insects
157. (b) Aldosterone
158. (c) Metanephros
159. (b) Dialysis
160. (d) Both (a) and (b)
161. (b) Glomerular hydrostatic pressure
162. (c) Glucose
163. (c) CO_2 and Ammonia
164. (d) 1100-2000 lit.
165. (b) Loses water
166. (d) Loses salt
167. (c) 300 mOsml/lit.
168. (a) Proximal convoluted tubule
169. (b) Active transport
170. (a) Nephron
171. (c) Collecting ducts
172. (a) Juxtaglomerular cells
173. (b) Plasma minus blood proteins
174. Uremia

(e) Locomotion and Movement

175. (b) Euglena
176. (b) Paramecium
177. (c) Eleven microtubules
178. (d) In all animals except protozoans and poriferans
179 (a) White collagen fibres
180. (b) Slightly movable joints
181. (b) Hinge joint
182. (b) Joint between atlas and axis vertebra
183. (a) Pivotal joint
184. (a) Gliding joint

185. (d) Actin, Myosin and Tropomyosin
186. (a) H-Zone
187. (b) Gout
188. (d) 2 pairs
189. (c) 33
190. (b) Sternum
191. (a) Flexor
192. (c) Hinge joint
193. (d) Hind limb
194. (b) ATP
195. (d) femur
196. (b) Troponin
197. (d) Atherosclerosis
198. (d) Flexor muscle

(f) Neural Control and Coordination

199. (a) Thinking
200. (b) piamater
201. (c) Cerebellum
202. (b) hypothalamus
203. (c) vagus
204. (a) ventral root
205. (d) boxing
206. (c) Trochlear
207. (d) Choroid
208. (b) choroid plexus
209. (d) Neither rods nor cones are present
210. (c) Na^+
211. (c) electrochemical
212. (c) 12 pairs
213. (b) motor unit
214. (c) alter the size of the pupil
215. (d) Foramen Magnum
216. (a) Cerebral hemispheres
217. (b) Outer grey matter and inner white matter
218. (b) 120 m/sec
219. (b) Vagus
220. (a) Central nervous system to the effectors
221. (b) First negative, then positive and back negative
222. (b) Lateral ventricles with third ventricle in brain
223. (d) Malleus, Incus and Stapes
224. (c) Foramen of Monro
225. Glossopharyngeal
226. Cornea
227. Pupil
228. Rhodopsin
229. Hearing

(g) Chemical Coordination and Regulation

230. (c) Estrogen
231. (b) Thyroid
232. (b) Adrenal Medulla
233. (d) All
234. (c) Adrenal Cortex
235. (c) Adrenal
236. (c) Lowered blood Ca^{+2}
237. (b) FSH & LH
238. (d) Hypothalamus
239. (b) Thyroxine
240. (c) Pancreas
241. (b) Thyroid
242. (b) Parathyroid
243. (b) Glucagon
244. (d) Alfa cells of Islets of Langerhans
245. (c) E. H. Starling
246. (a) Prolactin
247. (d) Hypothalamus
248. (c) Melatonin
249. (b) On cell surface
250. (b) Thymus
251. (b) Diabetes insipidus
252. (b) GH
253. (b) Adrenaline
254. (c) Oxytocin
255. (a) Cyclic AMP

2. *Fill in the blanks with correct answer(s) / correct the underlined portion of the sentence.*

Unit-I

(a) Diversity in Living World

1. Metabolism
2. Biodiversity
3. Domain
4. Superclass
5. Species
6. Zoos
7. Herbarium
8. Carolus Linnaeus

(d) Classification of Animals

9. Cellular
10. Open
11. Notochord
12. Nematoblasts or Cnidoblasts
13. Flame Cells or Solenocytes
14. Closed type
15. Arthropoda
16. Mantle
17. Torsion
18. Echinodermata
19. Sense
20. Tubefeet
21. Notochord
22. Cyclostomata
23. Four
24. Syrinx
25. Archaeopteryx
26. Mesonephros
27. Porifera
28. Radula
29. Osphradium
30. Two
31. Urea
32. Snakes
33. Uric acid
34. Aves / Birds
35. Nonnucleated
36. Larynx
37. Open
38. Nematohelminthes
39. Porifera
40. Sebaceous glands

Unit-II

(b) Animal Tissues & Cockroach

41. Basement
42. Pavement
43. Columnar
44. Cuboidal
45. Transitional
46. Elastic
47. Connective
48. Involuntary
49. Sarcoplasmic
50. Cardiac
51. Axon hillock
52. Node of Ranvier
53. Dendrites
54. Birds
55. Ligaments
56. Yellow
57. Crop
58. Gizzard
59. Grinding
56. Trachea
57. Crop
58. Gizzard
59. Grinding
60. Digestive juice
61. Trachea
62. Sphincters
63. Haemocoel
64. Antennae
65. Ejaculatory
66. Maxillae
67. Auditory
68. Pericardial

Unit-V

(a) Human Physiology

69. Stomach
70. Ampula of Vater
71. Taste buds
72. Epiglottis
73. Peristalsis

74. Rugae
75. Mucus
76. Lacteal
77. Vermiform Appendix
78. Ducts of Rivinus
79. Cystic
80. Pancreatic
81. Enterokinase
82. Cholecystokinin
83. Fructose
84. HCl
85. Autocatalysis
86. Casein
87. Thyroid
88. Diarrhoea
89. Hernia
90. Faeces
91. 9.3 KCal
92. Proteins
93. Incisura angularis
94. Serotonin (a Vasoconstrictor)

(b) Breathing and Respiration

95. Trachea
96. Spiracles
97. Cutaneous
98. Branchial
99. Alveoli
100. Nine
101. Vocal Cords
102. Ciliated
103. Intrapleural fluid
104. -2.5 mm of Hg
105. 52
106. $KHCO_3$
107. Globin
108. Lungs
109. Intercostal
110. Carbon Monoxide
111. Residual volume
112. Total lung capacity
113. 1.34 ml.
114. Hyperpnoea
115. Emphysema

(c) Bodyfluid and Circulation

116. Red bone marrow
117. Antibodies
118. More
119. Nucleus
120. Neutrophils and Monocytes
121. Platelets
122. Clotting or Coagulation
123. Straw Yellow
124. Serum
125. T-lymphocytes
126. 'D'
127. Erythroblastosis foetalis or haemolytic disease
128. MN
129. Fibrinogen
130. Blood platelets
131. Calcium
132. Antihaemophilic (or Factor-VIII)
133. Heparin
134. Platelets
135. Thrombus
136. A. V. node
137. Vagus
138. Sympathetic
139. Isometric
140. Pulse
141. Hypertension (high blood pressure)
142. Angina pectoris
143. Chordae tendineae
144. Oxygenated
145. Transglutamase

(d) Excretory products and their elimination

146. Selective
147. Ornithine cycle
148. ADH / Vasopressine
149. Salt (NaCl)
150. Hyper Osmotic
151. Diuresis
152. Juxtaglomerular apparatus
153. Proteinuria
154. Addison's disease
155. Nephrosis

156. Diabetes insipidus
157. Cellophane
158. Uric acid
159. Uric acid
160. Jundice
161. Glucose
162. Angiotensin-II
163. Glucose
164. Vasa recta
165. Osmoregulation
166. Hilus
167. Deproteinised
168. Glycine
169. Semen
170. 180 Litres
171. Uric acid
172. Pyuria

(e) Locomotion and Movement

173. Undulation
174. Epimysium
175. Anisotropic
176. Synovial membrane
177. Gliding
178. Ulna
179 Heavy (H) Meromysin
180. Tropomyosin
181. Creatine Phosphate (CP)
182. Sarcoplasmic reticulum
183. Actin
184. Latency-relaxation
185. Isometric
186. Gout
187. Glenoid cavity
188. Acetabulum
189. Antagonistic
190. Lactic acid
191. 206

(f) Neural Control and Coordination

192. diameter
193. arbor vitae
194. Conus medullaris
195. 31
196. Mixed
197. Eustachian tube
198. Sphincters and dilators
199. Synapse
200. Cerebral Cortex
201. arbor vitae
202. Anterior (Ventral)
203. Sympathetic
204. Motor
205. Acetylcholine
206. quadrigemina
207. Foramen of Magendie
208. Creatine Phosphate
209. Unconditioned reflex
210. Magnum
211. Electrochemical
212. Medullary sheath
213. Olfactory lobe
214. Hypothalamus
215. Cochlea

(g) Chemical Coordination and Regulation

216. Hypothalamic
217. Tetany
218. Thymosin
219. Glucagon
220. Insulin Shock
221. Steroids
222. Ketone Bodies
223. Androgen
224. Interstitial
225. Graafian follicle
226. Adreno Corticotrophic Hormone (ACTH)
227. Pancreas
228. Pineal gland
229. Melatonin
230. Parthormone
231. Addison's
232. Adrenals
233. Luteinising (LH)
234. Peptides
235. Cytosol
236. Pars intermedia
237. Thyrotrophin (TSH)
238. Thyroid
239. Corpus Luteum
240. Secondary Messengers
241. Thyroid
242. Acromegaly

GROUP - B

SORT TYPE QUESTIONS

3. Answer within 2 or 3 important sentences.

Unit-I

(a) Diversity in Living World

1. What is biodiversity ?
2. What is binomial nomenclature ?
3. What are the three domains of life ?
4. Which kingdom are under the domain Eukaryota ?
5. What is Taxonomic hierarchy ?
6. What are biological museums ?
7. Explain the concept of species.
8. What are the objectives of zoological parks ?

