Padasalai's Telegram Groups!

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1.THE LIVING WORLD

Evaluation

1. A living organism is differentiated from non-living structure based On -All the above
2. A group of organisms having similar traits of a rank is - a. Species
3. Every unit of classification regardless of its rank is - a. Taxon
4. Which of the following is not present in same rank? - a. Primata
5. What taxonomic aid gives comprehensive information about a taxon? - a. Taxonomic key
6. Who coined the term biodiversity?- a. Walter Rosen
7. Cladogram considers the following characters - b. Evolutionary and Phylogenetic
8. Molecular taxonomic tool consists of- a. DNA and RNA
9. Differentiate between probiotics and pathogenic bacteria

Probiotic Bacteria	Pathogenic Bacteria
1.Useful bacterias	1.Harmful bacterias
2.Convert Milk into Curd	2.Causes Disease in plants&animals
3.Eg: Lactobacillus	3.Eg:Vibrio cholerae(cholera)

10. Why mule is sterile in nature?

Some animals(Eg:Male donkey with Female Horse) which can produce **sterile offspring** because of mating with closely related species.

11. List any five salient features of the family *Felidae*

-Felidae is basically a cat family.
-They are obligate Carnivores.
-They have sharp teeth and claws to catch and eat prey.
-Mostly solitary, secretive and nocturnal.
-Acute sense-hearing,smell,vision and touch.

12. What is the role of Charles Darwin in relation to concept of species?

-In 1859 Charles Darwin in his book **Origin of species.**
-It explains the evolutionary connection of species by the process of natural selection.

13. Why elephants and other wild animals are entering into human living area?

Elephant and Wild animals living areas destroying by Human and animals entering into human living area For searching its foods and shelter.

14. What is the difference between a Zoo and wild life sanctuary?

Zoo Wild Life Sanctuary
ZOO

1.Animals are kept for public exhibition
2.Zoo is an Artificial Habitat

SANCTUARY

1.Animals protected from possible dangers
2.Natural Habitat of the animals

15. Can we use recent molecular tools to identify and classify organisms?

-Molecular techniques and approaches such as **DNA barcoding** (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 gene,) are used as taxonomical tools.

16. Explain the role of Latin and Greek names in Biology.

-**This** list of latin and greek words commonly used in Systematic names is intended to help those unfamiliar with classical languages to understand and remember the scientific names of organisms.
-The binomial nomenclature used for animals and plants is largely derived from Latin and Greek words,as are some of the names used for higher Taxa,such as Orders and above.

EXTRA QUESTIONS

1.The term biodiversity was first introduced by **Walter Rosen (1985),** and defined by E.D. Wilson.
2.The word taxonomy was coined by **Augustin Pyramus de Candole (1813).**
3.Aristotle is called the father of taxonomy (classical) and **Carolus Linnaeus** is the father of modern taxonomy.
4.Aristotle (384 to 322 BC), was the first to classify all animals in his **History of Animals**
5.Theophrastus (372-287 BC) continued his research on the classification of plants, and he was known as the "Father of Botany."
6.John Ray (1627–1705) In 1682 he published the *Methodus Plantarum*

Nova, which contained about **18,000** plant species.
7.The Swedish biologist **Carolus Linnaeus (1707 - 1788)** father of modern taxonomy and founder of modern systematic.
8.R.H.Whittaker (1969) proposed the **Five kingdom Classification**
9.Three domain classification was proposed by **Carl Woese** (1977) and his co-workers.
10.Bacteria cell wall contains peptidoglycans.
11. In 1987, **Cavalier-Smith** revised the six kingdom system to **Seven Kingdom system.**
12.Crosses between male horse and female donkey results in Hinny (Sterile).
13. Linnaeus books, ***Species Plantarum*** **(**1753) and ***Systema Naturae***, (1758).
14. In July, 2017, a 9 years old boy discovered a new Freshwater speciesof **Jellyfish** in the Kodaikanal lake, Tamilnadu.
15. Birdman of India, Ornithologist **Dr. Salim Ali.**
16. ALIS → Automated Leafhopper Identification System.
17.DAISY → Digital Automated Identification System.
18.ABIS → Automatic Bee Identification System.
19.SPIDA → Species Identified Automatically (spiders, wasp and bee wing characters).
20. PCR.....Polymerase Chain Reaction .

1.Ecosystem

Ecosystem is a community of living organisms (plants and animals), non-living
environment (including minerals, climate, soil, water, sunlight) and their interrelationships (**A.G. Tansley, 1935**).
2.Taxa-The scientific term used for these categories is **taxa** (taxon–singular).
Taxa indicates categories at different levels, for example Kingdom Animalia,
includes multicellular animals such as reptiles, mammals, etc.
3.Taxonomy-All living organisms can be classified into different taxa. This science of classification is called **taxonomy**.-Taxonomy (G. *taxis*arrangement ; *nomos*-law) is the science of arrangement of living organisms
along with classification, description, identification, and naming of organisms which includes all flora and fauna including microorganisms of the world.

4.Cladogram

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

-Arranging organisms on the basis of their similar or derived characters which differ from the ancestral characters produced a phylogenetic tree or cladogram.

5.Define five kingdom classification

-R.H.Whittaker (1969) proposed the **Five kingdom Classification**, the Kingdoms defined by him were Monera, Protista, Fungi, Plantae, and Animalia based on the cell structure, mode of nutrition, mode of reproduction and phylogenetic relationships.

6.Extremophiles

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.**

7. Taxonomical Hierarchy

-In biological classification, the taxonomical hierarchy includes seven major categories namely kingdom, phylum, class, order, family, genus and species.

8. Monotypic Genus

-In some genus there is only one species which is called as **monotypic genus** (e.g. Red panda is the only species in the genus *Ailurus* : *Ailurus fulgens*)

9.Polytypic Genus

-If there are more than one species in the genus it is known as **polytypic genus,**

- for example 'cats' come under the Genus *Felis*, which has a number of closely related species, *Felis domestica* (domestic cat), *Felis margarita* (jungle cat). *Felis silvestris* (wild cat).

10Tautonymy:

-The practice of naming the animals in which the generic name and species name are the same, is called Tautonymy. e.g. *Naja naja* (The Indian Cobra).

