

**XI BIO-ZOOLOGY IMPORTANT QUESTIONS (Reduced syllabus 2022))****CHAPTER 1. LIVING WORLD****TWO & THREE MARKS****1. Define-Biodiversity 2**

- ❖ The presence of a large number of species in a particular ecosystem is called biological diversity' or in short '**biodiversity**'.
- ❖ The term biodiversity was first introduced by **Walter Rosen (1985)**, and defined by E.D. Wilson.

**2. What is taxonomy? 2**

- ❖ Based on their characteristics, all living organisms can be classified into different taxa.
- ❖ This science of classification is called taxonomy.

**3. Define - criteria for systematics**

- ❖ The main criteria of systematics are identifying, describing, naming, arranging, preserving, and documenting the organisms.
- ❖ Apart from the above-said features, the evolutionary history of the species and the environmental adaptations and interrelationship between species are also being investigated in systematics.

**4. What is phylogenetic classification? 4**

- ❖ A modification of this system is the numerical taxonomy, which evolved in the 1950s.
- ❖ This system evaluates the resemblances and differences through statistical methods followed by computer analyses to establish the numerical degree

**5. What is cladogram? 4**

- ❖ Ernst Haeckel introduced the method of representing evolutionary relationships with the help of a tree diagram known as cladogram.

**6. Define -Three domain classification 5**

- ❖ Three domain classification was proposed by Carl Woese.
- ❖ This system emphasizes the separation of prokaryotes into two domains.
- ❖ Bacteria and Archaea, and all the eukaryotes are placed into the domain Eukarya.
- ❖ Archaea appears to have more in common with die Eukarya than the Bacteria.
- ❖ Archaea differ from bacteria in cell wall composition and differs from bacteria and eukaryotes in membrane composition and rRNA types.

**7. What are methanogens 5**

- ❖ Methanogens: Some of the extremophiles that produce methane are called methanogens.

**8. What are extremophiles 5**

- ❖ The domain Archaea includes single-celled organisms, the prokaryotes which have the ability to grow in extreme conditions like volcano vents, hot springs, and polar ice caps, hence are also called extremophiles.

## 9. Define -Five kingdom classification 6

- ❖ Five kingdom classification defined by R.H. Whittaker as Monera, Protista, Fungi, Plantae, and Animalia based on the cell structure, mode of nutrition, mode of reproduction, and phylogenetic relationships.

## 10. Name the molecular taxonomy tools 11

- ❖ Technological advancement has helped to evolve molecular taxonomical tools from classical tools to molecular tools.
- ❖ The accuracy and authenticity is more significant in the molecular tools.

### ***FIVE MARKS QUESTIONS***

#### 1. Explain-The classical taxonomical tools 11

- ❖ **The classical taxonomical tools:**
- ❖ **Taxonomical Keys:** Keys are based on a comparative analysis of the similarities and dissimilarities of organisms.
- ❖ There are separate keys for different taxonomic categories.
- ❖ **Museum:** Biological museums have a collection of preserved plants and animals for study and ready reference.
- ❖ Specimens of both extinct and living organisms can be studied.
- ❖ **Zoological parks:** These are places where wild animals are kept in protected environments under human care which enables us to study their food habits and behavior.
- ❖ **Marine parks:** Marine organisms are maintained in a protected environment.
- ❖ Printed taxonomical tools consist of identification cards, descriptions, field guides, and manuals.

#### 2. Describe about molecular taxonomical tools 11

- ❖ **Molecular taxonomical tools:**
- ❖ Technological advancement has helped to evolve molecular taxonomical tools from classical tools to molecular tools.
- ❖ The accuracy and authenticity is more significant in the molecular tools.
- ❖ The following methods are being used for taxonomical Classification.
- ❖ Molecular techniques and approaches such as DNA bar coding (short genetic marker in an organism's DNA to identify it as belonging to a particular species), DNA hybridization (measures the degree of genetic similarity between pools of DNA sequences), DNA fingerprinting (to identify an individual from a sample of DNA by looking at unique patterns in their DNA), Restriction Fragment Length Polymorphisms (RFLP) analysis (difference in homologous DNA sequences that can be detected by the presence of fragments of different lengths after digestion, of the DNA samples), and Polymerase Chain Reaction (PCR) sequencing (to amplify a specific gene or portion of a gene,) are used as taxonomical tools.

### 3. Explain -Three domain classification 5-6

- ❖ Three domain classifications was proposed by Carl Woese.
- ❖ This system emphasizes the separation of prokaryotes into two domains.
- ❖ Bacteria and Archaea, and all the eukaryotes are placed into the domain Eukarya.
- ❖ Archaea appears to have more in common with die Eukarya than the Bacteria.
- ❖ Archaea differ from bacteria in cell wall composition and differs from bacteria and eukaryotes in membrane composition and rRNA types.

## CHAPTER 2. KINGDOM ANIMALIA

### **TWO & THREE MARKS**

#### 1. Why round worms are called pseudocoelomates? 17

- ❖ Animals that possess a pseudocoel are called **pseudocoelomates** e.g., Round worms.
- ❖ The pseudocoelomic fluid in the pseudocoelom acts as a hydrostatic skeleton and allows free movement of the visceral organs and for circulation of nutrients.

#### 2. What are triploblastic animals ? 16

- ❖ Animals in which the developing embryo has three germinal layers are called triploblastic, animals and consists of outer ectoderm (skin, hair, neuron, nail, teeth, etc), inner endoderm (gut, lung, liver), and middle mesoderm (muscle, bone, heart).
- ❖ Most of the triploblastic animals show organ system level of organization (Flatworms to Chordates).

#### 3. What are diploblastic animals ? 16

- ❖ Animals in which the cells are arranged in two embryonic layers (Figure 2.1), the external ectoderm, and internal endoderm are called **diploblastic animals**.
- ❖ In these animals the ectoderm gives rise to the epidermis (the outer layer of the body wall) and endoderm gives rise to gastrodermis

#### 4. Define- asymmetry - 16

- ❖ The simplest body plan is seen in sponges.
- ❖ They do not display symmetry and are asymmetrical.
- ❖ Such animals lack a definite body plan or are irregular shaped and any plane passing through the center of the body does not divide them into two equal halves (Sponges).

#### 5. Define-metamerism 18

- ❖ The body of the annelids are metamerically segmented and the body surface is divided into segment or metameres.

- ❖ Internally the segments are divided from one another by partitions called septa. This phenomenon is known as metamerism.

## 6 . Compare closed and opened circulatory system? 15

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## 7. What are choanocytes 15

- ❖ **Choanocytes** or collar cells are special flagellated cells lining the spongocoel and the canals.
- ❖ The body is supported by a skeleton made up of calcareous and siliceous **spicules** or **spongin** or both.

## 8. Define-Pinacocytes- 15

- ❖ In sponges, the outer layer is formed of pinacocytes (platelike cells that maintain the size and structure of the sponge) and the inner layer is formed of choanocytes

## 9. Define-Radial symmetry- 16

- ❖ Symmetrical animals have paired body parts that are arranged on either side of a plane passing through the central axis.
- ❖ When any plane passing through the central axis of the body divides an organism into two identical parts, it is called radial symmetry.
- ❖ Such radially symmetrical animals have a top and bottom side but no dorsal (back) and ventral (abdomen) side, no right and left side.
- ❖ They have a body plan in which the body parts are organized in a circle around an axis.
- ❖ It is the principal symmetry in diploblastic animals.
- ❖ Cnidarians such as sea anemone and corals are radially symmetrical.
- ❖ However, triploblastic animals like echinoderms eg. Starfish have five planes of symmetry and show Pentamerous radial symmetry.