(d) Classification of Animals

9. What is pseudocoelom ?
10. What is metamerism ?
11. What is the mode of digestion in coelenterates ?
12. What is polymorphism ?
13. What is Cephalothorax ?
14. Which are the respiratory organs in Arthropoda ?
15. Why Hemichordata are placed among non-chordates ?
16. What is the function of lateral line system in fishes ?
17. What is cloaca ?
18. What is pecten of birds ?
19. What are the three important features of class mammalia ?

Unit-II

(b) Animal Tissues & Cockroach

20. What is Pseudo-stratified epithelium ?
21. What is fibrocartilage ?
22. Why blood is regarded as a fluid connective tissue ?
23. What are the fundamental properties of muscular tissue ?
24. What is Transitional epithelium ?
25. What is reticular connective tissue ?
26. What is adipose tissue ?
27. What is Haversian system ?
28. What is neuroglia ?
29. What are Nissl granules ?
30. What is node of Ranvier ?
31. What is storage excretion ?
32. In cockroach what are hepatic caeca ?
33. What is the role of alary muscles ?
34. What is the role of mushroom gland ?

Unit-V

(a) Human Physiology

35. What is peristalsis ?
36. What is the role of Pyloric sphincter ?
37. What is appendicitis ?
38. What is deglutination ?
39. What is vomiting ?
40. What is assimilation ?
41. What is calorific value of food ?
42. What is PEM ?

(b) Breathing and Respiration

43. Why larynx is regarded as the sound box ?
44. What is the principle of breathing ?
45. What is internal or tissue respiration ?
46. How the oxygen is transported in the blood?
47. What is chloride shift ?
48. Whether both O_2 and CO_2 can be transported by haemoglobin simultaneously ?
49. What is carbon monoxide poisoning ?

(c) Bodyfluid and Circulation

50. What is the advantage of absence of nucleus in RBCs ?
51. Which are the plasma proteins ?
52. What is double circulation ?
53. Which valves are there in the heart ?
54. What is pace maker of the heart ?
55. What are 'lub-dup, lub-dup, lub-dup' sound pattern of the heart.
56. What is cardiac cycle ?
57. What is Rh group ?
58. What is haemostatic plug ?
59. What is thrombosis ?
60. What ECG ?
61. What is cardiac output ?

(d) Excretory products and their elimination

62. What is renal corpuscle ?
63. What are apical canaliculi ?
64. What is pars recta ?
65. What is ultrafittration ?
66. What is selective reabsorption ?
67. What is Diabetes insipidus ?
68. What is vasa recta ?
69. How the net filtration pressure is calculated?
70. What is facultative reabsorption of water ?
71. What is the role of skin in excretion ?
72. What is Renal calculi ?
73. What is artificial kidney ?
74. What is renal failure (Kidney failure) ?

(e) Locomotion and Movement

75. What is epimysium, perimysium and endomysium ?
76. What is synovial fluid ?
77. What is hinge joint ?
78. What is saddle joint ?
79. What is tropomysin ?
80. What is the role of creatine phosphate in muscle activity ?
81. What is all or none response ?
82. What is Osteoarthritis ?
83. What is Osteoporosis ?
84. What is muscular dystrophy ?
85. What is the principle of antagonistic muscles?
86. What is Myasthenia gravis ?

(f) Neural Control and Coordination

87. What is synapse and its activity ?
88. What is blind spot ?
89. What is binocular vision ?
90. What is pons varolii ?
91. What is action potential ?
92. What is refractory period ?
93. What is saltatory conduction ?
94. What is reflex action ?
95. What is autonomic nervous system ?

(g) Chemical Coordination and Regulation

96. What are endocrine glands ?
97. Which endocrine glands are controlled by the secretion of other endocrine glands ?
98. What is the hormonal basis of diabetes ?
99. What are hormones ?
100. What are Leydig's cells ?

4. Differentiate between the pairs restric the answer to 3 or 4 important differences.

Unit-I

(a) Diversity in Living World

1. Living and Non-living
2. Domain Archaea and Bacteria
3. Prokaryote and Eukaryote
4. Taxonomy and Systematics
5. Herbarium and Botanical Garden
6. Genus and Species
7. Biological Museum and Herbarium
8. Domain Bacteria and Domain Eukaryota
9. Anabolism and Catabolism

(d) Classification of Animals

10. Diploblastic and Triploblastic Organisation
11. Open Circulation and Closed Circulation
12. Polyp and Medusa
13. Parazoa and Metazoa
14. Pseudocoel and Haemocoel
15. Schizocoelic and Enterocoelic Coelom
16. Urochordata and Cephalo Chordata
17. Cartilaginous Fish and Bony Fish
18. Chordata and Non-chordata

Unit-II

(b) Animal Tissues & Cockroach

19. Epithelial tissue and Connective Tissue
20. Tendon and Ligament
21. Bone and Cartilage
22. Hyaline Cartilage and Eleastic Cartilage
23. Skeletal Muscle and Cardiac Muscle
24. Smooth Muscle and Striated Muscle
25. Axon and Dendron
26. Blood and Lymph

Unit-V

(a) Human Physiology

27. Ptyalin and Amylopsin
28. Bile Salt and Bile Pigment
29. Gullet and Glottis
30. Cardiac Stomach and Pyloric Stomach

(b) Breathing and Respiration

31. Inspiration and Expiration
32. External Respiration and Internal Respiration
33. Trachea of Insects and Trachea of Human
34. External Intercostal Muscle and Internal Intercostal Muscle
35. Oxyhaemoglobin and Carboxyhaemoglobin

(c) Bodyfluid and Circulation

36. Erythrocytes and Leucocytes
37. Artery and Vein
38. Single Circulation and Double Circulation
39. Blood and Lymph
40. Blood Group 'O' and Blood Group 'AB'
41. Myogenic Heart and Neurogenic Heart
42. Pulmonary Circuit and Systemic Circuit

(d) Excretory products and their elimination

43. Superficial Nephrons and Juxtamedullary Nephrons
44. Ureotelism and Uricotelism
45. Afferent Arteriole and Efferent Arteriole

(e) Locomotion and Movement

46. Isotonic and Isometric Contraction
47. OsteoArthritis and Rheumatoid Arthritis
48. Axial Skeleton and Appendicular Skeleton
49. Actin and Myosin Filaments
50. Thoracic Vertebra and Lumbar Vertebra

(f) Neural Control and Coordination

51. Cerebrum and Cerebellum
52. Rod Cells and Cone Cells
53. Axon and Dendron
54. Sympathetic and Parasympathetic System
55. Myelinated and Non-Myelinated Nerve Fibres
56. Unconditoined Reflex and Conditioned Reflex

(g) Chemical Coordination and Regulation

57. Exopthalmic Goitre and Iodine-deficiency Goitre
58. Adrenal Cortex and Adrenal Medulla
59. Diabetes Mellitus and Diabetes Insipidus
60. Glucocorti Coids and Mineralocorticoids

GROUP - B
ANSWERS

3. *Answer within 2 or 3 important sentences.*

Unit-I

(a) Diversity in Living World

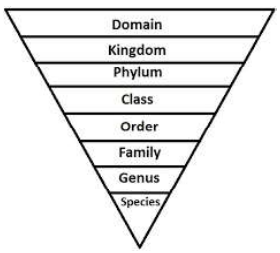
1. Large number of different kinds of plants animals and micro organisms are present around us. The variety of life forms existing in nature is termed as "biological diversity" or "biodiversity". It is the variation of life at all levels of biological organization.

2. Each biological name consists of two parts. The first part is the name of the genus and second part is the name of species. Example - Zoological name of human - *Homo sapiens*. There is a space between generic and specific name.

3. Carl Woese proposed the three domain system of biological classification in 1977 above the kingdom category. These domains are archaea, bacteria and eukaryota. Under each domain there are one or more Kingdoms.

4. Domain eukaryota includes all eukaryotes. Eukaryotes are organisms possessing nuclear membranes and DNA as genetic material. Four kingdoms are included in this domain : Protista, Fungi, Plantae and Animalia.

5. Kingdom is the largest taxonomic group and is divided and sub-divided into groups and sub-groups based on true relationships. Each group and sub-groups are ranked as taxonomic categories which are arranged in a descending order and forms a taxonomic hierarchy.



6. Biological museums contain many preserved specimens of animals and plants. Even the bones, skins and other hard parts of some animals are also preserved here. The purpose of establishing biological museums is study, reference and research.

7. A group of morphologically similar individuals which have the capacity to interbreed amongst themselves are categorized as a species. They produce fertile offsprings. This is regarded as the basic unit of classification and forms the lowest taxonomic category.

8. Zoological parks are places where wild animals live in enclosures under human care. Conditions similar to their natural habitats are provided to them. The objective of these parks are to display the animals to the public, study their behavior, conservation of endangered species with breeding to increase their number.

(d) Classification of Animals

9. The cavity between the digestive tract and body wall is termed as coelom. If this cavity is not lined by mesoderm, it is termed as pseudocoelom. Example - Nematohelminthes.

10. Metamerism is the phenomenon of segmentation of body in a linear series, fundamentally similar in structure. Each segment is referred to as a somite or metamere. Example - Annelida.

11. In coelenterates, digestion is both intracellular and extracellular. Extracellular digestion occurs within the coelenteron also called as gastrovascular cavity and intracellular digestion occurs within the cells.

12. The occurrence of structurally and functionally more than two different forms of individuals within the same organism is called polymorphism. In cnidarians there are two forms - polyp and medusa and there are different types of zooids due to division of labour.

13. In Arthrpoda body is generally divided into 3 parts -head, thorax and abdomen. However in some forms the head (cephalic region) and thorax fuse forming cephalothorax.

14. In Arthropoda respiration occurs by gills in aquatic forms and Oxygen is derived from water. The terrestrial forms derive oxygen from air and the respiratory organs in them are trachea and book lungs.