11.The basic need for classifications are:

To identify and differentiate closely related species
To know the variation among the species
To understand the evolution of the species
To create a phylogenetic tree among the different groups
To conveniently study living organisms

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CHAPTER 2.ANIMAL KINGDOM

1. The symmetry exhibited in cnidarians is -a. Radial
2. Sea anemone belongs to phylum - **c. Coelenterata**
3. The excretory cells that are found in platyhelminthes are - **b. Flame cells**
4. In which of the following organisms, self fertilization is seen- **d. Liver fluke**
5. Nephridia of Earthworms are performing the same functions as - **b. Flame cells of Planaria**
6. Which of the following animals has a true coelom ? - **b. Pheretima**
7. Metameric segmentation is the main feature of -**a. Annelida**
8. In *Pheretima* locomotion occurs with help of –
c. circular, longitudinal muscles and setae
9. Which of the following have the highest number of species in nature?- **a. Insects**
10. Which of the following is a crustacean? -**a. Prawn**
11. The respiratory pigment in cockroach is –**Non of the above**
12. Exoskeleton of which phylum consists of chitinous cuticle? - **c. Arthropoda**
13. Lateral line sense organs occur in - **d. Fish**
14. The limbless amphibian is -**a. Icthyophis**
15. Four chambered heart is present in - **d. Crocodile**
16. Which of the following is not correctly paired? -**d. Whale -- Anmonctelic**
17. Which of the following is an egg laying mammal? - **c. Ornithorhynchus**
18. Pneumatic bones are seen in - **b. Aves**
19. 19.Match the **b**.
20. In which of the following phyla, the adult shows radial symmetry but the larva shows bilateral symmetry? - **b. Echinodermata**
21. Which of the following is correctly matched? -**a. Physalia – Portugese man of war**

22. Why are spongin and spicules important to a sponge?
➢ The sponges body is **supported** by a skeleton made up of calcareous and siliceous spicules or spongin or both.

23. What are the four characteristics common to most animals?
➢ The basic fundamental features such as levels of organisation, diploblastic and triploblastic organisation, patterns of symmetry, coelom, segmentation and notochord.

24. List the features that all vertebrates show at some point in their development.
➢ The chordates are characterized by the presence of notochord, solid ventral nerve cord and gill slits.

25. Compare closed and opened circulatory system

➢ **Open type**: in which the blood remains filled in tissue spaces due to the absence of blood capillaries. (arthropods, molluscs, echinoderms, and urochordates)

Closed type: in which the blood is circulated through blood vessels of varying diameters (arteries, veins, and capillaries) as in annelids, cephalochordates and vertebrates.

26. Compare Schizocoelom with enterocoelom

➢ **Schizocoelomates** – in these animals the body cavity is formed by splitting of mesoderm. (e.g., annelids, arthropods, molluscs).

➢ **Enterocoelomate animals** the body cavity is formed from the mesodermal pouches of archenteron. (e.g., Echinoderms, hemichordates and chordates)

27. Identify the structure that the archenteron becomes in a developing animal.

➢ Eumetazoans have a true coelom called enterocoel, formed from the archenteron.

28. Observe the animal below and answer the following questions

a. Identify the animal-**Adamsia (Sea anemone)**

b. What type of symmetry does this animal exhibit?-**Bilateral Symmetry**

c. Is this animal Cephalized? -**No**

d. How many germ layers does this animal have?-**2Layers(Diploblastic)**

e. How many openings does this animal's digestive system have?-**One open only**

f. Does this animal have neurons? --**Primitive Nervous Systems**

29. Choose the term that does not belong in the following group and explain why it does not belong?- radial symmetry (chordates are bilaterally symmetrical.)

30. Why flatworms are called acoelomates?

➢ Animals which do not possess a body cavity are called acoelomates.

➢ Since there is no body cavity in these animals their body is solid without a perivisceral cavity, this restricts the free movement of internal organs. (e.g., Flatworms)

31. What are flame cells?

➢ Flatworms have Specialized excretory cells called flame cells.

➢ It helps in osmoregulation and excretion.

32. Concept Mapping - Use the following terms to create a concept map that shows the major characteristic features of the phylum nematoda:
Round worms → pseudocoelomates → digestive tract → cuticle → parasite → sexual dimorphism

33. In which phyla is the larva trochopore found?

➢ Phylum Annelida Development is direct or indirect and includes a trochophore larva.

34. Which of the chordate characteristics do tunicates retain as adults?

➢ Dorsal tubular nerve cord is present only in the larval stage and a single dorsal ganglion is present in the adults.

35. **List the characteristic features that distinguish cartilaginous fishes with living jawless fishes**

➢ **Jawless fish:**All members of cyclostomata are primitive, poikilothermic, jawless aquatic vertebrates and are ectoparasites on some fishes.

➢ Mouth is circular without jaws and suctorial

➢ Examples: *Petromyzon* (Lamprey) and *Myxine* (Hag fish)

➢ **Cartilaginous fish:**They are marine fishes with cartilaginous endoskeleton. Notochord is persistent throughout life.

➢ Skin is tough covered by dermal **placoid scales'**

➢ Their jaws are very powerful.

➢ Examples: *Scoliodon* (Shark), *Trygon* (Sting ray), *Pristis* (Saw fish)

36. List three features that characterise bony fishes.

➢ Bony fishes includes both marine and freshwater living with bony endoskeleton and spindle shaped body.

➢ Skin is covered by ganoid, cycloid or ctenoid scales.

➢ Respiration is by four pairs of filamentous gills and is covered by an operculum on either side.

➢ Sexes are separate, external fertilization is seen and most forms are oviparous Examples: *Exocoetus* (Flying fish).

37. List the functions of air bladder in fishes.

➢ **Hydrostatic organ:**keeps equal weight of fish and volume of water.

➢ **Respiration:**Helps in exchange of Gases.

➢ **Sound production:**Helps to produce sound

➢ **Auditory function:**Helps to ear sounds

➢ **Sensory function:** Helps to obserbs pressure changes in water.

38. Write the characteristics that contributes to the success of reptiles on land.

➢ Reptiles are mostly terrestrial animals and their body is covered by dry, and cornified skin with epidermal scales or scutes.

➢ Reptiles have three chambered heart but four chambered in crocodiles.

➢ Most reptiles lay **cleidoic eggs** with extraembryonic membranes like amnion, allantois, chorion and yolk sac.

➢ Excretion by metanephric kidneys and are uricotelic. They are monoecious. Internal fertilization takes place and all are oviparous.