## 10. What is biradial symmetry- 17

- ❖ Animals that possess two pairs of symmetrical sides are said to be biradially symmetrical.
- ❖ Biradial symmetry is a combination of radial and bilateral symmetry as seen in ctenophores.
- ❖ There are only two planes of symmetry, one through the longitudinal and sagittal axis and the other through the longitudinal and transverse axis. eg. Comb jellyfish – Pleurobrachia.
- ❖ Animals that have two similar halves on either side of the central plane show bilateral symmetry.

- ❖ It is an advantageous type of symmetry in triploblastic animals, which helps in seeking food, locating mates and escaping from predators more efficiently
- ❖ Animals that have dorsal and ventral sides, anterior and posterior ends, right and left sides are bilaterally symmetrical.

### 11. Compare Schizocoelomates and Enterocoelomate 17-18

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### 12. What are Cnidocytes or cnidoblasts? 20

- ❖ Cnidarians (were previously called Coelenterata), are aquatic, sessile or free swimming, solitary or colonial forms with radial symmetry The name Cnidaria is derived from **cnidocytes** or **cnidoblasts** with **stinging cells** or **nematocyst** on tentacles.
- ❖ Cnidoblasts are used for anchorage, defense, and to capture the prey.

### 13. Define-Metagenesis- 21

- ❖ Cnidarians which exist in both forms, also exhibit alternation of generations in their life cycle (**Metagenesis**).
- ❖ The polyp represents the asexual generation and medusa represents the sexual generation.

### 14. What is Bioluminescence? 21

- ❖ **Bioluminescence** (the ability of a living organism to emit light) is well marked in ctenophores.
- ❖ They lack nematocysts but possess special cells called **lasso cells** or **colloblasts** which help in food capture

### 15. Define-lasso cells or colloblasts 21

- ❖ They lack nematocysts but possess special cells called **lasso cells** or **colloblasts** which help in food capture.
- ❖ Digestion is both extracellular and intracellular

### 16. Define -metamerism 23

- ❖ The body of the annelids are metamERICALLY segmented and the body surface is divided into segment or metamer.
- ❖ Internally the segments are divided from one another by partitions called septa. This phenomenon is known as metamerism

### 17. List the characteristic features that distinguish cartilaginous fishes with living jawless fishes. pg29

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**18. What is anadromous migration? 28**

- ❖ Cyclostomes are marine but migrate to fresh waters for spawning (**anadromous migration**).
- ❖ After spawning within a few days they die.
- ❖ The larvae (**ammocoete**) after metamorphosis returns to the ocean.

**19. List the functions of air bladder in fishes 29**

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**20. List three features that characterize bony fishes .29 -**

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**FIVE MARKS QUESTIONS****1. What are the characteristic features of phylum Ctenophora (pg21), cnidaria (pg20), annelida(pg-22-23) , arthropoda(pg.23-24)?**

Write short notes about Ctenophora.

1. Ctenophora are exclusively marine, radially symmetrical, diploblastic animals with tissue level of organization.
2. Though they are diploblastic, their mesoglea is different from that of cnidaria. It contains amoebocytes and smooth muscle cells.
3. They have eight external rows of ciliated comb plates (comb jellies) which help in locomotion, hence commonly called comb jellies or sea walnuts.
4. Bioluminescence (the ability of a living organism to emit light) is well marked in ctenophores.
5. They possess special cells called lasso cells or colloblasts which help in food capture.
6. Digestion is both extracellular and intracellular.
7. Sexes are not separate (monoecious). They reproduce only by sexual means.
8. (Fertilization is external and development is indirect and includes a larval stage called cydippid larva, eg. Pleurobrachia and Ctenoplana

**Phylum - Coelenterata/ Cnidaria :-**

- ❖ Aquatic ,Marine ,Sessile(fixed ) ,free swimming animals.
- ❖ Radially symmetrical , Tissuelevel of organization , Diploblastic
- ❖ Have cnidoblasts, cnidocytes, stinging capsule on tentacles to capture the prey.
- ❖ Mouth on hypostome. Digestion extracellular and intracellular.
- ❖ In the life style two basic forms called polyp (sessile) and medusa (free living).
- ❖ They show alternation of generation ( metagenesis ) where polyp forms medusa  
Ex. - Hydra, Physalia, Sea anemone, Sea pen, Sea fan, Brain coral

**Phylum – Annelida :-**

- ❖ Aquatic or terrestrial, Free living, some are parasites.
  - ❖ Organ system level of body organization. coelomate animals.
  - ❖ Bilaterally symmetrical, Triploblastic, Metamerically segmented.
  - ❖ Possess longitudinal and circular muscles help in locomotion.
  - ❖ Closed circulatory system. Nephridia help in osmoregulation and excretion.
  - ❖ Some are monoecious (Earthworm), while some are dioecious (leech).
- Ex: Nereis, earth worm and Hirudinaria .

**7. Phylum – Arthropoda :-**

- ❖ Largest phylum (2/3) , jointed leg animals, Bilaterally symmetrical.
- ❖ Organ system level of body organization , Segmented and coelomates animal.
- ❖ Chitinous exoskeleton, body has head, thorax and abdomen.
- ❖ Respiratory organs are gills , Book lungs and tracheal system.
- ❖ Open circulatory system, Excretion by malpighian tubules .
- ❖ Sense organs are antennae, eye, statocysts ( balance organs ).
- ❖ Sexes are separate, fertilization is internal, Oviparous animals.
- ❖ Ex : Honey bees, Silkworm, Mosquito, Housefly crab, and prawn

**2. What are the difference between chordates and non-chordates? 27**

Chordates	Non-chordates
Notochord is present	Notochord is absent
Dorsal, hollow and single nerve cord	Double ventral solid nerve cord
Pharynx perforated by gill slits	Gill slits absent
Heart is ventrally placed	Heart is dorsal or laterally placed or absent
A post anal tail is present	A post anal tail is absent
Alimentary canal is placed ventral to the nerve cord	Alimentary canal is placed dorsal to the nerve cord

**3. What are the fundamental distinct features of Chordates? 26-27**

- ❖ All chordates possess three fundamental distinct features at some stage of their life cycle, they are:
  1. Presence of elongated rod like notochord below the nerve cord and above the alimentary canal. It serves as a primitive internal skeleton. It may persist throughout life in lancelets and lampreys. In adult vertebrates, it may be partially or completely replaced by backbone or vertebral column.
  2. A dorsal hollow or tubular fluid filled nerve cord lies above the notochord and below the dorsal body wall. It serve's to integrate and co-ordinate the body functions. In higher chordates, the anterior end of the nerve cord gets enlarged to

form the brain and the posterior part becomes the spinal cord, protected inside the vertebral column.

3. Presence of pharyngeal gill slits or clefts in all chordates at some stage of their life cycle.

It is a series of gill slits or clefts that perforates the walls of pharynx and appears during the development of every chordate. In aquatic forms, pharyngeal gill slits are vascular, lamellar and form the gills for respiration. In terrestrial chordates, traces of non-functional gill clefts appear during embryonic developmental stages and disappear later. Besides the above said features, chordates are bilaterally symmetrical, triploblastic, coelomates with organ system level of organisation; they possess post anal tail, closed circulatory system with a ventral myogenic heart except in Amphioxus.

### **CHAPTER 3. TISSUE LEVEL OF ORGANIZATION**

#### **TWO & THREE MARKS**

#### **1. What are the functions of epithelium ?38**

- ❖ The functions of epithelium includes **protection, absorption, filtration, excretion, secretion** and **sensory reception**.

#### **2. Define -Histology 37**

- ❖ The study of tissues is called **histology** complements the study of gross anatomy.
- ❖ Together they provide the structural basis for understanding organ physiology.