15. The buccal diverticulum of hemichordata was considered as homologous to the notochord of chordates. Due to its structural difference it is no longer considered as homologous to notochord and it is termed as stomochord. Based on this it is separated from chordates and placed among non-chordates.

16. Lateral line system is well developed in fishes. It functions as a rheoreceptor. It detects the direction of water current by perceiving vibrations.

17. Cloaca is the converging chamber of the rectum and the urinogenital duct. Cloaca discharges out through a cloacal aperture.

18. Pecten is present in each eye of birds. It helps in distinct vision.

19. Presence of hair. Mammary glands and hair are present in both males and females. External ear called pinna is also present.

Unit-II

(b) Animal Tissues & Cockroach

20. Collumnar epithelials are present in a single layer and placed on a basement membrane. All cells do not extend to the free surface. The nuclei lie at different heights, giving it a false stratified appearance.

21. There is presence of large amount of irregular and dense bundles of collagen fibers in its matrix. It consists of alternating layers of cartilage matrix and dense layer of collagen fibers.

22. Blood is composed of thrombocytes erythrocytes and WBCs. Plasma is the intercellular substance or the matrix. It has also hard or solid function (because when blood flow increases in penis, it becomes rigid).

23. Muscle tissue possess some degree of contraction and relaxation. They convert chemical energy to mechanical energy during contraction.

24. It occupies an intermediate position between simple epithelium and stratified epithelium. The number of layers of cells changes with time. There is the presence of thin basement membrane in comparison with other epithelial. Example - Wall of the urinary bladder.

25. It is characterized by presence of reticular or stellate cells and reticular fibers. The cells have reticular processes, which are interwoven forming a reticulum or network. Example - Bone marrow & lymphoid tissue.

26. Adipose tissue is an aggregate of fat cells or adipocytes. They donot have fiber forming function but have assumed the function of fat storage. Fat cells may be scattered singly or may associate with reticular fibers to form an adipose tissue.

27. A number of longitudinal canals are present in the mammalian bones and are called as Haversian canals. These canals contain blood vessels, lymphatic vessels, a nerve and some osteocytes which are all packed within areolar tissue. Haversian canals are connected by transverse Volkmann's canals forming Haversian system.

28. The nervous tissue consists of two elements - the nerve cells or neurons and neuroglia. It is composed of more or less undifferentiated supporting cells. They form a packing around the nerve cells.

29. These are the angular granules present in the dendrite and cell body except the axon and axon hillock. Chemically they are ribose nucleoproteins. They are either excretory or nutritive.

30. In medulated nerve fibers, earch nerve fiber is covered by myelin sheath (white) which insulate the nerve fibers. The myelin sheath is interrupted at regular intervals forming constrictions which are called nodes of Ranvier.

31. The fat bodies within the haemolymph contain specialized cells called urate cells. These urate cells absorb the nitrogenous wastes from the haemolymph and convert to uric acid. The uric acid, thus formed is permanently stored in these urate cells without discharge and is called storage excretion.

32. This a digestive gland associated with alimentary canal. These consist of 7-8 small narrow tubular structures open into anterior end of mesenteron (midgut). They secrete digestive juice which contain protein, carbohydrate and fat digesting enzymes.

33. When alary muscles contract, the auricular valves open and ventricular valves remain closed. The haemolymph from the pericardial sinus is pumped into the heart through Ostia. When the alary muscles relax, the auricular valves are closed and the ventricular valves open.

34. It is an accessory reproductive gland in male cockroach. Some cells of this gland absorb nitrogenous waste from haemolymph & synthesize uric acid which is discharged out alongwith the spermatophores. This gland also secretes nourishing fluid for the sperms.

Unit-V

(a) Human Physiology

35. The contraction of muscles at the back of the food and relaxation at the front of the food results in pushing the food forward. Such type of movement of food is called peristalsis by which food travels in the oesophagus.

36. The pyloric canal opens into the duodenum through pyloric orifice which is guarded by circular muscle called Pyloric Sphincter. It prevents back flow of small intestinal contents into the stomach.

37. Sometimes in vermiform appendix inflammation occurs due to collection and decaying of food or even entry of intestinal worms into it. Such a condition is called Appendicitis and needs its immediate removal by surgery.

38. Within the buccal cavity the food is moulded into bolus and pushed through pharynx and gullet into the oesophagus. Tongue, palate and pharynx are involved in the process of swallowing called deglutination.

39. When unwanted substance enters the stomach or there is irritation in Pharynx, reverse peristalsis occurs. This causes the food substance to come out through the mouth and this is called vomiting.

40. Monosaccharides and amino acids are transported to blood while fats are transported by lymph to blood. The blood finally transports these substances to different cells where they are again resynthesized into carbohydrates, proteins and fats and incorporated into protoplasm for future use. This process of resynthesis is called assimilation.

41. The amount of energy released from the food substances in cellular oxidation is termed as their calorific value. It is expressed in Calories (Cal) or Kilocalories (Kcal). For example this value for one gm. of carbohydrate is 4.1 Kcal.

42. The nutritional deficiency (Malnutrition), particularly of proteins of less caloric value (energy) for a long period of time causes many deficiency diseases. Hence it is known as Protein Energy Malnutrition (PEM) and generally affects infants and children. Two common PEM diseases include Kwashiorkor and Marasmus.

(b) Breathing and Respiration

43. The Larynx or the Adams apple consists of two folds of mucous membrane with embedded fibrous, elastic ligaments called as vocal cords. When air is forced from the lungs (=expiration) the vocal cords vibrate and sound is produced. Various kinds of sounds are produced by changing the position of the vocal cords.

44. The principle of breathing may be either negative pressure type or positive pressure type. When air is drawn passively by increasing the space lodging the lungs, it is said to of negative pressure type as in man. When air is forced by swallowing into lungs it is said to be of positive pressure type as in frog.

45. It is the complex series of chemical changes in the food material by oxidation. This results in the release of energy inside the cell. When it requires presence of free oxygen it is called aerobic respiration and free oxygen is not required is called anaerobic respiration.

46. About 19-20 ml of O_2 are carried by 100 ml of arterial blood and 14-15 ml by 100 ml of venous blood. Under NCTP only about 2% of O_2 is carried in physical solution in 100 ml of arterial blood. About 98% of O_2 is present in the blood in chemical combination with haemoglobin as oxyhaemoglobin.

47. When CO_2 enters blood, Cl^- from plasma enters the Red Cells. When CO_2 escapes from blood, Cl^- leaves the cells and enters the plasma. This phenomenon is called chloride shift.

48. The haeme part combines with O_2 and globin part combines with CO_2 forming carbamino compound. Oxygenation of haemoglobin inhibits formation of carbamino compound formation. It is because oxyhaemoglobin by virtue of its grater acidity liberates H^+ which blocks carbamino compound formation.

49. The affinity of haemoglobin for carbon monoxide is about 250 times greater than that of oxygen. In presence of CO and O_2, haemoglobin quickly combines with CO to form a stable compound called carboxy haemoglobin. Hence haemoglobin will not be available to transport oxygen resulting many harmful effects called carbon monoxide poisoning.

(c) Bodyfluid and Circulation

50. Since there is no nucleus, the RBCs become soft and flexible so that they can squeeze through narrow capillaries. unnecessary weight has been reduced so that they can carry more amount of oxygen and CO_2.

51. The organic constituents of plasma include 7-9% of proteins. These include albumins, globulins, prothrombin and fibrinogen. Albumins help maintain blood volume and pressure, globulins (a & b) help in transporting lipids and fat soluble vitamins and globulin (g) function as antibodies, and prothrombin and fibrinogen help in blood coagulation.

52. In human, there are two circuits in circulatory system : systemic circuit and pulmonary circuit. The heart is completely four chambered. Hence the same blood pass twice through the heart, once through the left side (oxygen-rich blood) and once through the right side (oxygen-poor blood) which is called as double circulation.

53. Four sets of valves guard different opening or apertures of the heart. The right auriculo-ventricular aperture is guarded by a tricuspid valve and left auriculo-ventricular aperture is guarded by a bicuspid or mitral valve. The opening between the left ventricle and systemic aorta is guarded by aortic semilunar valve and opening between right ventricle and pulmonary trunk is guarded by pulmonary semilunar valve.

54. The S.A. node is a junctional tissue situated in the right atrium at the junction between the superior venacava and the right auricle. It generates the normal cardiac impulse at the rate of 70-80 per minute in the adult. It maintains the pumping rhythm of the heart and hence it is known as pace maker of the heart.

55. 'Lub' is the first heart sound and is created by the recoil of blood against the closed A. V. Valves. 'Dup' is the second heart sound created by the recoil of blood against the closed S. L. Valves. Lub has a frequency of 30-80/sec with a duration of 0.05 second and dup has a frequency of 150-200/sec with a duration of 0.025 second.

56. Changes that occur in the heart during one beat, are repeated in the same order in the next beat and subsequent beats. This cyclical repetition of various events in heart, from beat to beat, is termed as cardiac cycle.

57. Similar to Rhesus monkey, there are six aggulatinogens (antigens) - C, c; D, d; E, e also in human. Human red cells will always carry three agglutinogens - one from each pair but never both the members of any pair. Of these D is highly antigenic hence individuals containing 'D' are termed Rh+ve and with 'd', Rh-ve.

58. After the formation of fibrin polymers (haemostatic clot) ATP of red cells is converted to ADP by thrombin. Then this ADP causes numerous platelets to aggregate in the injured site of blood vessel. This results in the formation of haemostatic plug.