➢ Examples : *Chelone* (Turtle), *Testudo* (tortoise), *Hemidactylus* (House lizard),

39. List the unique features of bird's endoskeleton.

➢ The endoskeleton of bird is fully ossified (bony) and the long bones are hollow with air cavities (pneumatic bones).

➢ It helps to fly in air with low weight.

40. Could the number of eggs or young ones produced by an oviparous and viviparous female be equal? Why?

➢ The numbers of eggs produced by an oviparous mother will be more than the young ones produced by a viviparous mother because in oviparous animals, the development of youngones takes place outside the mother"s body.

➢ Their eggs are more prone to environmental conditions and predators.

➢ Therefore,to overcome the loss ,more eggs are produced by mothers so that even under harsh environmental conditions,some eggs might be able to survive and produce youngones.

➢ On the otherhand in viviparous organisms,the development of youngones takes place in safe conditions inside the body of the mother.

➢ They are less exposed to environmental conditions and predators.

Therefore,there are more chance of their survival and hence,less number of youngones is produced compared to the number of eggs.

EXTRA POINTS

Levels of organization:

1. Body symmetry
2. Nature of coelom(cavity)
3. Body plan
4. Pattern of development
5. Segmentation of the body
6. Presence/absence of notochord

1.Level of organization

• Cellular level - organ level

• Tissue level - organ system level (open and closed circulation)

• Complete/incomplete digestive system. (hydra)

2.Body symmetry

• A symmetry – Ex. Sponges

• Symmetrical → Bilatral symmetry(Annelids and Arthropods) and Radial symmetry Eg.Ctenophora, Coelenterate and Echinoderms)

3.Nature of Coelom(Body cavity)

• Coelomate – body cavity with ecto, endo and mesoderms - Ex. Annelids, Molluscs, Arthropods, Echinoderms, hemichordates and chordates.

• Pseudococlomate – no mesoderm, have only ectoderm and enderm layers - Ex. Aschelminthes (round worms)

• Acoclomate – no body cavity - Ex. Platyhelminthes (flat worms)

4.Body plan

• Cell aggregate plan

• Blind sac body plan

5.Embryonic germinal layers

• Diploblastic (Coelenterates) – only ectoderm and endoderm

• Triploblastic organization(Platyhelminthes to Chordates)- ectoderm, enderm and mesoderm

• **6.Segmentation**- Metameric segmentation – true segmentation(metamerism) – Ex. - Earthworm

7.Notochord

• It is a mesodermal origin – rod like structure – animals with notochord is chordates and without that are non-chordates.

CLASSIFICATION OF ANIMALS:

1.Phylum - Porifera - Ex. Sponges.

• Marine , asymmetrical, cellular level of organization
• Have water canal system
• Ostia → Spongocoel → Osculum
• Choanocytes/ collar cells line in the spongocoel
• Digestion is intracellular
• Skeleton made up of spicules/ sponging fibres
• Hermaphrodite –male and female organs present on the same body.
• Reproduce asexually by fragmentation
• sexually by gametes
• Fragmentation is internal and development is indirect

Eg. Sycon, spongilla.

2.Phylum Coelenterata (cnidaria) - Ex. Hydra

• Aquatic /marine
• Sessile(fixed) /free swimming
• Radially symmetrical
• Have cnidoblasts/ cnidocytes, stinging capsule on tentacles
• Used for defense, anchorage and to capture the prey
• Tissuelevel of organization diploblastic
• Mouth on hypostome.
• Digestion extracellular and intracellular
• Corals have skeleton made of calcium carbonate.
• Exhibit 2 basic forms called polyp and medusa.
• Polyp is sessile cylindrical (hydra)
• Medusa is umbrella shaped free living (jelly fish)
• They show alternation ofgeneration (metagenesis) wherepolyp forms medusa asexually and
• medusa forms polyp sexually. Ex. Obelia

Ex. - Hydra, Physalia, Sea anemone, Sea pen, Sea fan, Brain coral.

3.Phylum - Ctenophora (sea walnuts/comb jellies)

• Marine , radially symmetrical diploblastic
• Tissue level of organization
• Body bears 8 rows ciliated comb plates help in locomotion
• Digestion by intra and extra cellular
• Bioluminescence is well developed
• Sexes are not separate(monoecious)
• Reproduce by sexual reproduction
• Fertilizationis external and indirect development.

Ex. - Pleurobrachia and ctenoplana

4.Phylum – Platyhelminthes (flat worms)

• Dorso-ventrally flattened body
• Endoparasites,bilaterally symmetrical
• Organ level of organization
• Triploblastic - acoclomate
• Hooks and suckers are present
• Flame cells for excretions
• Sexes are not separate - fertilizationis internal and development is through many

larval stages
• Have high regeneration
capacity Ex.- Tape
worm,Planaria,Liver fluke

5.Phylum - Aschelminthes (round worms)
• Free living, aquatic, terrestrial parasitic
• Organ system level of body organization
• Bilaterally symmetrical andtriploblastic
• Pseudocoelomate
• Digestive system is complete (mouth and anus)
• Sexes are separate (dioecious)
• Fertilization is internal and development is direct.
Ex. Ascaris, Wuchereria (filarial worm) and Ancylostoma (hookworm)

6.Phylum – Annelida (annulus little ring)
• Aquatic/terrestrial
• Freeliving/ parasites
• Organ system level of body organization
• Bilaterally symmetrical
• Triploblastic
• Metamerically segmented – coelomate
• Metameres/body is segmented
• Marine Nereis possess parapodia
• Possess longitudinal and circular muscles help in locomotion
• Closed circulatory system
• Nephridiahelp in osmoregulation and excretion
• Dioecious(sexes are separate)
• Earthworm and leeches are monoecious
• Reproductionis sexual
Eg. Nereis, Pheretima (earth worm) and Hirudinaria (blood sucking leech)

7.Phylum – Arthropoda – (jointed legs)
• Largest phylum 2/3 are insects
• Organ system level of body organization
• Bilaterally symmetrical
• Segmented andcoelomate
• Chitinous exoskeleton.
• Body has head thorax and abdomen.
• Have jointed appendages(organs for locomotion)respiratory organs are gills/book gills/Book lungs / tracheal system
• Open circulatory system.
• Sense organs are antennae, eye, statocysts (balance organs)
• Fertilization isinternal.
• Excretion by malpighian tubules.
• Sexes are separate (Dioecious)
• Oviparous
• Development may be direct/ indirect
• Economic importance-
- Honey bees (*Apis*)
- Silkworm worm (*Bombyx*)
- Vectors. Mosquito, Housefly
- Aquatic –crab, prawn, lobster