#### **3. Why tissues are called living fabrics? 37**

- ❖ Tissues are organized in specific proportions and patterns to form organs like lungs, heart, stomach, kidneys, ovaries, testes etc., hence the tissues are called the 'living fabrics'.

#### **4. What are the functions Goblet cell ? 39**

- ❖ special mucus secreting columnar epithelial cell located in the respiratory tract and intestine.

#### **5.Name the different types of cell junction and their functions.**

- ❖ Tight junctions help to stop substances from leaking across a tissue. Adhering junctions perform cementing to keep neighbouring cells together.
- ❖ Gap junctions facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules and sometimes big molecules.

#### **8. What is tissue fluid? 42**

- ❖ The Areolar connective tissue beneath the skin acts as a support framework for epithelium and acts as a reservoir of water and salts for the surrounding body tissues, hence aptly called tissue fluid



**9. Differentiate white adipose tissue from brown adipose tissue.42**

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**10. Some epithelia are pseudostratified. What does this mean? 39- book back**

**11. What is Rhabdomyosarcoma? 44**

- ❖ Life threatening soft tissue tumour of head, neck and urinogenital tract.

**12. Define- compound epithelium ? types?41**

1. The compound epithelium is made of more than one layer (multi-layered) of cells and thus has a limited role in secretion and absorption.
2. Their main function is to provide protection against chemical and mechanical stresses.

There are four types of compound epithelium namely, stratified squamous epithelium, cuboidal epithelium, columnar epithelium and transitional epithelium.

**13. Define-Ehler's -Danlos syndrome 44**

- ❖ Defect in the synthesis of collagen in the joints, heart valves, organ walls and arterial walls

**14. What is Rheumatoid arthritis? 44**

- ❖ The immune cells attack and inflame the membranes around the joints. It can also affect heart, lungs and eyes.

**15. Differentiate between elastic fibre and elastic connective tissue. 43 book back**

**16. What are the main functions of connective tissues? 41**

- ❖ Major functions of connective tissues are **binding, support, protection, insulation and transportation**

***FIVE MARKS QUESTIONS***

**1. Write the classification of connective tissue and their functions 41-43 – book back**

**2. What is an epithelium? Enumerate the characteristic features of different epithelia. 38-40**

- ❖ Simple epithelium is composed of a single layer of cells. They are found in the organs of absorption, secretion and filtration.
- ❖ Simple epithelial tissue is further classified into squamous epithelium, cuboidal epithelium, columnar epithelium, ciliated epithelium and pseudostratified epithelium.
- ❖ The squamous epithelium is made of a single thin layer of flattened cells with irregular boundaries.

- ❖ They are found in the kidney glomeruli, air sacs of lungs, lining of heart, blood vessels and lymphatic vessels and are involved in functions like forming a diffusion boundary and filtration in sites where protection is not important.
- ❖ The cuboidal epithelium is made of a single layer of cube-like cells.
- ❖ This tissue is commonly found in the kidney tubules, ducts and secretory portions of small glands and the surface of the ovary.
- ❖ Its main functions are secretion and absorption.
- ❖ The columnar epithelium is composed of a single layer of tall cells with round to oval nuclei at the base.
- ❖ It lines the digestive tract from the stomach to the rectum.
- ❖ The functions of this epithelium include absorption, secretion of mucus, enzymes and other substances.
- ❖ This ciliated type propels mucus by ciliary actions and it lines the small bronchioles, fallopian tubes and uterus.
- ❖ Non-ciliated type lines most of the digestive tract, gall bladder and secretory ducts of glands.
- ❖ Pseudo-stratified epithelial cells are columnar but unequal in size.
- ❖ Although the epithelium is single-layered yet it appears to be multi-layered because the nuclei lie at different levels in different cells.
- ❖ Hence, it is also called pseudostratified epithelium and its functions are protection, secretion and absorption.
- ❖ Ciliated forms line the trachea and the upper respiratory tract.
- ❖ The non-ciliated forms line the epididymis, large ducts of glands and tracts of the male urethra.

### 3. Explain the types of compound epithelium .41

- ❖ There are four types of compound epithelium namely, stratified squamous epithelium, cuboidal epithelium, columnar epithelium and transitional epithelium.
- ❖ Stratified squamous epithelium is of two types called keratinized type which forms the dry epidermis of the skin and the non keratinized type forms the moist lining of the oesophagus, mouth, conjunctiva of the eyes and vagina.
- ❖ Stratified cuboidal epithelium mostly found in the ducts of sweat glands and mammary glands.
- ❖ The stratified columnar epithelium has limited distribution in the body, found around the lumen of the pharynx, male urethra and lining of some glandular ducts.
- ❖ Transitional Epithelium is found lining the ureters, urinary bladder and part of the urethra.
- ❖ This epithelium allows stretching and is protective in function.

#### 4. What are specialized connective tissues? Explain 43

- ❖ **Specialized connective tissues** (cartilage, bone and blood).
- ❖ **Specialised connective tissues** are classified as cartilage, bones and blood.
- ❖ The intercellular material of **cartilage** is solid and pliable and resists compression.
- ❖ Cells of this tissue (chondrocytes) are enclosed in small cavities within the matrix secreted by them (Figure 3.6).
- ❖ Most of the cartilages in vertebrate embryos are replaced by bones in adults.
- ❖ Cartilage is present in the tip of nose, outer ear joints, ear pinna, between adjacent bones of the vertebral column, limbs and hands in adults.
- ❖ **Bones** have a hard and non-pliable ground substance rich in calcium salts and collagen fibres which gives strength to the bones.
- ❖ It is the main tissue that provides structural frame to the body. Bones support and protect softer tissues and organs.
- ❖ The bone cells (osteocytes) are present in the spaces called **lacunae**.
- ❖ Limb bones, such as the long bones of the legs, serve weightbearing functions.
- ❖ They also interact with skeletal muscles attached to them to bring about movements.
- ❖ The bone marrow in some bones is the site of production of blood cells.
- ❖ **Blood** is the fluid connective tissue containing plasma, red blood cells (RBC), white blood cells (WBC) and platelets.
- ❖ It functions as the transport medium for the cardiovascular system, carrying nutrients, wastes, respiratory gases throughout the body.

### CHAPTER 4. ORGAN AND ORGAN SYSTEM IN ANIMALS

#### **TWO & THREE MARKS**

#### 1. Name the types of earthworms based on their ecological strategies. 48

- ❖ Earthworms are also conveniently classified based on their ecological strategies as epigeics, anecics and endogeics.
- ❖ Epigeics are surface dwellers, eg. *Perionyx excavatus* and *Eudrilus eugeniae*.
- ❖ Anecics are found in upper layers of the soil, eg. *Lampito mauritii*, *Lumbricus Terrestris*.
- ❖ Endogeics are found in deeper layers of the soil.  
eg. *Octochaetona thurstoni*.

#### 2. Define-Clitellum 48

- ❖ Due to the presence of clitellum in the 14-17 segment, the body of an earthworm is divided into pre clitellar region (1st – 13th segments), clitellar region (14th – 17th segments) and the post-clitellar region (after the 17th segment).
- ❖ In all the segments of the body except the first, last and clitellum, there is a ring of chitinous body setae

### 3. What is typhlosole? 50

- ❖ The dorsal wall of the intestine is folded into the cavity as the **typhlosole**.
- ❖ This fold contains blood vessels and increases the absorptive area of the intestine.

### 4. Define-vermicast (or )worm castings 50

- ❖ The undigested particles along with earth are passed out through the anus, as **worm castings** or **vermicasts**.