59. When there is slowing of circulation and damage of vascular endothelium, masses of platelets adhere to the damaged region and liberate thromboplastin. This results in the formation of clot called thrombus (i.e. intravascular clot). This phenomenon of thrombus formation is called thrombosis.

60. Electrocardiogram (ECG) is a record of the electrical events in the heart on a piece of moving paper. The body fluid is a good conductor of electricity and therefore the fluctuations in the potential of myocardial cells are recorded by placing electrodes externally. Any deviation from the normal ECG points towards a defect in heart.

61. Cardiac output is the volume of blood pumped by the left ventricle into the systemic circuit per minute. It depends on heart rate (pulse) and stroke volume (amount of blood pumped by the left ventricle each time it contracts). Since the heart rate is 72 times per minute and stroke volume is about 70 ml. of blood, the cardiac output is 72 x 70 ml = 5040 ml (roughly 5 litres) which is little less than total amount of blood (about 6.8 litres) present in the body.

(d) Excretory products and their elimination

62. It is the first part of the nephron and also called as malpighian corpuscle or malpighian body. It consists of two parts; glomerulus and Bowman's capsule. Bowman's capsule is the cup shaped double walled epithelial sac which surrounds a capillary network called glomerulus and involved in filtration of blood.

63. The proximal convoluted tubule is lined by a single layer of epithelial cells having brush border at the free end. The brush border consists of microvilli to increase surface area of absorption. The tubular invaginations at the clefts between microvilli are called apical canaliculi which are involved in the absorption of protein form the filtrate.

64. The proximal convoluted tubule runs down into the medulla, makes a hairpin turn and returns to the cortex. This U-shaped loop is called as loop of Henle or Pars recta. Anatomically it can be divided into a descending limb and an ascending limb. It is involved in the reabsorption of water and salt.

65. More blood enters the glomerulus and less blood leaves the glomerulus because afferent arterioles are wider than the efferent arterioles. So blood in the glomerulus is subjected to high pressure. Hence filtration occurring in glomerulus under pressure is called ultrafiltration.

66. During the passage of capsular filtrate through the renal tubule, the reabsorption is differential and purposefully selective. The more useful substances are reabsorbed to a higher degree than the less useful ones.

67. Water reabsorption is controlled by ADH. In its absence or deficiency, urine is excreted in large volumes. This disorder is called Diabetes insipidus.

68. The efferent arteriole forms a network of peritubular capillaries around the proximal convoluted tubule and distal convoluted tubule. Long hairpin like loops of blood vessels are given off from these capillary net works parallel to the Henle's loops. These are called vasa recta.

69. In Renal Capsule the glomerular capillary blood pressure favoures filtration which is 75 mmHg. Two forces oppose the filtration and those are fluid pressure of Bowman's capsule i..e 20 mmHg and second is Osmotic pressure of the blood due to proteins i.e. 30 mmHg. Hence the net filtration pressure is [75 mmHg - (20 mmHg + 30 mmHg)] = 25 mmHg.

70. When body needs to retain more water, more ADH shall be secreted from posterior pituitary. This hormone increases the water permeability of internal lining of distal convoluted tubule and allow more water reabsorption. This kind of reabsorption of water under ADH influence is known as facultative reabsorption of water.

71. Skin possesses sweat glands which secrete sweat and sebaceous glands which secrete Sebum. Sweat contains NaCl, lactic acid, urea, amino acids and glucose. Depending upon the activity and temperature, 14 litres of sweat per day is formed whose main function is to regulate body temperature. Sebum contains some lipids, hydrocarbons and fatty acids.

72. Renal calculus is also called kidney stone is a solid piece of material formed in the kidneys from minerals and acid salts that stick together in concentrated urine. The stones usually form in the pelvis of the kidney, where they cause pain. Sometimes it passes into the ureter and cause blockage and sever pain.

73. Dialysis is a procedure that is a substitute for many of the normal duties of the kidneys. Haemodialysis is called as artificial kidney. It employs the process of diffusion across a semipermeable membrane cellophane. A constant flow of blood on one side of the membrane and a cleansing solution (dialysate) on the other side results in separation of waste substances by a process similar to glomerular filtration.

74. Normally kidneys regulate the composition of the blood by removing excess water, minerals and wastes hence one designated as 'master chemists' of the body. Sometimes the glomeruli and tubules undergo degenerative changes so that both the kidneys become non-functional which is called kidney failure. It leads to a number of disorders related to urine and blood.

(e) Locomotion and Movement

75. A skeletal muscle is surrounded by a connective tissue sheath, the epimysium. Each fasciculus is surrounded by a sheath known as perimysium. Each muscle fibre is surrounded by an endomysium.

76. There is a synovial membrane round the inside of the hip joint. This membrane holds a lubricating liquid called synovial fluid which further lessens friction between the cartilage surfaces as they move over one another.

77. This joint allows movements in one plane only just like the movement of door and windows. One edge of the socket is prolonged to check the movement of the ball in that direction. Examples of such joint are elbow joint, knee joint, wrist joint etc.

78. One of the articulating bones of this joint has a projection which fits into the saddle-shaped depression of other participating bone. There is also greater freedom of movement at this joint. Example - Joint between metacarpals and corresponding carpals of thumb.

79. The muscle fibre contains three types of proteins : myosin, actin and tropomyosin. Tropomyosin is non-contractile. Vertebrates have tropomyosin-B where as the invertebrates have tropomyosin-A.

80. During rest, the ATP produced from the breakdown of glycogen is more than what is required. This excess energy is transferred to creatine phosphate (CP) from ATP, where it is stored as reserve. When muscle activity needs energy at a faster rate, CP transfers its energy back to ATP which supplies energy for muscle activity.

81. The magnitude of response of a single muscle fibre is independent of the type or strength of the stimulus. If a fibre responds at all, it generally responds maximally. If there is no stimulus there is no response.

82. The formation of synovial fluid decreases and the cartilage of joints is replaced by bony structures. due to more friction movements at joints become painful. This is also called as ankylosis and occurs in old age.

83. Loss of minerals and fibres from the bone matrix is called Osteoporosis. Over production of parathyroid secretion removes abnormal amounts of calcium from the bones. Excess use of analgesic drugs and antiallergics makes the individuals prone to osteoporosis.

84. Muscular dystrophy refers to a disorganization of the skeletal muscle fibres. A gene of X-chromosome encodes a protein dystrophin which is a constituent protein of the cytoskeleton of muscle fibre. After mutation of the gene, normal dystrophin fails to be synthesized which causes the cytoskeleton to become abnormal and muscle fibres become fragile.

85. A muscle can pull a part of the body by its contraction (shortening) and cannot push that part by relaxation (elongation). Hence the muscles are typically arranged in antagonistic (opposing) pairs, one muscle moves a body part in one direction by its contraction and the other muscle moves that part in the opposite direction by its contraction. Of course when one muscle contracts, its opposing muscle relaxes. Example - Biceps muscle (Flexor muscle) and Triceps muscle (Extensor muscle) of upper arm.

86. It is an autoimmune disorder in which self antibodies are generated against acetylcholine receptors at the neuromuscular junctions causing their destructions. Hence the motor nerve fibres fail to transmit the signal (impulse) to the muscle (effector). This results in fatigue, weakening and ultimately paralysis of skeletal muscle.

(f) Neural Control and Coordination

87. A very minute gap exists between terminal knob of axon of one neuron and Dendron of other neuron. This minute gap is called synapse. Synapse acts as a one-way valve because neurotransmitter is secreted at the terminal knobs of axon only while the dendrite membrane (post-synaptic membrane) has the enzyme to break this neurotransmitter.

88. The point on the retina from where the optic nerve starts is called the blind spot. No image is formed on it because it lacks the receptor cells and is insensitive to light.

89. Most primates, including man, have binocular vision. In them both the eyes are focussed on the same object from different angles. This provides depth to the image (3D image) and helps judge precise distance of the object.

90. It is a thickening located above the medulla oblongata. It appears anteriorly as a bulging mass of transverse fibres. These bundles run from the pons to the opposite cerebellar hemispheres and vice versa. Pons is primarily concerned with the maintenance of normal rhythm of respiration.

91. The surface of resting nerve cell is positively charged and inside is negatively charged. After stimulation the permeability of the membrane to Na+ increases causing the entry of Na+ into inside. As a result the surface at the stimulated point becomes negative and inside positive (depolarization). This change in electrical charge potential is called action potential.

92. When a nerve fibre is once excited, it will not respond to a second stimulus for a brief period called absolute refractory period (ARP). During this sodium carrier mechanism is inactivated so there is no development of action potential. Immediately following this there is a brief relative refractory period (RRP), during which the excitability is subnormal but gradually rising. ARP is 0.5 milli second and RRP is 3 milli second.

93. In myelinated (medullated) nerve fibres, myelin sheath serves as an insulator and does not permeate the ions. Ions can only pass through the Nodes of Ranvier (the region without myelin sheath) more easily. For this the depolarization jumps from one Node of Ranvier to the next hence impulse is transmitted from node to node rather than continuously. This is called saltatory conduction (Saltare = to dance).

94. Reflex action is an automatic effector response to a sensatory stimulus. There are mainly two types of reflexes : unconditioned reflex and conditioned reflex. Unconditioned reflexes are inborn, inherent, fixed and cannot be altered normally but conditioned reflexes are all acquired and can be established and abolished.

95. Autonomic nervous system controls the activity of the viscera. Its actions are generally unconscious and independent of 'will'. Certain special nerve centres of this system are located in medulla, pons and mid-brain. Functionally it consists of sympathetic and parasympathetic systems.

(g) Chemical Coordination and Regulation

96. These are ductless glands and are involved in internal secretion. They directly discharge into the blood. Their secretions are hormones.