7.Phylum - Mollusca: (soft bodied and shelled)
• Second largest phylum
• Terrestrial and aquatic
• Organ system level of body organization
• Bilaterally symmetrical
• Triploblasticand Coelomate
• Calcareous shell and unsegmented body with head muscular foot and visceral hump
• Soft spongy layer of skin forms a mantle over the visceral hump
• Gillsfor respiration and excretion
• Head has sensorytentacles
• Mouth has file like rasping organ for feeding radula
• Sexes are separate (Dioecious)
• Oviparous
• Indirect development
Eg. Oyster, snail, squid, devil fish
8.Phylum - Echinodermata: (spiny skinned)
• Spiny skin has exoskeleton which is calcarious ossicles
• Marine organ level of body organization
• Radially symmetrical
• Coelomate
• Triploblastic
• Mouth of the lower side and anus on the upper side.
• Have water vascular system, help in locomotion,to capture and transport of food andfor respiration
• Excretory system is absent
• Dioeciousand fertil zation is external,development is indirectwith free swimming larva Ex. Starfish, sea urchin, sea lily, sea cucumber
9.Phylum – Hermichordata
• Under non chordate
• Worm like marine animals
• Organ system level oforganization
• Bilaterially symmetrical , triploblstic
• Coclomate – body has anterior proboscis , a collar and a long trunk
• Circulatory system is open type
• Respiration is through gills
• Excretory organ is proboscis gland
• Sexes are separate
• Fertilization is external
• Development is indirect
Ex. Balanoglossus
10.Phylum – Chordata
• Presence of notochord dorsal hollowspinal cord –nerve cord and paired pharyngeal gill slits
• Bilaterally symmetricalandtriploblastic
• Coelomate organ system level of organization
• Have post and tail
• Closed circulatory system

Chordates	Non chordates
1. Notochord present	1. Notochord is absent
2. Central nervous system is dorsal	2. Central nervous system is ventral,solidand double

hollow and single
3. Gills are present 3. Gills are absent
4. Heart is ventral 4. Heart is dorsal
5. Tail is present 5. Tail is absent
Chordata -Urochordata,Cephalochordate and Vertebrata (protochordates)
Urochordata – notochord present in larval tail eg. Ascidia, salpa
Cephalochordate – notochord extends from head to tail eg. Amphioxus

1.Subphylum – Vertebrata:

• Possess notochord (replaced by vertebral column)
• All vertebrates are chordates but not all chordates are vertebrates(all vertebrates have vertebral column, but all chordates do not have vertebral chord).
• Ventral muscular heart
• Excretion by kidneys
• Fins / limbs for locomotion

a)Super class – Agnatha(without Jaw) Class – Cyclostomata

• Ectoparasites on some fishes.
• Elongated body with 6-15 pairsof gill slits
• Sucking circular mouthwithout jaw
• Body is devoid of scales – paired fins
• Cranium and vertebral column arecartilaginous
• Circulation is closed –mariebut migrate to fresh waterfor spawning
• After spawning they die
• Larvas, metamorphosis and return to the ocean
Ex. Lamprey,Hagfish

b)Super class - Gnathostomata(with jaw)

• Jaws are present
• Paired lateral Appendages There are six classes:

Class – Chondrichthyes:

• Cartilage fish, endoskeleton is cartilage
• Body is stream lined
• Pelvic fins in male with claspers
• 5-7 pairs of gills.
• No operculum
• Mouth in ventral with teeth.
• Jaws are powerful
• Air bladder is absent
• Heart is 2chambered (I auricle and one ventricle)
• Some possess electric /poison stings
• Poikilothermous(cold blooded)
• Body has placoid scales
• Unisexual
• Viviparous and fertilization is internal
Eg. Shark, sting rays.

Class – Osteichthyes - boney fish

• Endoskeletonis bone. Skin is covered by cycloid scales.
• Fourpairs of gill slits with operculum, mouth is terminal, air bladder is present

and help in buoyancy.
• Heart is two chambered (I auricle and I ventricle)
• Poikilotherms (cold blooded)
• Sexes are separate ,fertilization is externalandoviparous
Ex. Angel fish, Clown fish, Rohu, Katla,Tilapia, Hippocampus.

Class – Amphibia - dual life
• Live on land and move to water for breeding
• Body has head and trunk
• Tail is in larval stage – two paires of limbs
• Digits without claws.
• Poikilotherms – eyes are with nictitating membranes
• Skin is smooth and moistwith mucous glands
• Tympanum is ear drum
• Heart is three chambered (two auricle and one ventricle)
• Respiration by gills in larva and by lungs and skin in adults.
• Digestive system
• Urinary tract and reproductive tract open in to a common cloacal chambers and the
• Opening is called cloacal aperture.
• Sexes are separate
• Oviparous
• Fertilization is externaland development is indirect with tadpole larva
Ex. Toad, Frog

Class – Reptilia
• Skin is dry without glands.
• Covered by horny epidermal scales (scutes)
• Tympanum is small no external opening
• 12 pairs of cranial nerves
• Trunk bears two pairs of pentadactyl limbs with claws.
• Heart with three and half chambered (two auricle, one which is incompletely partitioned ventricle)
• OnlyCrocodiles have four chambered heart
• Respirationisby lungs.
• Fertilization is internal.
• Oviparous andeggiscovered by hard calcareoue shells
Ex. Snake, Tortoise, Turtle, Viper, Lizard

Class – Aves
• Streamlined body andcovered with feathers
• Jaws are modified in to beaks, teeth absent , various shapes and sizesofbeaks
• Digestive system has two structures – cropand gizzard(grinding the food)
• Forelimbs form wings.
• Hindlimbs modified for perching,swimming, running, etc.
• Voice box called syrinx is present
• Respirationisby lungs.
• Skin is dry with oil glands, at the base of tail.
• Bones are pneumatic bones (air cavities) helps to make the body light.
• Homeiothermous
• Heart is 4 chambered
• Oviparous and eggiswith calcareous shells.
• Fertilization is internal.
Ex. Pigeon, Crow, Sparrow, Ostrich.