### 5. What are lateral hearts or commissural vessel?51

- ❖ In the anterior part of the body the dorsal vessel is connected with the ventral vessel by eight pairs of **commissural vessels** or the **lateral hearts** lying in the 6th to 13<sup>th</sup> segments.
- ❖ These vessels run on either side of the alimentary canal and pump blood from the dorsal vessel to the ventral vessel.

### 6. Why earth worm are called friends of farmers? 48

- ❖ Earthworms are known as “friends of the farmer” because they make burrows in the soil and make it porous which helps in respiration and penetration of developing plant roots.

### 7. Name the types of nephridia and their location 53

- ❖ Excretion is the process of elimination of metabolic waste products from the body.
- ❖ In earthworm, excretion is affected by segmentally arranged, minute coiled, paired tubules called nephridia.
- ❖ There are three types of nephridia:
  1. Pharyngeal or tufted nephridia – present as paired tufts in the 5th 9th segments.
  2. Micronephridia or Integumentary nephridia – attached to the lining of the body wall from the 14th segment to the last which open on the body surface.
  3. Meganephridia or septal nephridia – present as pair on both sides of intersegmental septa of the 19th segment to the last and open into the intestine. The meganephridium has an internal funnel-like opening called the nephrostome, which is fully ciliated.

### 8. What are chloragogen cells? Mention their use 53

- ❖ Besides nephridia, special cells on the coelomic wall of the intestine, called chloragogen cells are present.
- ❖ They extract the nitrogenous waste from the blood of the intestinal wall, into the body cavity to be sent out through the nephridia.

**9. What is sinus venosus? 66**

❖ **Sinus venosus** is a large, thin walled, triangular chamber, which is present on the **dorsal side** of the heart.

**10. Define- truncus arteriosus- 66**

- ❖ Truncus arteriosus is a thick-walled and cylindrical structure that is obliquely placed on the ventral surface of the heart.
- ❖ It arises from the ventricle and divides into the right and left aortic trunk, which is further divided into three aortic arches namely carotid, systemic and pulmonary.

**11. What is mesovarium? 68**

- ❖ **Female** reproductive consists of paired **ovaries**, attached to the kidneys, and dorsal body wall by folds of peritoneum called mesovarium.

**12. What is mesorchium? 68**

❖ The **male** frog has a pair of testes which are attached to the kidney and the dorsal body wall by folds of peritoneum called mesorchium.

**13. Write the types of respiration seen in frog.66 book back****14. How do earthworm breathe? 51 book back****15. What are difference between anus and cloaca? 65**

- ❖ Anus is the opening that excretes undigested waste from the digestive tract of mammals.
- ❖ On the other hand, cloaca is the opening that excretes urine, faeces and genital tract excretions in reptiles, birds and amphibians.

**16. Draw a neat diagram of the digestives system of frog.65****17. How does the male frog attracts the female for mating? 64 book back*****FIVE MARKS QUESTIONS*****1. What are the economic importance of frog? 69**

Economic importance of Frog:

1. The frog is an important animal in the food chain; it helps to maintain our ecosystem. So 'frogs should be protected'.
2. Frog is beneficial to man since they feed on insects and helps in reducing the insect pest population.
3. Frogs are used in traditional medicine for controlling blood pressure and for their anti-ageing properties.

4. In the USA, Japan, China and the North East of India, frogs are consumed as delicious food as they have high nutritive value.

## 2. Explain the respiratory system of frog 65-66

- ❖ Frog respire on land and in the water by two different methods. In water, **skin** acts as aquatic respiratory organ (**cutaneous respiration**).
- ❖ Dissolved oxygen in the water gets, exchanged through the skin by diffusion.
- ❖ On land, the buccal cavity, skin and lungs act as the respiratory organs.
- ❖ In **buccal respiration** on land, the mouth remains permanently closed while the nostrils remain open.
- ❖ The floor of the buccal cavity is alternately raised and lowered, so air is drawn into and expelled out of the buccal cavity repeatedly through the open nostrils.
- ❖ Respiration by lungs is called **pulmonary respiration**.
- ❖ The lungs are a pair of elongated, pink coloured saclike structures present in the upper part of the trunk region (thorax).
- ❖ Air enters through the nostrils into the buccal cavity and then to the lungs. During **aestivation** and **hibernation** gaseous exchange takes place through skin.

## 3. Describe the circulatory system of earthworm 51-52

### Structure of Heart :-

- ❖ The **heart** with three chambers, **blood vessels** and **blood**.
- ❖ Heart is covered by a double-walled membrane called **pericardium**.
- ❖ There are two thin walled anterior chambers called auricles (Atria) and a single thick walled posterior chamber called ventricle.
- ❖ **Sinus venosus** is a large, thin walled, triangular chamber, which is present on the **dorsal side** of the heart.
- ❖ **Truncus arteriosus** is a thick walled and cylindrical structure placed on the **ventral surface** of the heart.
- ❖ It arises from the ventricle and divides into right and left **aortic trunk**.
- ❖ **Aortic trunk** is further divided into **three aortic arches** namely carotid, systemic and pulmo-cutaneous.
- ❖ The **Carotid** trunk supplies blood to the anterior region of the body.
- ❖ The **Systemic trunk** of each side is joined posteriorly to form the **dorsal aorta**. They supply blood to the posterior part of the body.
- ❖ **Pulmo-cutaneous trunk** supplies blood to the lungs and skin.
- ❖ Sinus venosus receives the deoxygenated blood from the body parts by two anterior precaval veins and one post caval vein. It delivers the blood to the right auricle.
- ❖ At the same time left auricle receives oxygenated blood through the pulmonary vein. Renal portal and hepatic portal systems are seen in frog.

## 4. Explain the reproductive system of frog- 68 BOOK BACK

## **CHAPTER 5. DIGESTION AND ABSORPTION**

### ***TWO & THREE MARKS***

#### **1. Define-Gingivitis 74**

- ❖ In the tooth a narrow gap between the gums and enamel and causes inflammation called – **gingivitis**

#### **2. What is GERD?- 75**

- ❖ If the cardiac sphincter does not contract properly during the churning action of the stomach the gastric juice with acid may flow back into the oesophagus and cause heart burn, resulting in GERD (Gastro Oesophagus Reflex Disorder).

#### **3. What is Crypts of leiberkhun?-76**

- ❖ The wall of the small intestine bears crypts between the base of villi called **crypts of Leiberkuhn**

#### **4. Define-Peyer's patches – 76**

- ❖ Along with villi, the ileal mucosa also contain mucus secreting goblet cells and lymphoid tissue known as **Peyer's patches** which produce lymphocytes

#### **5. What is Brunner's glands? Name their function - 75**

- ❖ The wall of the duodenum has **Brunner's glands** which secrete mucus and enzymes.
- ❖ Ileum is the longest part of the small intestine and opens into the caecum of the large intestine.

#### **6. What are Haemorrhoids?- 76**

- ❖ The anus is guarded by two anal sphincter muscles.
- ❖ The anal mucosa is folded into several vertical folds and contains arteries and veins called anal columns.
- ❖ Anal column may get enlarged and causes **piles** or **haemorrhoids**.

#### **7. Write the function and location of Parietal cell or oxyntic cell-77**

- ❖ Parietal / oxyntic cells – it secrete HCl and an intrinsic factor responsible for the absorption of Vitamin B12 called Castle's intrinsic factor

#### **8. What is Glisson Capsule?- 77-78**

- ❖ The liver consists of two major left and right lobes and two minor lobes. These lobes are connected with diaphragm.
- ❖ Each lobe has many hepatic lobules (functional unit of liver) and is covered by a thin connective tissue sheath called the **Glisson's capsule**.