97. Pituitary gland secretes a number of hormones (Example - TSH, ACTH etc.) which regulate the working of other endocrine glands (Example - TSH controls the growth and activity of thyroid gland). However, the pituitary gland itself remains under the control of hormones (releasing factors) secreted by hypothalamus of brain.

98. Diabetes mellitus is a pancreatic hormone disorder resulting from hyposecretion of insulin hormone and its main symptoms are hyperglycemia and excessive and repeated urine formation. Diabetes insipidus is a hypothalamic disorder resulting from hyposecretion of vasopressin (ADH) and its main symptoms are dehydration, excretion of bulky urine.

99. Hormones are informational molecules (chemical messengers) secreted by endocrine glands in to the blood in one part of body. This is in response to changes in external or internal environment. They are carried by blood to another part having target tissues/organs where they stimulate or inhibit specific physiological processes for the good of the body as a whole.

100. Leydig's cells are present in the connective tissue between the sperm-producing seminiferous tubules. They secrete androgens. Luteinizing hormone (LH) from anterior pituitary stimulates the Leydig's cells to secrete androgens (testosterone).

4. Differentiate between the pairs restric the answer to 3 or 4 important differences.

Unit-I

(a) Diversity in Living World

1. Living and Non-living

Living	Non-living
i) Living Organisms have a characteristic feature of growth, both inside and outside.	i) These cannot grow. They do not grow from inside.
ii) The living organisms reproduce for continuity of the race.	ii) These can not reproduce for continuity of the race.
iii) They have the power of movement.	iii) They have no power of movement.
iv) They have power of digestion, respiration and excretion.	iv) They have no power of digestion, respiration and excretion.
v) They respond to various changes in the environment for their survival.	v) They do not respond to external stimuli.

2. Domain Archaea and Bacteria

Domain Archaea	Bacteria
i) It consists of Kingdom Archaebacteria.	i) It consists of the Kingdom Eubacteria.
ii) These are the oldest organisms.	ii) They are not the oldest organism.
iii) They can survive in tough or extreme environment.	iii) They can not survive in extreme environment.
iv) This domain do not contain pathogenic prokaryotes.	iv) This domain contains most pathogenic prokaryotic organisms.
v) They have no diacyl glycerol diester lipid in their cell membrane.	v) Diacyl glycerol diester lipid is in their cell membrane.
vi) They have unique 16S rRNA genes.	vi) They have unique 16S rRNA genes.

3. Prokaryote and Eukaryote

Prokaryote	Eukaryote
i) Unicellular organisms with no nucleus and nuclear membrane.	i) They have well organised nucleus with nuclear membrane.
ii) All membrane bound organelles such as mitochondria, chloroplasts, lysosomes etc. are absent.	ii) All membrane bound organelles are present.
iii) They have 70S ribosome.	iii) They have 80S ribosome.
iv) They have circular DNA.	iv) They have double hellical DNA.
v) The major component of the cell wall is peptidoglycan.	v) The major component of cell wall is cellulose.

4. Taxonomy and Systematics

Taxonomy	Systematics
i) Taxonomy is the branch of biology that deals with the classification and nomenclature of organisms.	i) Systematics is involved in the determination of evolutionary relationships of organisms in addition to classification and naming.
ii) Does not deal with the evolutionary history of organisms.	ii) It deals with the evolutionary history of organisms.
iii) It can change with further studies.	iii) Does not change with further studies.
iv) Taxonomy is a part of systematics.	iv) Systematics include taxonomy.
v) Different organisms are scientifically named and grouped.	v) Organisms are grouped based on their evolutionary relationship.

5. Herbarium and Botanical Garden

Herbarium	Botanical Garden
i) Herbarium is a collection of plant specimens and data relating to them.	i) These are dedicated to the cultivation and display of a variety of living plants.
ii) These specimens are preserved for future taxonomic studies of plant and research.	ii) These provide for education, research and conservation purpose.
iii) The specimens may be whole plants or their parts which are preserved and stored and kept in protected rooms.	iii) There may be special collections of rare and exotic plants.

6. Genus and Species

Species	Genus
i) Species is a group of interbreeding individuals which produce fertile offsprings.	i) Two or more species having common ancestry and similar features and grouped into a genus.
ii) This is the basic unit of classification and helps to understand taxonomy and helps to understand taxonomy.	ii) The genus occupies a significant position in classification.
iii) It is the lowest taxonomic category.	iii) It is the taxonoic category above the species.

7. Biological Museum and Herbarium

Biological Museum	Herbarium
i) Biological museum contain many preserved specimens of animals and plants.	i) Herbarium is a collection of plant specimens and data relating to them.
ii) Hard parts of animals are also preserved here.	ii) Parts of plants are preserved and stored.
iii) Purpose is education and research.	iii) Purpose is for future taxonomic studies of plants and research.

8. Domain Bacteria and Domain Eukaryota

Domain Bacteria	Domain Eukaryota
i) This domain is prokaryotic and consists of Kingdom Eubacteria.	i) This domain includes all eukaryotes and consists of Kingdom protista, fungi, plantae and Animalia.
ii) The cells do not possess well organised nucleus with nuclear membrane.	ii) The cells possess well organised nucleus with nuclear membrane.
iii) They contain a genome composed of bacteria rRNA.	iii) They contain DNA as genetic material.
iv) They have diacyl glycerol diester lipid in their cell membranes.	iv) They do not have diacyl glycerol diester lipid in thir cell membrane.

9. Anabolism and Catabolism

Anabolism	Catabolism
i) It is a constructive process.	i) It is a destructive process.
ii) It builds complex molecules from simper ones.	ii) It breaks large molecules into smaller ones.
iii) It usually requires energy for completion.	iii) It usually releases energy for the organism to use.
Example : Synthesis of protein from Amino acids.	Example : Breakdown of glucose into CO_2 and H_2O.

(d) Classification of Animals

10. Diploblastic Organisation and Triploblastic Organisation

Diploblastic Organisation	Triploblastic Organisation
i) Diplobalastic animals are radially symmetric.	i) Bilaterally symmetric animals are triploblastic.
ii) They have two germ layers - Endoderm and Ectoderm separated by a non cellular layer called mesogloea.	ii) They have three germ layers - Endoderm and ectoderm separated by mesoderm.
iii) Do not have coelom.	iii) Develop a body cavity, the coelom.
iv) Do not have organs.	iv) Have true organs.

11. Open Circulation and Closed Circulation

Open Circulation	Closed Circulation
i) Here the blood flows freely through spaces/ cavities of the body (sinuses).	i) Here blood flows through blood vessels.
ii) There are no vessels to conduct blood.	ii) Through the vessels the blood is conducted through out the body.
iii) The haemolymph (blood within the spaces) directly bathes the organs and tissues.	iii) Blood directly reaches the specific tissues and organs.
iv) Capillary system is absent. Blood flow is slow.	iv) Capillary system is present. Blood flow is rapid.

12. Polyp and Medusa

Polyp	Medusa
i) It is tubular in shape. ii) Fixed at their bases with mouth present at the other end. iii) Polyp reproduce asexually by budding or sexually by spawnning. iv) Polyps do not have a manubrium.	i) It is bell shaped. ii) It is mobile life cycle stage. iii) Medusa reproduce exclusively sexually. iv) Medusa have a tube hanging down from the bell known as manubrium.

13. Parazoa and Metazoa

Parazoa	Metazoa
i) Animals of cellular grade of organisation with incipient tissue formation. It includes the only phylum porifera. ii) They have no mouth and digestive tract. iii) Digestion is intracellular and ingestion occurs by Choanocytes.	i) Animals with tissue or organs and organ system grade of organization. It includes from phylum Ceolenterata to Class Mammalia. ii) Mouth and digestive tract present. iii) Digestion is both extracellular and intra-cellular or only extra-cellular.

14. Pseudocoel and Haemocoel

Pseudocoel	Haemocoel
i) The cavity is not lined by mesoderm hence it is a false body cavity. ii) It is derived from blastocoel of the embryo. iii) It is not filled with blood.	i) The body cavity is lined by mesoderm hence it is a true body cavity filled with haemolymph or blood. ii) It arises as a cavity in the embryonic mesoderm. iii) It is filled with blood or haemolymph.

15. Schizocoelic Coelom and Enterocoelic Coelom

Schizocoelic Coelom	Enterocoelic Coelom
i) The coelom is formed by splitting of mesoderm bands. ii) The mesoderm is derived from a source other than the archenteron. iii) The mesoderm cells separate off from the endoderm early during development. Example - Annelida, Arthropoda, Mollusca.	i) The coelom is derived from the lateral mesodermal pouches from the wall of the archenteron. ii) The mesoderm is derived from the roof of archenteron. iii) The mesodermal cells remain associated with the endoderm and separate off late during development. Example - Echinodermata, hemichordata and chordata.

16. Urochordata and Cephalo Chordata

Urochordata	Cephalo Chordata
i) Notochord is absent in the adult. It is present in the larva confined to the tail region.	i) Notochord is present in the adult and extends all along the length of the body upto anterior end of head.
ii) Nerve cord is absent in the adult but present in the larva.	ii) Nerve cord is present in the adult.
iii) They are hermaphrodites. Development is indirect.	iii) Sexes are separate and development is direct.
iv) Body covered with a test of tunicin.	iv) Body not covered with a test of tunicin.

17. Cartilaginous Fish and Bony Fish

Cartilaginous Fish	Bony Fish
i) Endoskeleton is made of cartilage.	i) Endoskeleton is made of bone.
ii) Skin with placoid scales.	ii) Skin with cycloid, ctenoid or ganoid scales.
iii) They have no swim bladder.	iii) Swim bladder is present.
iv) Operculum is absent but gill clefts are present.	iv) Operculum is present.
v) Tail is heterocercal.	v) Tail is homocercal

18. Chordata and Non-chordata

Chordata	Non-chordata
i) Presence of notochord.	i) Notochord is absent.
ii) Presence of dorsal tubular nerve cord.	ii) Presence of solid and ventral nerve cord.
iii) Presence of pair pharyngeal gill slits.	iii) No paired pharyngeal gill slits.