Class- Mammalia

- Aquatic/aerial/terrestrial
- Body has head, neck, trunkand tail
- Have mammary glands in females
- External ear(pinna)is present
- Skin has sweat glands and sebaceous glands
- Heart is 4 chambered
- Respiration is by lungs.
- Body has hair
- Excretion is by kidneys (ureotelic – urea)
- Sexes are separate
- Viviparous(give birth young ones)
- Few are ovoviviiparous – egg laying mammals (Platypus)
- Few are marsupials – pouched mammalswith brood pouches (Kangaroo)
- Ex. *Canis macaca, Camelus,Dolphin*.

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Chapter 3. TISSUE LEVEL OF ORGANISATION

Evaluation

1. The main function of the cuboidal epithelium is - **d. Both (b) and (c)**
2. The ciliated epithelium lines the - **d. Trachea**
3. What type of fibres are found in connective tissue matrix?-**a. Collagen**
4. Prevention of substances from leaking across the tissue is provided by- **b. Adhering junction**
5. Non-shivering thermogenesis in neonates produces heat through -**b. Brown fat**
6. **Some epithelia are pseudostratified. What does this mean?**

-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 function is secretion and absorbtion.

7. **Differentiate white adipose tissue from brown adipose tissue.**

-Adipose tissues are also found in subcutaneous tissue, surrounding the kidneys, eyeball, heart, etc. Adipose tissue is called '**white fat**' or **white adipose tissue.**
-The adipose tissue which contains abundant mitochondria is called '**Brown fat**' or **Brown adipose tissue.**
-White fat stores nutrients whereas brown fat is used to heat the blood stream to warm the body. -Brown fat produces heat by **non-shivering thermogenesis** in neonates.

8. **Why blood is considered as a typical connective tissue?**

-**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.

9. **Differentiate between elastic fibres and elastic connective tissue.**

-Elastic fibre is found in the skin as the leathery dermis and forms fibrous capsules of organs such as kidneys, bones, cartilages, muscles, nerves and joints.
-**Elastic connective tissue** contains high proportion of elastic fibres. It allows recoil of tissues following stretching. It maintains the pulsatile flow of blood through the arteries and the passive recoil of lungs following inspiration.
-It is found in the walls of large arteries; ligaments associated with **vertebral**

column and within the walls of the **bronchial tubes.**

10. Name any four important functions of epithelial tissue and provide at least one example of a tissue that exemplifies each function.

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

1.Absorption Simple epithelium

2.Secretion Columnar epithelium,pseudo-stratified epithelium

3.Protection Pseudo-stratified epithelium

11. Write the classification of connective tissue and their functions

-Connective tissue develops from the **mesoderm** and is widely distributed in the body.

-There are four main classes of connective tissues. They are **connective tissue** (which includes fat and the fibrous tissue of ligaments), **cartilage, bones** and **blood.**

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

12. What is an epithelium? Enumerate the characteristic features of different epithelia.

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

-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.

-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 surface of the ovary. Its main functions are secretion and absorption.

-The **columnar epithelium** is composed of single layer of tall cells with round to oval nuclei at the base. It lines the digestive tract from the stomach to the rectum.

-ciliated type propels mucus by ciliary actions and it lines the small bronchioles, fallopian tubes and uterus.

-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.

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Extra Questions

-The study of tissues, or **histology.**

-Based on the mode of secretion exocrine glands are classified as **merocrine, holocrine** and **apocrine**.
-**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.
-The **'Fibres'** of connective tissue provide support.
-**Loose connective tissues** (Areolar, Adipose and Reticular)
- **Dense connective tissues** (dense regular, dense irregular and elastic).
-Adipocytes commonly called **adipose** or **fat cells** predominate and account for 90% of this tissue mass.
-The bone cells (osteocytes) are present in the spaces called **lacunae.**
-**Biopsy** is an examination of tissue or liquid removed from a living body to discover the presence, cause or extent of a disease.
-Autopsy is a post-mortem (dissection of a dead body) examination to discover the cause of death or the extent of disease.
-The field of **Forensic science** effectively uses the histological techniques to trace out crimes.
-Important connective tissue disorders: (Heritable types)
1. Ehler's -Danlos syndrome – Defect in the synthesis of collagen in the joints, heart valves, organ walls and arterial walls.
2. Stickler syndrome – Affects collagen and results in facial abnormalities.
3. Rhabdomyosarcoma – Life threatening soft tissue tumour of head, neck and urinogenital tract.
-Autoimmune connective tissue disorders
1. Rheumatoid arthritis: The immune cells attack and inflame the membranes around the joints. It can also affect heart, lungs and eyes.
2. Sjogren's syndrome: Progressive inability to secrete saliva and tears.
-Palmaris muscle:
This long narrow muscle runs from the elbow to the wrist and is important for hanging and climbing in primates, is missing in 11% of humans today.
-Diseases of Nervous System:
1. Parkinson's disease: A degenerative disorder of the nervous system that affects movement, often including tremors.
2. Alzheimer's disease: It is a chronic neurodegenerative disease which includes the symptoms of difficulty in remembering recent events, problems with language, disorientation and mood swings.
-Important epithelial tissue disorders: Eczema, Psoriasis, Epithelial carcinoma and severe asthma.

CHAPTER. 4 ;ORGAN AND ORGAN SYSTEM IN ANIMALS

Evaluation

1. The clitellum is a distinct part in the body of earthworm *Lampito mauritii*, it is found in?

   -b. Segments 14 - 17

2. Sexually, earthworms are - **b. Hermaphroditic but not self - fertilizing**

3. To sustain themselves, earthworms must guide their way through the soil using their powerful muscles. They gather nutrients by ingesting organic matter and soil, absorbing what they need into their bodies.True or False: The two ends of the earthworm can equally ingest soil.

   - **b. False**

4. The head region of Cockroach pairs of and shaped eyes occur.

   -**a. One pair, sessile compound and kidney shaped**

5. The location and numbers of malpighian tubules in *Periplaneta.*

   -a. At the junction of midgut and hindgut, about 150.

6. The type of vision in Cockroach is - **c. Mosaic**

7. How many abdominal segments are present in male and female Cockroaches?

   -a. 10, 10

8. Which of the following have an open circulatory system?**-d. Cockroach**

9. Buccopharyngeal respiration in frog-**d. stops when mouth is opened**.

10. Kidney of frog is-**b. Mesonephros**

11. Presence of gills in the tadpole of frog indicates that-**d. frogs evolved from gilled ancestor**

12. Choose the wrong statement among the following:

    -c. Muscular layer in the body wall of earthworm is made up of only circular muscles.