#### **9. Name the components of saliva- 79**

- ❖ The saliva contain water, electrolytes (Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup>, HCO<sub>3</sub><sup>-</sup>), salivary amylase (ptyalin), antibacterial agent lysozyme and a lubricating agent mucus (a glycoprotein).

- ❖ The mucus in saliva prepares the food for swallowing by moistening, softening, lubricating and adhering the masticated food into a bolus

#### 10. Write human dental formula- 74

- ❖ Arrangement of teeth in each half of the upper and lower jaw, in the order of I, C, PM and M can be represented by a dental formula, in human the dental formula is

$$\frac{2123}{2123} \quad \times 2$$

#### 11. Name the location of Sphincter of Oddi and mention their function- 78

- ❖ The bile duct passes downwards and joins with the main pancreatic duct to form a common duct called hepato-pancreatic duct.
- ❖ The opening of the hepato-pancreatic duct into the duodenum is guarded by a sphincter called the **sphincter of Oddi**

#### 12. What is Gastric rugae?- 75

- ❖ The inner wall of stomach has many folds called **gastric rugae** which unfolds to accommodate a large meal.

#### 13. What is Peritonitis?- 84

- ❖ If treatment is delayed the appendix may rupture and results in infection of the abdomen, called peritonitis.

#### 14. Define -Gall stones- 84

- ❖ Any alteration in the composition of the bile can cause the formation of stones in the gall bladder.
- ❖ The stones are mostly formed of crystallized cholesterol in the bile.
- ❖ The gall stone causes obstruction in the cystic duct, hepatic duct and also hepato-pancreatic duct causing pain, jaundice and pancreatitis

#### 15. Name the Salivary glands with their duct.77

- ❖ There are three pairs of salivary glands in the mouth.
- ❖ They are the largest parotids gland in the cheeks, the sub-maxillary/ sub-mandibular in the lower jaw and the sublingual beneath the tongue.
- ❖ These glands have ducts such as **Stenson's duct, Wharton's duct and Bartholin's duct or duct of Rivinis** respectively .
- ❖ The salivary juice secreted by the salivary glands reaches the mouth through these ducts.
- ❖ The daily secretion of saliva from salivary glands ranges from 1000 to 1500mL.

#### 16. Why are villi present in the intestine and not in the stomach? Book back

#### 17. Bile juice contains no digestive enzymes, yet it is important for digestion.

Why? Book back



**18. List the chemical changes that starch molecule undergoes from the time it reaches the small intestine. Book back**

### **FIVE MARKS QUESTIONS**

#### **1. What are functions of liver?- 78**

- ❖ Destroys aging and defective blood cells.
- ❖ Stores glucose in the form of glycogen or disperses glucose into the blood stream with the help of pancreatic hormones.
- ❖ Stores fat soluble vitamins and iron.
- ❖ Detoxifies toxic substances.
- ❖ Involves in the synthesis of non-essential amino acids and urea.

#### **2. Explain the process of digestion in Stomach-79**

- ❖ Food remains in the stomach for 4 to 5 hours, the rhythmic peristaltic movement churns and mixes the food with gastric juice and make it into a creamy liquid called **chyme**.
- ❖ The gastric secretion is partly controlled by autonomic reflexes. The secretion of gastric juice begins when the food is in the mouth.
- ❖ The gastric juice contains HCl and proenzymes. The proenzyme pepsinogen, on exposure to HCl gets converted into the active enzyme pepsin which converts proteins into proteoses and peptones (peptides).
- ❖ The HCl provides an acidic medium which is optimum for pepsin, kills bacteria and other harmful organisms and avoids putrefaction.
- ❖ The mucus and bicarbonates present in the gastric juice play an important role in lubrication and protection of the mucosal epithelium from the eroding nature of the highly acidic HCl (Figure. 5.8).
- ❖ Another proteolytic enzyme found in gastric juice of infants is rennin helps in the digestion of milk protein, caseinogen to casein in the presence of calcium ions.
- ❖ This enzyme secretion gradually reduces with aging.

#### **3. Describe nutritional and digestive disorders (any 5)- 84-85**

- ❖ **Indigestion:** It is a digestive disorder in which the food is not properly digested leading to a feeling of fullness of stomach.
- ❖ It may be due to inadequate enzyme secretion, anxiety, food poisoning, over eating, and spicy food.
- ❖ **Constipation:** In this condition, the faeces are retained within the rectum because of irregular bowel movement due to poor intake of fibre in the diet and lack of physical activities.
- ❖ **Vomiting:** It is reverse peristalsis. Harmful substances and contaminated food from stomach are ejected through the mouth. This action is controlled by the

vomit centre located in the medulla oblongata. A feeling of nausea precedes vomiting.

- ❖ **Jaundice:** It is the condition in which liver is affected and the defective liver fails to break down haemoglobin and to remove bile pigments from the blood. Deposition of these pigments changes the colour of eye and skin yellow.
- ❖ Sometimes, jaundice is caused due to hepatitis viral infections.
- ❖ **Liver cirrhosis:** Chronic disease of liver results in degeneration and destruction of liver cells resulting in abnormal blood vessel and bile duct leading to the formation of fibrosis. It is also called deserted liver or scarred liver. It is caused due to infection, consumption of poison, malnutrition and alcoholism.
- ❖ **Gall Stones:** Any alteration in the composition of the bile can cause the formation of stones in the gall bladder. The stones are mostly formed of crystallized cholesterol in the bile. The gall stone causes obstruction in the cystic duct, hepatic duct and also hepato-pancreatic duct causing pain, jaundice and pancreatitis.
- ❖ **Appendicitis:** It is the inflammation of the vermiform appendix, leading to severe abdominal pain. The treatment involves the removal of appendix by surgery. If treatment is delayed the appendix may rupture and results in infection of the abdomen, called **peritonitis**.

#### 4. Explain the process of digestion in small intestine-80-81

- ❖ **Digestion in the small intestine :-**
- ❖ The intestinal glands secrete the intestinal juice or **succus entericus**.
- ❖ The enzymes in the intestinal juice such as maltase, lactase, sucrase (invertase), dipeptidases, lipases, nucleosidases act on the breakdown products of bile and pancreatic digestion.
  1. Maltose  $\xrightarrow{\text{Maltase}}$  glucose + glucose
  2. Sucrose  $\xrightarrow{\text{Sucrase}}$  glucose + fructose
  3. Lactose  $\xrightarrow{\text{Lactase}}$  glucose + galactose
  4. Dipeptides, Tripeptides  $\xrightarrow{\text{Peptidase}}$  Amino acids
  5. Nucleotides  $\xrightarrow{\text{Nucleotidase}}$  Nucleoside + Phosphoric acid.
  6. Nucleoside  $\xrightarrow{\text{Nucleosidase}}$  Sugar + Nitrogen base.
  7. Diglycerides & Monoglycerides  $\xrightarrow{\text{Lipase}}$  Fatty acids + glycerol.
- ❖ As a result of digestion, all macromolecules of food are converted into their corresponding monomeric units.
- ❖ The simple substances thus formed are absorbed in the jejunum and ileum region of the small intestine.

**5. Write about digestive glands and their secretion.- 77- 79**

Organs	Functions	Secretions
Salivary glands	Moistens food	Salivary mucus lubricates food. Salivary amylase digests starch
Liver	Produces bile, synthesizes cholesterol and steroids. Destroys old blood cells, Detoxifies poisons produced by bacteria and others in food. Breaks hemoglobin of dead and damaged RBC and convert into bile pigments	Bile emulsifies fat
Gall Bladder	Stores bile	-
Pancreas	Exocrine part secretes digestive enzymes. Endocrine part secretes hormones such as insulin by beta cells, glucagon by alpha cells which regulates blood glucose levels	Bicarbonate neutralizes stomach acid. Trypsin and chymotrypsin digest protein. Carboxypeptidase digests . Amylase digests starch and glycogen. Lipase digests lipids. Nuclease digests nucleic acid.