Unit-II

(b) Animal Tissues & Cockroach

19. Epithelial Tissue and Connective Tissue

Epithelial Tissue	Connective Tissue
i) Covers the general body surface.	i) Connects other types of tissues.
ii) The cells are tightly packed and there is no intercellular space and matrix.	ii) The cells are scattered with intercellular space fillled with matrix.
iii) Cells rest upon a basement membrane.	iii) There is no basement membrane.
iv) It consists of homogeneous types of cells.	iv) It consists of heterogenous types of cells.

20. Tendon and Ligament

Tendon	Ligament
i) It is made up of white collagen fibers.	i) It is made up of yellow elastic fibers.
ii) It is inelastic and tough.	ii) It is elastic and strong.
iii) Fibroblasts are present in rows.	iii) Fibroblasts are scattered.
iv) It connects muscle to bone.	iv) It connects bone to bone.

21. Bone and Cartilage

Bone	Cartilage
i) It is hard and inelastic.	i) It is soft and elastic.
ii) Matrix is formed of the protein ossein.	ii) Matrix is formed of the protein chondrin.
iii) The cells are osteoblasts and osteocytes.	iii) The cells are chondroblasts and chondrocytes.
iv) Bones are vascular and contain marrow.	iv) Thee are nonvascular and there is no marrow.

22. Hyaline Cartilage and Elastic Cartilage

Hyaline Cartilage	Elastic Cartilage
i) Bluish-white in colour.	i) Yellow in colour.
ii) Matrix consists mostly of fine collagen fibers and very few elastic fibers.	ii) Matrix consists mostly of yellow elastic fibers and few fine collagen fibers.
iii) Most common type of cartilage present in the body.	iii) This is present in the specific parts of the body.

23. Skeletal Muscle and Cardiac Muscle

Skeletal Muscle	Cardiac Muscle
i) Attached to bones and cartilages.	i) Present in the wall of the heart.
ii) Voluntary and undergo fatigue.	ii) Involuntary and do not undergo fatigue.
iii) Muscle fibres are not branched.	iii) Muscle fibers are branched which anastomoise with each other.
iv) The fibers are multinucleated (syncytial).	iv) The fibers are uninucleate, occasionally binucleated.

24. Smooth Muscle and Striated Muscle

Smooth Muscle	Striated Muscle
i) These are involuntary, nonstriated and unstriped.	i) These are voluntary, striated and striped.
ii) Muscle cells are long and spindle shaped containing centrally placed nucleus.	ii) Muscle cells are long and cylindrical, called muscle fibers.
iii) Myofilaments such as actin and myosin present in the sarcoplasm are not organized into regular bundles.	iii) Myofilaments (actin and myosin) are organised into regular bundles to impart a striated appearance (alternate dark and light bands).

25. Axon and Dendron

Axon	Dendron
i) Axon is a singular long process, which arises from the cell body.	i) These are many nerve processes, which terminate near the cell body.
ii) These conduct the nerve impulse away from the cell body.	ii) These carry impulses towards the cell body.
iii) They are devoid of Nissl bodies.	iii) They contain Nissl bodies.
iv) Each one is of uniform diameter.	iv) These are of uneven thicness.

26. Blood and Lymph

Blood	Lymph
i) Blood is red in colour due to the presence haemoglobin.	i) Lymph is colourless due to absence of haemoglobin.
ii) It is composed of RBC, WBC, thrombocytes and plasma.	ii) It is composed of WBC and plasma only.
iii) Neutrophils are most abundant.	iii) Lymphocytes are most abundant.

Unit-V

(a) Human Physiology

27. Ptyalin and Amylopsin

Ptyalin	Amylopsin
i) It is the alternative name of salivary amylase.	i) It is the alternative name of pancreatic amylase.
ii) It is present in Saliva.	ii) It is present in pancreatic juice.
iii) It acts an boiled starch.	iii) It acts on both boiled and unboiled starch.
iv) It starts its action in buccal cavity.	iv) It starts its action in duodenum.

28. Bile Salt and Bile Pigment

Bile Salt	Bile Pigment
i) It consists of sodium glycocholate and sodium taurocholate.	i) It consists of bilirubin and biliverdin which are produced from haemoglobin.
ii) These are involved in the emulsification of fat before digestion.	ii) They do not play any role in digestion. They affect the colour of faeces.
iii) It is a secretory product.	iii) It is a excretory product.

29. Gullet and Glottis

Gullet	Gullet
i) At the base of pharynx two openings are there and one is Gullet.	i) The other opening is glottis.
ii) The laryngopharynx opens into the oesophagus through gullet.	ii) The laryngopharynx opens into the larynx or the sound box through glottis and larynx is continued into the trachea.
iii) There is no guard over gullet.	iii) The glottis is guarded by a muscular flap called epiglottis.
iv) Food passes through gullet.	iv) Air panesthrough glottis.

30. Cardiac Stomach and Pyloric Stomach

Cardiac Stomach	Pyloric Stomach
i) The zone surrounding the oesophageal orifice is called cardiac part.	i) It is the narrow lower part of the stomach and opens into duodenum through pyloric orifice.
ii) Oesophageal orifice is guarded by Oesophageal or cardiac sphincter.	ii) The pyloric orifice guarded by pyloric sphincter.
iii) The oesophagus drains food into cardiac stomach.	iii) The pyloric stomach drains food into duodenum.
iv) Cardiac glands are present.	iv) Pyloric glands are present.

(b) Breathing and Respiration

31. Inspiration and Expiration

Inspiration	Expiration
i) Air is taken into the lungs from outside.	i) The used air is expelled out of the lungs to outside.
ii) Contraction of external intercostal mucle, the muscles of diaphragm increse the thoracic cavity. Internal intercostal muscles relax.	ii) Relaxation of external intercostal muscle and muscle of diafragm decreases thoracic cavity. Internal interostal muscles contract.
iii) Intra pleural pressure and intrapulmonary pressure decrease.	iii) Intrapleural pressure and intrapulmonary pressure increase.
iv) Hence Air is drawn into the lungs.	iv) Hence air is expelled out of the lungs.

32. External Respiration and Internal Respiration

External Respiration	Internal Respiration
i) It refers to the mechanisms by which O_2 is obtained from the environment in exchange with CO_2 which is expelled from the body.	i) It is the complex series of chemical changes in cells in which O_2 is utilized for production of energy and CO_2 becomes a byproduct.
ii) This occurs at the respiratory surface area which may be integument, gill, trachea or lungs.	ii) The respiratory surface is cell or tissue.
iii) For various processes of it energy is required.	iii) Here there is production of energy.

33. Trachea of Insects and Trachea of Human

Trachea of Insects	Trachea of Human
i) It is the chief respiratory structure of tracheal respiration.	i) It is a part of respiratory system where lungs is the chief respiratory organ. (Pulmonary respiration)
ii) The tracheae open to the outside through spiracle.	ii) It originates from larynx.
iii) These carry atmospheric air to the tissues directly.	iii) These carry atmospheric air to the lungs where gaseous exchange takes place.
iv) There is no need for transport by blood.	iv) From lungs O_2 is transported to tissues by blood.

34. External Intercostal Muscle and Internal Intercostal Muscle

External Intercostal Muscle	Internal Intercostal Muscle
i) These are the inspiratory muscles.	i) These are the expiratory muscles.
ii) The muscle fibres run forwards and down wards from rib to rib.	ii) The muscle fibres run backwards and down words from rib to rib.
iii) Inspiration is brought about by the contraction of the external intercostal muscle and relaxation of the internal intercostal muscle.	iii) Expiration is brought about by the contraction of the internal intercostal muscle and relaxation of the external intercostal muscle.

35. Oxyhaemoglobin and Carboxyhaemoglobin

Oxyhaemoglobin	Carboxyhaemoglobin
i) When O_2 diffuses into blood it combines with haeme of hamoglobin to form Oxyhaemoglobin.	i) In presence of CO, and O_2, the haemoglobin combines quickly with CO to form carboxyhaemoglobin.
ii) It is dissociable.	ii) It is stable.
iii) In the tissues it dissociates to Hb and O_2.	iii) In the tissues it will not dissociate.
iv) Oxygen carrying capacity is not affected by formation of HbO_2.	iv) By formation of carboxy-haemoglobin, oxygen transporting capacity of blood falls.

(c) Bodyfluid and Circulation

36. Erythrocytes and Leucocytes

Erythrocytes	Leucocytes
i) They are smaller in size and without nucleus.	i) They are bigger in size and nucleated.
ii) The cytoplasm contains haemoglobin.	ii) They do not contain haemoglobin.
iii) The lif span is 120 days and their function is to transport respiratory gases.	iii) Their life span is shorter (upto 12 days) and have defence functions.
iv) They are much more in number (about 5 million per Cu.m.m. of blood) and are not amoeboid.	iv) They are much less in number (about 7,000 per Cumm of blood and are actively amoeboid.

37. Artery and Vein

Artery	Vein
i) Transport blood away from the heart to the lungs and tissues.	i) Transport blood to the heart from the lungs and tissues.
ii) Valves are absent.	ii) Valves are present.
iii) Generally lie deep-seated in the body.	iii) Generally superficially seated.
iv) Walk is thick and blood pressure is higher.	iv) Wall is thinner and blood pressure is lower.