13. Which of the following are the sense organs of Cockroach?

    -a. Antennae, compound eyes, maxillary palps, anal cerci

14. **What characteristics are used to identify the earthworms?**

-Light brown in colour, with purplish tinge at the anterior end, number of compartments called **segments** or **metameres,**14 to 17 segments thickening **clitellum.**

15. **What are earthworm casts?**

-The undigested particles along with earth are passed out through the anus of

earthworm, as **worm castings** or **vermicasts**.

16. **How do earthworms breathe?**

-Respiration takes place in earthworm through the body wall.

-The outer surface of the skin is richly supplied with blood capillaries which aid in the diffusion of gases.

17. **Why do you call cockroach a pest?**

-Cockroach carry with them harmful germs of various bacterial diseases like cholera, diarrhoea, tuberculosis, and typhoid and hence are known as "**Vectors**"..

18. **Comment on the functions of alary muscles?**

-The triangular muscles that are responsible for blood circulation in the cockroach are called **alary muscles** (13 pairs).

19. **Name the visual units of the compound eyes of cockroach.**

-Cockroach consists of a pair of compound eyes at the dorsal surface of the head.

- Each eye is formed of about 2000 simple eyes called the **ommatidia** (singular: *ommatidium*).

20. **How does the male frog attracts the female for mating?**

-The male frog has a pair of **vocal sacs** and a copulatory or **nuptial pad** on the ventral side of the first digit of each forelimb .

- Vocal sacs assist in amplifying the croaking sound of frog.

21. **Write the types of respiration seen in frog.**

-Frog respires on land and in the water by two different methods.

-In water, **skin** acts as aquatic respiratory organ (**cutaneous respiration**).

-In land Respiration by lungs is called **pulmonary respiration &** In **buccal respiration** .

22. **Differentiate between peristomium and prostomium in earthworm.**

-The mouth is found in the centre of the first segment of the body, called the **peristomium**.

-Overhanging the mouth is a small flap called the upper lip or **prostomium**.

23. **Give the location of clitellum and spermathecal openings in *Lampito mauritii.***

-14 to 17 segment with a glandular thickening of the skin called the **clitellum**.

-Spermathecal openings are three pairs of small ventrolateral apertures lying intersegmentally between the grooves of the segments 6/7, 7/8 and 8/9.

24. **Differentiate between tergum and a sternum.**

-The abdomen in both male and female consists of 10 segments. Each segment is covered by the dorsal tergum.

-The ventral sternum and between them a narrow membranous pleuron on each side.

25. **Head of cockroach is called hypognathous. Why?**

-The head of cockroach is small, triangular lies at right angle to the longitudinal body **axis**. the mouth parts are directed downwards so it is **hypognathous.**

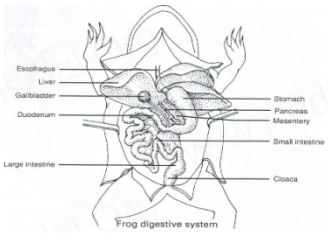
26. **How respiration takes place in cockroach?**

-The respiratory system of cockroach is well developed.
- Branched tubes known as **trachea** open through 10 pairs of small holes called **spiracles** or **stigmata,** present on the lateral side of the body.

27. **What are the components of blood in frog?**

-The **blood** consists of **plasma** [60%] and blood **cells** [40 %], red blood cells, white blood cells, and platelets.

28. Draw a neat labeled diagram of the digestives system of frog.-



29. **Explain the reproductive system of frog**

-**The male frog** has a pair of testes which are attached to the kidney and the dorsal body wall by folds of peritonium called mesorchium.
-Vasa efferentia arise from each **testis**. They enter the kidneys on both side and open into the bladder canal. Finally, it communicates with the urinogenital duct that comes out of kidneys and opens into the cloaca.
-**Female** reproductive system consists of paired **ovaries,** attached to the kidneys, and dorsal body wall by folds of peritoneum called mesovarium.
-There is a pair of coiled **oviducts** lying on the sides of the kidney. Each oviduct opens into the body-cavity at the anterior end by a funnel like opening called ostia.
-Unlike the male frog, the female frog has separate genital ducts distinct from ureters. Posteriorly the oviducts dilated to form **ovisacs** before they open into cloaca.
-Ovisacs store the eggs temporarily before they are sent out through the cloaca. Fertilization is external.

……

Extra points

- **Earthworm** last segment has the anus called the **pygidium.**
-**The common Indian earthworms** are 1.*Lampito mauritii (S*yn. *Megascolex mauritii),2. Perioynx excavatus* and 3.*Metaphire posthuma (*Syn. *Pheretima posthuma).*
-**Earthworm Classification**, Phylum : Annelida, Class : Oligochaeta, Order : Haplotaxida,Genus : *Lampito,* Species : *mauritii.*
-**S** – shaped Setae can be protruded or retracted and their principal role is in

locomotion.
-The coelom of earthworm contains the coelomic fluid and serves as a **hydrostatic skeleton,** in which the coelomocytes are known to play a major role in regeneration, immunity and wound healing.
-The coelom of earthworm consists of granulocyte or eleocyte ,amoebocytes mucocytes and leucocytes.
-In Earthworm the dorsal wall of the intestine is folded into the cavity as the **typhlosole**.
-In Eartworm ,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 13th segments.
-The **Photoreceptors** (sense of light) - dorsal surface of the body.
-**Gustatory** (sense of taste) and **olfactory receptors** (sense of smell) are found in the buccal cavity**.**
-Tactile receptors (sense of touch), **chemoreceptors** (detect chemical changes) and **thermoreceptors** (changes in temperature) are present in the prostomium and the body wall.

-Coackroach Classification:
Phylum : Arthropoda ,Class : Insecta ,Order : Orthoptera ,Genus : *Periplaneta,*Species : a*mericana.*
-Cockroach leg consists of five segments – **coxa** (large), **trochanter** (small), **fernur** (long and broad), **tibia** (long and thick) and **tarsus**.
-The last segment of the leg - tarsus has five movable joints or **podomeres** or **tarsomeres**.
-150 yellow coloured thin filamentous **malphigian** tubules which are helpful in removal of the excretory products from the haemolymph.