## CHAPTER 7 .BODY FLUIDS AND CIRCULATION

### TWO & THREE MARKS

1. Name the types of extracellular fluids & give examples. 110

2. Name the types of plasma proteins- 110

The four main types of plasma proteins synthesized in the liver are albumin, globulin, prothrombin and fibrinogen. **Albumin** maintains the osmotic pressure of the blood. **Globulin** facilitates the transport of ions, hormones, lipids and assists in immune function. Both **Prothrombin** and **Fibrinogen** are involved in blood clotting. **Organic constituents** include urea, amino acids, glucose, fats and vitamins and the **inorganic constituents** include chlorides, carbonates and phosphates of potassium, sodium, calcium and magnesium

3. Write the composition of blood – 110

Blood is the most common body fluid that transports substances from one part of the body to the other. Blood is a connective tissue consisting of plasma (fluid matrix) and formed elements. The plasma constitutes 55% of the total blood volume. The remaining 45% is the formed elements that consist of blood cells. The average blood volume is about 5000ml (5L) in an adult weighing 70 Kg.

4. What is erythropoietin? 112

**Erythropoietin** is a hormone secreted by the kidneys in response to low oxygen and helps in differentiation of stem cells of the bone marrow to erythrocytes (erythropoiesis) in adults

5. Define – haematocrit 112

The ratio of red blood cells to blood plasma is expressed as **Haematocrit** (packed cell volume)

6. What are kupffer cells? 113

The macrophages of the central nervous system are the ‘microglia’, in the sinusoids of the liver they are called ‘**Kupffer cells**’ and in the pulmonary region they are the ‘**alveolar macrophages**’

7. What is erythroblastosis foetalis? 113-114

During subsequent pregnancies the Rh antibodies from the mother (Rh<sub>2</sub>) enters the foetal circulation and destroys the foetal RBCs. This becomes fatal to the foetus because the child suffers from anaemia and jaundice. This condition is called **erythroblastosis foetalis**.

8. Name the uses of heparin 114

**Heparin** is an **anticoagulant** produced in small quantities by mast cells of connective tissue which prevents coagulation in small blood vessels

### 9. What is heart beat? 119

Rhythmic contraction and expansion of heart is called **heart beat**. The contraction of the heart is called **systole** and the relaxation of the heart is called **diastole**. The heart normally beats 70-72 times per min in a human adult.

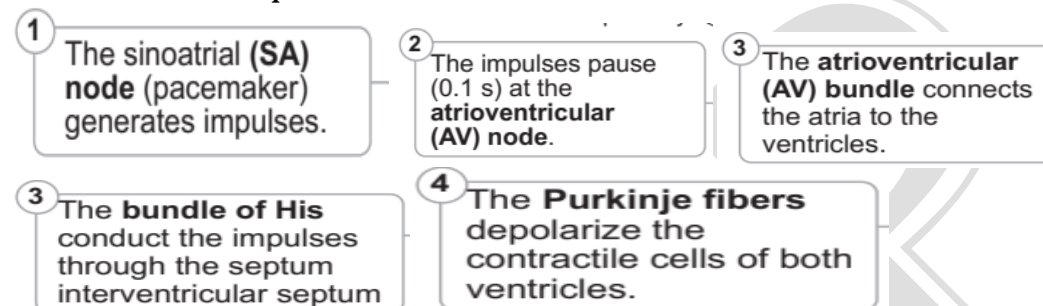
### 10. Define-trabeculae corneae- 119

The myocardium of the ventricle is thrown into irregular muscular ridges called **trabeculae corneae**.

### 11. What is chordae tendinae- 119

The trabeculae corneae are modified into **chordate tendinae**. The opening and closing of the semilunar valves are achieved by the chordae tendinae.

### 12. Write the sequence of electrical conduction of heart- 119



### 13. What is cardiac cycle?- 120

The events that occur at the beginning of heart beat and lasts until the beginning of next beat is called cardiac cycle. It lasts for 0.8 seconds. The series of events that takes place in a **cardiac cycle**.

### 14. Define -cardiac output(CO)- 120

The amount of blood pumped out by each ventricle per minute is called **cardiac output(CO)**. It is a product of **heart rate (HR)** and **stroke volume (SV)**.

### 15. What is Stroke volume (SV)- 120

Stroke volume (SV) is the volume of blood pumped out by one ventricle with each beat. SV depends on ventricular contraction.  $CO = HR \times SV$ . SV represents the difference between EDV (amount of blood that collects in a ventricle during diastole) and ESV (volume of blood remaining in the ventricle after contraction).  $SV = EDV - ESV$ .

### 16. What is end diastolic volume (EDV)- 120

The contraction of the auricles pushes maximum volume of blood to the ventricles until they reach the end diastolic volume (EDV). EDV is related to the length of the cardiac muscle fibre. More the muscle is stretched, greater the EDV and the stroke volume.

### 17. What is end of systolic volume (ESV)- 120

Increased ventricular pressure forces the semilunar valves to open and blood is ejected out of the ventricles without backflow of blood. This point is the end of systolic volume (ESV).

### 18. What is Stroke?-124

Stroke is a condition when the blood vessels in the brain bursts, (**Brain haemorrhage**) or when there is a block in the artery that supplies the brain, (atherosclerosis) or thrombus. The part of the brain tissue that is supplied by this damaged artery dies due to lack of oxygen (**cerebral infarction**).

### 19. What are varicose veins? -125

**Varicose veins** The veins are so dilated that the valves prevent back flow of blood. The veins lose their elasticity and become congested. Common sites are legs, rectal-anal regions (haemorrhoids), the oesophagus and the spermatic cord.

### 20. What is Embolism?-125

**Embolism** is the obstruction of the blood vessel by abnormal mass of materials such as fragment of the blood clot, bone fragment or an air bubble. Embolus may lodge in the lungs, coronary artery or liver and leads to death.

### 21. What is Aneurysm?- 125

**Aneurysm** The weakened regions of the wall of the artery or veins bulges to form a balloon like sac. Unruptured aneurysm may exert pressure on the adjacent tissues or may burst causing massive haemorrhage.

### 22. Define- Ischemic heart disease- 125

The blood clot or **thrombosis** blocks the blood supply to the heart and weakens the muscle fibres. It is also called **Ischemic** heart disease due to lack of oxygen supply to the heart muscles

### 23. What is Rheumatic fever?- 125

Rheumatic fever is an autoimmune disease which occurs 2-4 weeks after throat infection usually a streptococcal infection. The antibodies developed to combat the infection cause damage to the heart. Effects include fibrous nodules on the mitral valve, fibrosis of the connective tissue and accumulation of fluid in the pericardial cavity.

### 24. Define-Myocardial infarction- 124-125

When the blood supply to the heart muscle or myocardium is remarkably reduced it leads to death of the muscle fibres. This condition is called **heart attack** or **myocardial infarction**.

## FIVE MARKS QUESTIONS

1. Explain the mechanism of blood coagulation in an injured blood vessel- 114
2. Explain- ABO blood grouping- 113
3. Write any five disorder of circulatory system .124-125
4. Explain the process of origin and conduction of heart beat- 119

## CHAPTER 8. EXCRETION

### TWO & THREE MARKS

#### 1. Define-Stenohaline-pg 133

The stenohaline animals can tolerate only narrow fluctuations in the salt concentration (example: Gold fish),

#### 2. Define-Euryhaline 133

The euryhaline animals are able to tolerate wide fluctuations in the salt concentrations eg., *Artemia*, *Tilapia* and *Salmons*.