38. Single Circulation and Double Circulation

Single Circulation	Double Circulation
i) The blood flows once through the heart i.e. there is a single circuit of circulation.	i) The blood flows twice through the heart i.e. there are two circuits of circulation namely pulmonary and systemic.
ii) The heart contains venous blood (oxygen poor blood) only at any point of time.	ii) The heart contains both venous (oxygen poor) and arterial (oxygen rich) blood.
iii) The heart is two chambered - one atrium and one ventricle. Example - Cyclosomes & Fishes.	iii) The heart is 3-4 chambered with two auricles and one ventricle or two atria and two ventricles. Example - All tetrapods.

39. Blood and Lymph

Blood	Lymph
i) Blood is red in colour due to the presence of red cells.	i) It is colurless due to absence of red cells.
ii) It is composed of plasma, RBCs, WBCs and platelets.	ii) It is a composed of plasma and WBCs.
iii) It transports materials to and from tissues.	iii) It only transports materials to subclavian vein.
iv) Neutrophils are more and oxygen content is more whereas Nitrogenous Waste Substances are less.	iv) Lymphocytes are more and oxygen content is less whereas Nitrogenous waste substances are more.

40. Blood Group 'O' and Blood Group 'AB'

Blood Group 'O'	Blood Group 'AB'
i) It is regarded as universal donor.	i) It is regarded as universal recipient.
ii) The red cell membranes do not contain A or B antigens hence called 'O' Group.	ii) The red cell membranes contain both A and B antigens hence called AB group.
iii) The serum contains both Anti-A and Anti-B antibodies.	iii) Serum does not contain anti-A and anti-B antibodies.

41. Myogenic Heart and Neurogenic Heart

Myogenic Heart	Neurogenic Heart
i) The heart beat is initiated and controlled by a special node of cardiac muscle fibres known as pace maker.	i) The heart beat originates by nervous stimulation created by a nerve ganglion situated very near the heart.
ii) The pace maker produces rhythmic signals leading to contraction of the heart.	ii) The ganglion sends rhythmic signals to the heart muscle.
iii) The rhythm of the heart is regulated by nerves and acetylcholine inhibits the heart beat. Example-Most Arthropods and some Annelids.	iii) Acetylcholine accelerates the heart rate. Example - Vertebrates and Molluscs.

42. Pulmonary Circuit and Systemic Circuit

Pulmonary Circuit	Systemic Circuit
i) It includes pulmonary artery, lungs, pulmonary vein and left atrium.	i) It includes systemic aorta, body organs & tissues, superior & inferior venacava and right atrium.
ii) The pulmonary artery carries deoxygenated blood to the lungs from right ventricle.	ii) The systemic aorta divided into many branches which carry oxygenated blood to all body organs from left ventricle.
iii) After oxygenation of Hb and discharge of CO_2, the oxygenated blood is carried by the pulmonary vein into left atrium of the heart.	iii) The deoxygenated blood is carried from different organs by superior and inferior venacava into right atrium of the heart.

(d) Excretory products and their elimination

43. Superficial Nephrons and Juxtamedullary Nephrons

Superficial Nephrons	Juxtamedullary Nephrons
i) They occupy outer two thirds of cortex.	i) They occupy the inner third of the cortex.
ii) They make up about 85% of the total number.	ii) They account for about 15% of the total number.
iii) They are relatively smaller in size.	iii) They are large.
iv) They function fully under normal conditions.	iv) They work only in conditions of stress.

44. Ureotelism and Uricotelism

Ureotelism	Uricotelism
i) Animals are said to be ureotelic whose chief nitrogenous waste product is urea.	i) Animals are said to be unicotelic whose chief nitrogenous waste product is uric acid.
ii) The process by which animals produce urea is called ureotelism.	ii) The process by which animals produce uric acid is called uricotelism.
iii) Urea is produced by combination of NH_3 and CO_2. It is less toxic.	iii) NH_3 is converted to uric acid. It is least toxic.
iv) Urea is removed in the form of solution.	iv) Uric acid requires very little water for removal as it is insoluble in water. It helps in conservation of body water for survival.

45. Afferent Arteriole and Efferent Arteriole

Afferent Arteriole	Efferent Arteriole
i) The renal artery divides into several inter lobular arteries, which finally divide into afferent arterioles.	i) Each afferent arteriole enters into a glomerulus and forms a tuft of capillaries which reunite to form the efferent arteriole.
ii) Through afferent arteriole blood is drained into glomerulus.	ii) Through efferent arteriole blood is drained out from glomerulus after filtration.
iii) It is wider and long.	iii) It is narrower and short.

(e) Locomotion and Movement

46. Isotonic Contraction and Isometric Contraction

Isotonic Contraction	Isometric Contraction
i) There is physical shortening of muscle fibres.	i) There is no physical shortening of muscle fibres.
ii) The tension of the muscle remains practically the same.	ii) The tension increases sharply.
iii) At least 25% of the energy expenditure occurs as mechanical work.	iii) All the energy utilized is recorded as heat.
iv) No work is done.	iv) Work is done.

47. Osteo Arthritis and Rheumatoid Arthritis

Osteo Arthritis	Rheumatoid Arthritis
i) The formation of synovial fluid decreases.	i) The production of synovial fluid is in excess.
ii) The cartilage of joints is replaced by bony structures and due to more friction movements at joints become painful.	ii) Swelling occurs in joints resulting in pain. It is initiated from small joints and spreads to larger joints (limb joints).
iii) This occurs in old age and also called as ankylosis.	iii) It is common in women and begins at an early age.

48. Axial Skeleton and Appendicular Skeleton

Axial Skeleton	Appendicular Skeleton
i) It includes the bones present along the main axis of body.	i) The bones away from the axis constitute the appendicular skeleton.
ii) It has 80 bones.	ii) It consists of 126 bones.
iii) It includes the bones of middle ear, cranium, vertebral column, ribs and sternum.	iii) It includes the bones of limbs (Fore limbs & hind limbs), pectoral and pelvic girdles.

49. Actin and Myosin Filaments

Actin Filament	Myosin Filaments
i) These are present in I-band and also project in A-band.	i) These are found in A-band only.
ii) These are thin, having size of $50A^0$ and molecular weight of 46,000 daltons.	ii) These are thick, having size of 100 A^0 and molecular weight of 470,000 daltons.
iii) There are 3000 actin filaments per myofibril.	iii) There are 1500 myosin filaments per myofibril.
iv) Cross-bridges (heads) are absent.	iv) Cross bridges (heads) are present.

50. Thoracic Vertebra and Lumbar Vertebra

Thoracic Vertebra	Lumbar Vertebra
i) These are 12 in numbers and located in thorax.	i) These are 5 in numbers and located in abdomen.
ii) Neural spine is long and directed downward.	ii) Neural spine is short, flat and directed upward.
iii) Facet for ribs are present.	iii) Facet for ribs are absent.
iv) Transverse processes are club-shaped.	iv) Transverse processes are thin and elongated.

(f) Neural Control and Coordination

51. Cerebrum and Cerebellum

Cerebrum	Cerebellum
i) It is a part of fore brain and is the largest part of the brain.	i) It is a part of the hind brain and is the second largest part of the brain.
ii) It consists of two cerebral hemispheres each comprising 4 lobes.	ii) It consists of two cerebellar hemispheres and a median vermis.
iii) It encloses two lateral ventricles.	iii) It is solid.
iv) White matter does not form arbor vitae and it initiates vountary movement.	iv) White matter from arbor vitae and it maintains posture and equilibrium.

52. Rod Cells and Cone Cells

Rod Cells	Cone Cells
i) Outer segment is cylindrical and contains rhodopsin.	i) Outer segment is conical and contains iodopsin.
ii) Sensitive to dim light, and give 'twilight' vision.	ii) Sensitive to bright light and give 'daylight' vision.
iii) Do not give colour vision.	iii) Give colour vision.
iv) Insufficient rhodopsin results in night blindness.	iv) Insufficient iodopsin results in colour blindness.
v) Rod cells are far more numerous than cone cells.	v) Cone cells are far fewer than rod cells.

53. Axon and Dendron

Axon	Dendron
i) The axon is the singular long process which arises from the cell body.	i) These are many nerve processes which terminate near the cell body shorter in lenth.
ii) Axon conducts the nerve impulse away from the cell body.	ii) They carry impulses towards the cell body.
iii) It is devoid of Nissl granules.	iii) They contain Nissl granules.

54. Sympathetic and Parasympathetic System

Sympathetic System	Parasympathetic System
i) The thoracolumbar portion of the Autonomic nervous system is called sympathetic system. ii) Sympathetic fibres leave the CNS from the thorasic and lumbar vegions of the spinal cord. iii) Most of the sympathetic ganglia lie close to spinal cord and forms two chains of ganglia known as sympathetic trunks. Other sympathetic ganglia lie closer to the innervated organs. iv) The major neurotransmitter is norepinephrine.	i) The craniosacral portion of the autonomic nervous system is called parasympathetic system. ii) The parasympathetic fibres leave the CNS from the sacral region of spinal cord. iii) The parasympathetic ganglia lie within the innervated organs. iv) The major neurotransmitter is acetylcholine.
The two systems have more or less opposite effects.	

55. Myelinated and Non-Myelinated Nerve Fibres

Myelinated	Non-Myelinated Nerve Fibres
i) It comprises neuraxis which is covered by two sheaths - (i) inner thick, myelin sheath of fatty material called myelin, (ii) outer thin neurilemma. ii) Nodes of Ranvier are present at intervals. iii) Voltage - gated ion channels are concentrated at the nodes. iv) Action potential jumps from node to node and hence nerve impulse conduction is saltatory.	i) It comprises neuraxis which is covered by a single sheath, the neurilemma. Myelin sheath is absent. ii) Nodes of Ranvier are absent. iii) Voltage - gated ion channels are spread all over the axon. iv) Action potential propagates all along the axon and hence nerve impulse conduction is smooth.