-Frog Classification
Phylum : Chordata, Class : Amphibia, Order : Anura, Genus : *Rana,* Species : *hexadactyla*
-**Truncus arteriosus** is a thick walled and cylindrical structure which is obliquely placed on the **ventral surface** of the heart.
-During **aestivation** and **hibernation** gaseous exchange takes place through skin.
-Economic importance of Frog
-Frog is an important animal in the **food chain**; it helps to maintain our ecosystem. So **'frogs should be protected'.**
-Frog are beneficial to man, since they feed on insects and helps in reducing insect pest population.
-Frogs are used in traditional medicine for controlling **blood pressure** and

for its **anti aging** properties.

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

……

CHAPTER ; 5 DIGESTION AND ABSORPTION

Evaluation

1. Choose the incorrect sentence from the following:

-d. Enterokinase stimulates the secretion of pancreatic juice.

2. What is chyme….?-

-c. The process of preparation of incompletely digested acidic food through gastric juice.

3. Which of the following hormones stimulate the production of pancreatic juice and bicarbonate?

-c. Cholecysokinin and secretin

4. The sphincter of Oddi guards -**a. Hepatopancreatic duct**

5. In small intestine, active absorption occurs in case of -**d. All the above**

6. Which one is incorrectly matched?-**b. Renin – liver**

7. Absorption of glycerol, fatty acids and monoglycerides takes place by

-a. Lymph vessels within villi

8. First step in digestion of fat is -**a. Emulsification**

9. Enterokinase takes part in the conversion of -**b. Trypsinogen into trypsin**

10. **a.Bilirubin & biliverdin-**
i)intestinal juice

11.**a. P-iv,Q-iii,R-i,S-ii.**

12.**b. P-ii,Q-iv,R-I,S-iii.**

13.**c. P-iv,Q-iii,R-ii,S-i.**

14.**a.Production of Insulin**

15. Assertion : (A) Large intestine also shows the presence of villi like small intestine.
Reason: (B) Absorption of water takes place in large intestine.

d. A is false but B is true

16. Which of the following is not true regarding intestinal villi?

- **d. They only participate in digestion of fats**.

17. **Why are villi present in the intestine and not in the stomach?**

-There is no villi in stomach because absorption and assimilation takes place only in Intestine.

18. **Bile juice contains no digestive enzymes, yet it is important for digestion. Why?**

- The liver secrete bile. Bile helps the small intestine by breaking downs fats and making them easier to absorb

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

1.Maltose…..Maltase….> Glucose+Glucose
2.Sucrose….Sucrase….>Glucose+Fractose
3.Lactose….Lactase….>Glucose+Galactose

20. **How do proteins diff er from fats in their energy value and their role in the body?**

- Fat has a caloric value of 9.45 Kcal and a physiological fuel value of 9 Kcal per gram.
- The caloric value and physiological fuel value of one gram of protein are 5.65 Kcal and 4 Kcal respectively.

21. **Digestive secretions are secreted only when needed. Discuss.**

-The smell, sight and taste as well as the mechanical stimulation of food in the mouth, triggers a reflex action which results in the secretion of saliva.
-The mechanical digestion starts in the mouth by grinding and chewing of food. It is called mastication.

-The saliva contain water, electrolytes (Na_+, K_+, Cl_-, HCO_3), salivary amylase (ptyalin)
-polysaccharides……ptyaline…> disaccharides.
Stomach;
-pepsinogen…..Hcl….> pepsin,
-protein….pepsin….> protease+peptones,
-casinogen….Renin….> casin
Intestine;
Pancreas
Trypsinogen….enterokinase….> Trypsin,
Chymotrypsinogen….trypsin….> chymotrypsin.
Starch….amylase….> maltose.
Glycerides….Lipase….>fatty acids+glycerols
Bile;
-Fat…..>chillomicron

22. **Label the given diagram.**

A.Right hepatic duct of liver
B.Common heapatic duct
C.Pancreatic duct (duct of wirsung)
D.Heapatopancreatic duct
E.Cystic duct.

Extra points

-Each tooth is embedded in a socket in the jaw bone; this type of attachment is called **thecodont**.
-I, C, PM and M can be represented by a dental formula, in human the dental formula is 2123/2123.
-Mineral salts like calcium and magnesium are deposited on the teeth and form a hard layer of **'tartar' or calculus** called plaque.
-The wall of the duodenum has Brunner's glands which secrete mucus and enzymes.
-Ileal mucosa also contain mucus secreting goblet cells and lymphoid tissue known as **Peyer's patches** which produce lymphocytes.
-The wall of the small intestine bears crypts between the base of villi called **crypts of Leiberkuhn.**
-The daily secretion of saliva from salivary glands ranges from 1000 to 1500mL.
- Targest parotids gland in the cheeks- **Stenson's duct,**
-The sub-maxillary/ sub-mandibular in the lower jaw- **Wharton's duct**,
-The sublingual beneath the tongue-**Bartholin's duct or duct of Rivinis.**
- In stomach Chief cells or **peptic cells or zymogen cells** in the gastric glands secrete gastric enzymes and **Goblet cells** secrete mucus.
-In human liver Each lobe has many hepatic lobules (functional unit of liver) and is covered by a thin connective tissue sheath called the **Glisson's capsule**.
- Th e opening of the hepato-pancreatic duct into the duodenum is guarded by a sphincter called the **sphincter of Oddi**

- The saliva contain water, electrolytes (Na^+, K^+, Cl^-, HCO_3), salivary amylase (ptyalin), antibacterial agent lysozyme and a lubricating agent mucus (a glycoprotein).
- Protein deficient diet during early stage of children may lead to protein energy malnutrition such as **Marasmus and Kwashiorkor**.
- Degree of obesity is assessed by body mass index (**BMI**). A normal BMI range for adult is 19-25; above 25 is considered as obese.
- Nobel Prize for the year 2005 was awarded to Robin Warren and Barry Marshall for the discovery of *Helicobacter pylori* which causes peptic ulcer……

Chapter 6 I ; Respiration

Evaluation

1. Breathing is controlled by -**b. medulla oblongata**
2. Intercostal muscles are found between the -**c. ribs**
3. The respiratory structures of insects are - **a. tracheal tubes**
4. Asthma is caused due to -**d. infection of lungs**
5. The Oxygen Dissociation Curve is -**a. sigmoid**
6. The Tidal Volume of a normal person is - -**c. 500 mL**
7. During inspiration, the diaphragm -**d. contracts and flattens**
8. CO_2 is transported through blood to lungs as -**c. carbamino haemoglobin**
9. When 1500 mL air is in the lungs, it is called -**c. residual volume**
10. Vital capacity is -**d. TV + TRV + ERV**
11. After a long deep breath, we do not respire for some seconds due to-**b. more O_2 in the blood**
12. Which of the following substances in tobacco smoke damage the gas exchange system? -**b. carbon monoxide and nicotine**
13. Column I represents diseases and column II represents their symptoms. Choose the correctly paired option

Column I	Column II
(P) Asthma	(i) Recurring of bronchitis
(Q) Emphysema	(ii) Accumulation of W.B.CS in alveolus
(R) Pneumonia	(iii) Allergy

a. P = iii, Q = ii, R = i

14. Which of the following best describes the process of gas exchange in the lungs?

-c. Oxygen and carbon dioxide diffuse down their concentration gradients between blood and alveolar air.