#### 3. Name the outer layers of kidney 135

The outer layer of the kidney is covered by three layers of supportive tissues namely, renal fascia, perirenal fat capsule and fibrous capsule

#### 4. What is Renal corpuscle? 135

The renal tubule begins with a double walled cup shaped structure called the Bowman's capsule, which encloses a ball of capillaries that delivers fluid to the tubules, called the glomerulus. The Bowman's capsule and the glomerulus together constitute the **renal corpuscle**.

### 5. Define-Cortical nephrons- 136

In the renal tubules, PCT and DCT of the nephron are situated in the cortical region of the kidney whereas the loop of Henle is in the medullary region. In majority of nephrons, the loop of Henle is too short and extends only very little into the medulla and are called **cortical nephrons**.

### 6. What is Juxtamedullary nephrons(JMN)?- 136

Some nephrons have very long loop of Henle that run deep into the medulla and are called **juxta medullary nephrons (JMN)**

### 7. What are Peritubular capillaries?- 136-137

The efferent arteriole that comes out of the glomerulus forms a fine capillary network around the renal tubule called the peritubular capillaries.

### 8. Define-Vasa recta- 137

The efferent arteriole serving the juxta medullary nephron forms bundles of long straight vessel called vasa recta and runs parallel to the loop of Henle. Vasa recta is absent or reduced in cortical nephrons.

### 9. Define- Ornithine cycle- 137

The nitrogenous waste formed as a result of breakdown of amino acids is converted to urea in the liver by the Ornithine cycle or urea cycle

### 10. Define-Osmolarity – 139

Osmolarity - The solute concentration of a solution of water is known as the solutions osmolarity, expressed as milliosmoles /liter (mOsm/L)

### 11. What is countercurrent multiplier?- 140

**Ascending and descending limbs of Henle, create a counter current multiplier** (interaction between flow of filtrate through the limbs of Henle's and JMN) by active transport. (a) shows the counter current multiplier created by the long loops of **Henle of the JM nephrons which creates medullary osmotic gradient**

### 12. What is countercurrent exchanger ?- 140

**The vasa recta, maintains the medullary osmotic gradient via counter current exchanger** (the flow of blood through the ascending and descending vasa recta blood vessels) by passive transport. (b) shows counter current exchanger where the vasa recta preserves the medullary gradient while removing reabsorbed water and solutes.

### 13. Define-Osmoconformers 133

Osmoconformers are able to change their internal osmotic concentration with change in external environment as in marine molluscs and sharks.

### 14. Define-Osmoregulator- 133

Osmoregulators maintain their internal osmotic concentration irrespective of their external osmotic environment (example: Otters).

### 15. Define-Filtration slits- 135

The podocytes end in foot processes which cling to the basement membrane of the glomerulus. The openings between the foot processes are called filtration slits

### 16. What are Aquaporins? – 139

The change in permeability to water is due to the presence of number of waterpermeable channels called **aquaporins**.

### 17. What is Positive feedback ?- 141

When there is excessive loss of fluid from the body or when there is an increase in the blood pressure, the osmoreceptors of the hypothalamus respond by stimulating the neurohypophysis to secrete the antidiuretic hormone (ADH) or vasopressin (a positive feedback)

### 18. what is Negative feedback?- 141

When you drink excess amounts of your favourite juice, osmoreceptors of the hypothalamus is no longer stimulated and the release of ADH is suppressed from the neurohypophysis (negative feedback) and the aquaporins of the collecting ducts move into the cytoplasm

### 19. What is Juxta glomerular apparatus (JGA)?- 141

Juxta glomerular apparatus (JGA) is a specialized tissue in the afferent arteriole of the nephron that consists of macula densa and granular cells. The macula densa cells sense distal tubular flow and affect afferent arteriole diameter, whereas the granular cells secrete an enzyme called renin.

### 20. what is atrial natriuretic peptide?- 142

Excessive stretch of cardiac atrial cells cause an increase in blood flow to the atria of the heart and release Atrial Natriuretic Peptide or factor (ANF) travels to the kidney where it increases  $\text{Na}^+$  excretion and increases the blood flow to the glomerulus, acting on the afferent glomerular arterioles as a vasodilator or on efferent arterioles as a vasoconstrictor.

## FIVE MARKS QUESTIONS

1. Explain-Renin angiotensin Aldosterone system (RAAS) 141-142
2. Explain the structure of Kidney – 134-135
3. Describe the mechanism of urine formation. 137-139
4. Explain the structure of nephron- 135

## CHAPTER 9. LOCOMOTION AND MOVEMENT

### TWO MARKS& THREE MARKS

#### 1. Name the types of cell movement – 152

The different types of movements that occur in the cells of our body are amoeboid, ciliary, flagellar and muscular movement.

#### 2. Define- fascicle 152

Skeletal muscle is attached to the bone by a bundle of collagen fibres known as **tendon**. Each muscle is made up of bundles of **muscle fibres** called **fascicle**

#### 3. Define -myofibrils – 152

Each muscle fibre contains hundreds to thousands of rod-like structures called **myofibrils** that run parallel to its length.

#### 4. What is myoglobin – 157

**Myoglobin** is a red- coloured respiratory pigment of the muscle fibre. It is similar to haemoglobin and contains iron group that has affinity towards oxygen and serves as the reservoir of oxygen.

#### 5. What are glycosomes? – 152

**Glycosomes** are the granules of stored glycogen that provide glucose during the period of muscle fibre activity. Actin and myosin are muscle proteins present in the muscle fibre.

#### 6. Define- isotonic contraction 156

In isotonic contraction the length of the muscle changes but the tension remains constant. Here, the force produced is unchanged. Example: lifting dumb bells and weightlifting.

#### 7. Define -isometric contraction – 156



In isometric contraction the length of the muscle does not change but the tension of the muscle changes. Here, the force produced is changed. Example: pushing against a wall, holding a heavy bag.

#### 8. Define –Sarcomere- 15

The myofibrils contain the contractile element, the **sarcomere** which is the functional unit of the skeletal muscle. A Sarcomere is the region of a myofibril between two successive Z-discs. It contains an A-band with a half I-band at each end. Inside the sarcomere two types of filaments are present namely the **thick** and **thin filaments**.

#### 9. What is muscle tension ?- 154

The contraction of muscle fibre is a remarkable process that helps in creating a force to move or to resist a load. The force which is created by the contracting muscle is called muscle tension.

#### 10. What is red muscle fibre? – 157

Such fibres depend on blood flow to deliver oxygen and nutrients to the muscles. The oxidative fibres are termed as **red muscle fibres**

#### 11. Define- oxidative fibres – 157

Fibres that contain numerous mitochondria and have a high capacity for oxidative phosphorylation are classified as **oxidative fibres**

#### 12. What is glycolytic fibres- 157

Fibres that contain few mitochondria but possess a high concentration of glycolytic enzymes and large stores of glycogen are called **glycolytic fibres**.

#### 13. Define synarthroses?- 164

They are immovable fixed joints in which no movement between the bones is possible. Sutures of the flat skull bones are fibrous joints.

#### 14. What is amphiarthroses ?- 164

They are slightly movable joints in which the joint surfaces are separated by a cartilage and slight movement is only possible. E.g., Joints of adjacent vertebrae of the vertebral column.

#### 15. Define - diarthroses?- 164

They are freely movable joints, the articulating bones are separated by a cavity which is filled with synovial fluid.

#### **FIVE MARKS**

1. Explain the structure of skeletal muscle . 152-153
2. Explain the mechanism of muscle contraction. 154-155
3. Explain the structure of contractile proteins. 153-154.