56. Unconditoined Reflex and Conditioned Reflex

Unconditoined Refle	Conditioned Reflex
i) It is an innate (hereditary) characteristic of an animal. ii) It does not require previous learning or experience. iii) It is not lost even if the stimulus is not received for a longtime. It can not change. iv) It does not need additional receptor and cerebral centre.	i) It is an acquired behaviour of an animal. ii) It is gradually developed by training (repetition of a definite stimulus). iii) It is lost if the conditioned stimulus is discontinued for some time. It can change also. iv) It needs additional receptor and cerebral centre.

(g) Chemical Coordination and Regulation

57. Exopthalmic Goitre and Iodine-deficiency Goitre

Exopthalmic Goitre	Iodine-deficiency Goitre
i) It is caused by hypersecretion of thyroxine.	i) It is caused by hyposecretion of thyroxine.
ii) The size of thyroid gland increases 2-3 times.	ii) The size of thyroid gland increases about 15 times.
iii) BMR increases and eyes bulge forward.	iii) BMR decreases and no effect on eyes.
iv) Increase in the heart beat, pulse and blood pressure.	iv) Decrease in heart beat, pulse and blood pressure.

58. Adrenal Cortex and Adrenal Medulla

Adrenal Cortex	Adrenal Medulla
i) It is external firm region of the adrenal gland.	i) It is central soft region of the adrenal gland.
ii) It forms about 80% of the adrenal gland.	ii) It forms just 20% of the adrenal gland.
iii) It secretes 3 groups of hormones : mineralocorticoids, glucocorticoids and sex corticoids.	iii) It secretes 2 similar hormones : noradrenaline and adrenaline.
iv) It is stimulated by ACTH of anterior pituitary to release its hormones.	iv) It is stimulated by nerve impulses reaching by sympathetic nerve fibres to secrete its hormones.

59. Diabetes Mellitus and Diabetes Insipidus

Diabetes Mellitus	Diabetes Insipidus
i) It is caused by deficiency of insulin.	i) It is caused by deficiency of antidiuretic hormone (ADH).
ii) It is, thus, a pancreatic disorder.	ii) It is thus, a hypothalamic disorder.
iii) Blood sugar rises and glucose is excreted in urine.	iii) It increases the loss of water in the urine without glucose.

60. Glucocorticoids and Mineralocorticoids

Glucocorticoids	Mineralocorticoids
i) These are secreted by zona fasciculata of adrenal cortex.	i) These are secreted by zona glomerulosa of adrenal cortex.
ii) These play a role in the regulation of carbohydrate metabolism and increase in the blood sugar level.	ii) These play a role in the regulation of Na^+/K^+ level in the blood.
iii) Example - Cortisol.	iii) Example - Aldosterone.

GROUP - C
LONG TYPE QUESTIONS

5. Describe the physiology of digestion of carbohydrates and fats in human.
6. Describe the physiology of digestion of proteins in human.
7. Give an account of the absorption of end products of digestion of carbohydrates, proteins and fats.
8. Explain the mechanism of breathing and its regulation in human.
9. Describe the transport of O_2 and CO_2 in human blood.
10. Give an account of the composition of human blood.
11. Describe the structue and working of human heart.
12. Describe the structure of human excretory system.
13. Describe the structure and function of human kidney.
14. Describe the mechanism of urine formation in human.
15. Give an account of the contractile proteins and their role in muscle contraction.
16. Explain the physiology of muscle contraction.
17. Describe the structure of human brain.
18. How nerve impulse is generated ? Describe the conduction of nerve impulse.
19. Describe the structure and function of anterior pituitary.

GROUP - C
ANSWERS

5. Describe the physiology of digestion of carbohydrates and fats in human.

i) Definition of digestion.

ii) Digestive juices.

iii) Carbohydrate digestion in mouth, stomach, intestine, enzyes of concerned juices and their action.

iv) Fat digestion - Action of bile salt (emulsification of fat), Action of Pancreatic lipase. Action of other lipases.

v) End products of carbohydrate digestion and fat digestive.

vi) Chemical changes showing enzyme action.

6. Describe the physiology of digestion of proteins in human.

i) Definition of digestion.

ii) Different digestive juices and protein digesting enzymes.

iii) Digestion in stomach and intestine.

iv) Role of gastric juice, pancreatic juice and succus entericus with chemical charges showing enzyme action.

v) Digestion of milk protein.

7. Give an account of the absorption of end products of digestion of carbohydrates, proteins and fats.

i) End products of digestion of carbohydrates, proteins, fats. Site of absorption.

ii) Principles of absorption involved in absorption of amino acids and monosaccarides (glucose, fructose & galactose). Absorption into blood.

iii) Absorption of fat. Absorption into lymph.

8. Explain the mechanism of breathing and its regulation in human.

i) Principle of breathing in human it is negative pressure type.

ii) Inspiration and Expiration Role of diaphragm, intercostal muscles, abdominal muscles.

iii) Nervous regulation (Respiratory Centre) (Medullary and pontine respiratory centres).

iv) Chemical regulation (O_2 Tension, H^+ ion concentraton and CO_2 tension).

9. Describe the transport of O_2 and CO_2 in human blood.

i) Pulmonary exchange of gases (O_2 & CO_2).

ii) Transport of oxygen - In physical solution, as chemical compound HbO_2, Oxygen Carrying Capacity.

iii) Transport of carbondioxide - In physical solution, CO_2 as chemical compounds - as bicarbonates.

iv) Chloride shift

v) CO_2 as carbamino compounds.

vi) Inter relation between carriage of O_2 and CO_2.

10. Give an account of the composition of human blood.

i) Blood as a flid connective tissue.

ii) Plasma and its components - water, electrolytes, proteins, sugar, metabolic waste products, hormones, vitamins and number of foods.

iii) Cellular elements -

a) Erythrocytes, haemoglobins and its functions.

b) Leucocytes - Agranulocytes and granulocytes. Diagram of different types of leucocytes. Functions of leucocytes.

c) Platelets and their functions.

11. Describe the structue and working of human heart.

i) Structure of human heart - Different chambers with their function, valves of heart as one-way traffics with diagram.

ii) Junctional tissues of heart - S. A. node, A-V node, Bundle of His, Left and Right bundle branch and purkinje fibres.

iii) Working of heart and double circulation.

iv) Heart sounds and heart beat.

12. Describe the structure of human excretory system.

i) Definition of excretion. The organ of excretion.

ii) Kidney and its structure, blood supply to it.

iii) Nephron and different parts of it with diagram.

iv) Ureters, urinary bladder and urethra. Diagram of human excretory system.

13. Describe the structure and function of human kidney.

i) Type of kidney - metanephros.

Structure - Diagram of L.S. through kidney

Different zones of kidney. Nephron (the structural and functional unit of kidney).

ii) Diagram of Nephron. Description of different parts of nephron.

iii) Blood supply.

iv) Function - Urine functions (in brief) and Osmoregulation.

14. Describe the mechanism of urine formation in human.

i) Diagram of nephron with labelling.

ii) Formation of urea in liver.

iii) Urine formation in kidney -

a) Ultrafiltration, net effective filtration pressure.

b) Selective reabsorption in different parts.

c) Tubular secretion.

d) Counter current mechanism

iv) Action of ADH for reabsorption of water in DCT.

v) Composition of urine and comparison with blood.

15. Give an account of the contractile proteins and their role in muscle contraction.

i) Primary Myofilaments - Myosin & Actin. Their chemical nature and location.

ii) Other proteins - Actinin, titin, troponin and tropomyosin.

Actin - F (Fibrous) actin & G (Globular) actin.

iii) Role of Actin & Myosin and other proteins in muscle contraction (in sliding filament mechanism)

iv) Diagram of striated muscle and sliding filament mechanism.

16. Explain the physiology of muscle contraction.

i) Ultra structure of striated and smooth muscle.

ii) Contractile proteins. Action of neurotransmitter.

iii) Sliding filament mechanism

iv) Electrokynematic hypothesis.

v) Energy for muscle contraction. All or none response. Isotonic and isometric contraction.

17. Describe the structure of human brain.

i) Location of brain, menings of brain, cerebospinal fluid. Diagram of human brain.

ii) Fore brain (prosencephalon) - Cerebrum, and diencephalon (Thalamus and hypothalmus).

iii) Mid brain (Mesencephalon) - Corpora quadrigemina.

iv) Hind brain (Rhombencephalon) -

a) Matencephalon (Cerebellum and Pons)

b) Myelencephalon (Medulla oblongata)

v) Ventricles of brain.

18. How nerve impulse is generated ? Describe the conduction of nerve impulse.

i) Stimulus and excitation of nerve fibre.

ii) Generation of impulse - Resting membrane potential, action potential.

iii) Mechanism of development of action potential - depolarisation, repolarisation, reorientation of ions.

iv) Conduction of nerve impulse -

a) In non-medullated nerve fibres (smooth conduction)

b) In myelinated nerve fibres - saltatory conduction

v) Diagram related to saltatory conduction.

19. Describe the structure and function of anterior pituitary.

i) Diagram of pituitary gland of man.

ii) Anterior pituitary (Adenohypophysis) - Pars distalis or pars anterior. Pars tuberalis and pars intermedia.

iii) Functions of Pars distalis - Secretion of TSH, ACTH, Gonadotrophic hormones/ GTH (FSH, LH or ICSH, LTH or MH), GH or STH. Their role.

iv) Functions of Pars intermedia - MSH. Its role.

v) Role of pars tuberalis.

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