### **CHAPTER 10. NEURAL CONTROL AND COORDINATION**

#### **TWO & THREE MARKS**

#### 1. What are the functions of neural system?- 170

The neural system of higher animals are well developed and performs the following basic functions:

- **Sensory functions**- It receives sensory input from internal and external environment.
- **Motor functions**- It transmits motor commands from the brain to the skeletal and muscular system.
- **Autonomic functions**- Reflex actions.

2. what is crystalline ?- 183

**Eye lens** is transparent and biconvex, made up of long columnar epithelial cells called **lens fibres**. These cells are accumulated with the proteins called **crystalline**.

3. Name the layers of eyeball- 182

The wall of the eye ball consists of three layers: fibrous **Sclera**, vascular **Choroid** and sensory **Retina**

4. What is sty? 183

Dilation and congestion of the blood vessels of the conjunctiva due to local irritation or infection are the cause of bloodshot eye (conjunctivitis - commonly called Madras eye). Infection of ciliary glands by bacteria causes a painful, pus filled swelling called a Sty.

5. Name the Visual pigments for colour vision 185

**Retina** forms the inner most layer of the eye and it contains two regions: A sheet of **pigmented epithelium** (non visual part) and **neural visual regions**. The neural retina layer contains three types of cells: photoreceptor cells – **cones and rods** , **bipolar cells and ganglion cells**.

6. What is macula lutea? 184

The yellow flat spot at the centre of the posterior region of the retina is called **macula lutea** which is responsible for sharp detailed vision

7. Define stereocilia 187

Protruding from the apical part of each hair cell is hair like structures known as **stereocilia**.

8. What is tactile merkel disc? 190

**Tactile merkel disc** is light touch receptor lying in the deeper layer of epidermis.

9. Define unconditional reflex 180

**Unconditional reflex** is an inborn reflex for an unconditioned stimulus. It does not need any past experience, knowledge or training to occur; Ex: blinking of an eye when a dust particle about to fall into it, sneezing and coughing due to foreign particle entering the nose or larynx.

10. Define conditional reflex 184

**Conditioned reflex** is a response to a stimulus that has been acquired by learning. This does not naturally exists in animals. Only an experience makes it a part of the behaviour. Example: excitement of salivary gland on seeing and smelling a food. The conditioned reflex was first demonstrated by the Russian physiologist **Pavlov** in his classical conditioning experiment in a dog. The cerebral cortex controls the conditioned reflex

11. What is canal of schlemm ? 183

Sclera forms the white of the eye and protects the eyeball. Posteriorly the sclera is innervated by the optic nerve. At the junction of the sclera and the cornea, is a channel called '**canal of schlemm**' which continuously drains out the excess of aqueous humor.

12. What are the differences between rod and cone cells?184

Rod cells	Cone cells
Rods are responsible for vision in dim light	The cones are responsible for colour vision and works best in the bright light.
The pigment present in the rods is rhodopsin, formed of a protein scotopsin and retinal (an aldehyde of vitamin A )	The pigment present in the cones is photopsin, formed of opsin protein and retinal.
There are about 120 millions rod cells	There may be 6-7 millions cone cells
Rods are predominant in the extra fovea region	Cones are concentrated in the fovea region

### 13. Explain- mechanism of vision .185

When light enters the eyes, it gets refracted by the **cornea, aqueous humor and lens and it is focused** on the retina and excites the rod and cone cells. The photo pigment consists of **Opsin**, the protein part and **Retinal**, a derivative of vitamin A. Light induces dissociation of retinal from opsin and causes the structural changes in opsin. This generates an action potential in the photoreceptor cells and is transmitted by the optic nerves to the visual cortex of the brain, via bipolar cells, ganglia and optic nerves, for the perception of vision.

### 14. What is vestibular system ? 188

The organ of balance is known as the **vestibular system** which is located in the inner ear next to the cochlea. The vestibular system is composed of a series of fluid filled sacs and tubules. These sacs and tubules contain endolymph and are kept in the surrounding perilymph

### 15. Define otoliths- 188

The maculae contain the hair cells that act as mechanoreceptors. These hair cells are embedded in a gelatinous otolithic membrane that contains small calcareous particles called **otoliths**.

### 16. what is Meissner's corpuscle ? 190

**Meissner's corpuscles** are small light pressure receptors found just beneath the epidermis in the dermal papillae. They are numerous in hairless skin areas such as finger tips and soles of the feet.

### 17. What is pacinian corpuscle? 190

**Pacinian corpuscles** are the large egg shaped receptors found scattered deep in the dermis and monitoring vibration due to pressure. It allows to detect different textures, temperature, hardness and pain.

### 18. What is vitiligo ?

Vitiligo (Leucoderma) is a condition in which the melanin pigment is lost from areas of the skin, causing white patches, often with no clear cause. Vitiligo is not contagious. It can affect people of any age, gender, or ethnic group. The patches appear when melanocytes fails to synthesis melanin pigment.

### 19. Define astigmatism 185

**Astigmatism** is due to the rough (irregular) curvature of cornea or lens. Cylindrical glasses are used to correct this error

### 20. What is cataract? 185

Due to the changes in nature of protein, the lens becomes opaque. It can be corrected by surgical procedures.

### 21. write about limbic system 177

The inner part of the cerebral hemisphere constitutes the limbic system. The main components of limbic system are **olfactory bulbs, cingulated gyrus, mammillary body, amygdala, hippocampus and hypothalamus.**

22. Write about organ of corti 187

The **organ of Corti** is a sensory ridge located on the top of the **Basilar membrane** and it contains numerous hair cells that are arranged in four rows along the length of the basilar membrane. Protruding from the apical part of each hair cell is hair like structures known as **stereocilia**. During the conduction of sound wave, stereocilia makes a contact with the stiff gel membrane called **tectorial membrane**, a roof like structure overhanging the organ of corti throughout its length.

23. Mention the possibilities of conductive deafness. 187

Deafness may be temporary or permanent. It can be further classified into **conductive deafness** and **sensory-neural deafness**. Possible causes for conductive deafness may be due to

- i. the blockage of ear canal with earwax,
- ii. Rupture of eardrum
- iii. Middle ear infection with fluid accumulation
- iv. Restriction of ossicular movement.

In **sensory-neural deafness**, the defect may be in the organ of Corti or the auditory nerve or in the ascending auditory pathways or auditory cortex.

24. Define blind spot. 185

The optic nerves and the retinal blood vessels enter the eye slightly below the posterior pole, which is devoid of photo receptors; hence this region is called **blind spot**.

25. What are the functions of association areas? 176

26. What are the uses of ceruminous glands ? 186

There are very fine hairs and wax producing sebaceous glands called **ceruminous glands** in the external auditory meatus. The combination of hair and the **ear wax** [cerumen] helps in preventing dust and foreign particles from entering the ear.

#### **FIVE MARKS**

1. Explain refractive errors of eye . 185

**Myopia** (near sightedness): The affected person can see the nearby objects but not the distant objects. This condition may result due to an elongated eyeball or thickened lens; so that the image of distant object is formed in front of the yellow spot. This error can be corrected using concave lens that diverge the entering light rays and focuses it on the retina.

**H y p e r m e t r o p i a** (long sightedness): the affected person can see only the distant objects clearly but not the objects nearby. This condition results due to a shortened eyeball and thin lens; so the image of closest object is converged behind the retina. This defect can be overcome by using convex lens that converge the entering light rays on the retina.

**Presbyopia:** Due to aging, the lens loses elasticity and the power of accommodation. Convex lenses are used to correct this defect.

**Astigmatism** is due to the rough (irregular) curvature of cornea or lens. Cylindrical glasses are used to correct this error

**Cataract:** Due to the changes in nature of protein, the lens becomes opaque. It can be corrected by surgical procedures