15. Make the correct pairs. **I) P – iii , Q – iv , – i , S – ii**

16.Make the correct pairs.

Columan–I	Column–II
(P) Tidal volume	i. 1000 to 1100 ml
(Q) Residual volume	ii. 500 ml
(R) Expiratory reserve volume	iii. 2500 to 3000 ml
(S) Inspiratory reserve volume	iv. 1100 to 1200 ml

(d) P – iii , Q – iv , R – i , S – ii

17.Name the respiratory organs of flatworm, earthworm, fish, prawn, cockroach and cat. -Flatworm -Body surface, Earthworm-Body surface,, Fish-gills, Prawn-gills, Cockroach-trachea, Cat-lungs.

18.Name the enzyme that catalyses the bicarbonate formation in RBCs.

-Carbonic anhydrase facilitates the formation of Bicarbonate in RBCs.

19.Air moving from the nose to the trachea passes through a number of structures. List in order of the structures.

-External nostrils- nasal cavity- pharynx- larynx- trachea- bronchi-bronchioles - alveoli.

20.Which structure seals the larynx when we swallow?

-During swallowing a thin elastic flap called epiglottis prevents the food from entering into the larynx and avoids choking of food.

21.Resistance in the airways is typically low. Why? Give two reasons.

-a.surface area of respiratory path is very large b.concentration of air is low.

22.How the body makes long–term adjustments when living in high altitude.

-When the person moves on a long–term basis to mountains from sea level is body begins to make respiratory and haematopoietic adjustments.

-To overcome this situation kidneys accelerate production of the hormone erythropoietin, which stimulates the bone marrow to produce more RBCs.

23.Diffusion of gases occurs in the alveolar region only and not in any other part of the respiratory system. Discuss.

-.The primary site for the exchange of gases is the alveoli.

-The uptake of O_2 and the release of CO_2 occur between the blood and tissues by

simple diffusion driven by partial pressure gradient of O_2 and CO_2.
-Partial pressure is the pressure contributed by an individual gas in a mixture of gases.
-It is represented as pO_2 for oxygen and pCO_2 for carbon–dioxide.
- Due to pressure gradients, O_2 from the alveoli enters into the blood and reaches the tissues.
-CO_2 enters into the blood from the tissues and reaches alveoli for elimination.
-The thin squamous epithelial cells of the alveoli are composed of Type I and Type II cells.
-Type I cells are very thin so that gases can diffuse rapidly through them.
-Type II cells are thicker, synthesize and secrete a substance called **Surfactant**.

24.Sketch a flow chart to show the path way of air flow during respiration.

Inspiration

Respiratory centre initiates the stimuli during inspiration.

↓

Impulses are carried to the inspiratory muscles through nerves.

↓

Diaphragm and inspiratory muscles contract. ↓

The thoracic volume increases as the chest wall expands. ↓

The intra pulmonary pressure is reduced.

↓

The alveolar pressure decreases than the atmospheric pressure

↓

Expiration

Respiratory centre terminates the stimuli during expiration.

↓

The diaphragm and inspiratory muscles relax. ↓

Chest wall contracts and the thoracic volume gets reduced.

↓

The intra pulmonary pressure is reduced.

↓

The alveolar pressure increases than the atmospheric pressure.

Air flows into the alveoli until the alveolar pressure equalizes the atmospheric pressure and the alveoli get inflated.

↓

Air is sent out due to the contraction of alveoli.

↓

Air flows out of the alveoli until the alveolar pressure equalizes the atmospheric pressure and the alveoli get deflated.

25.Why is pneumonia considered a dangerous disease?

-Pneumonia– Inflammation of the lungs due to infection caused by bacteria or virus is called pneumonia.

-The common symptoms are sputum production, nasal congestion, shortness of breath, sore throat, etc.

26 Explain the conditions which creates problems in oxygen transport.

-When a person travels quickly from sea level to elevations above 8000ft, where the atmospheric pressure and partial pressure of oxygen is lowered ,the individual responds with symptoms of acute mountain sickness (AMS)– a headache, shortness of breath, nausea and dizziness due to poor binding of O_2 with haemoglobin.

-When the person moves on a long–term basis to mountains from sea level is body begins to make respiratory and haematopoietic adjustments.

- To overcome this situation kidneys accelerate production of the hormone erythropoietin, which stimulates the bone marrow to produce more RBCs.

-When a person descends deep into the sea, the pressure in the surrounding water increases which causes the lungs to decrease in volume.

-This decrease in volume increases the partial pressure of the gases within the lungs.

-This effect can be beneficial, because it tends to drive additional oxygen into the circulation, but this benefit also has a risk, the increased pressure can also drive nitrogen gas into the circulation.

-This increase in blood nitrogen content can lead to a condition called **nitrogen narcosis. -**When the diver ascends to the surface too quickly a condition called 'bends' or decompression sickness occurs and nitrogen comes out of solution while still in the blood forming bubbles.

-Small bubbles in the blood are not harmful, but large bubbles can lodge in small capillaries, blocking re lowered, blood flow or can press on nerve endings.- Decompression sickness is associated with pain in joints and muscles and neurological problems including stroke.
-The risk of nitrogen narcosis and bends is common in scuba divers.
-During carbon–dioxide poisoning, the demand for oxygen increases. As the O_2 level in the blood decreases it leads to suffocation and the skin turns bluish black.

EXTRA QUESTIONS

- **Apnoea –** Temporary stopping of respiration.
- **Book gills –** Respiratory organs in aquatic Limulus.
- **Book lungs –** Respiratory organs of Scorpions and most spiders.
- **COLD –** Chronic Obstructive Lung Disease.
- **Dyspnoea –** painful respiration.
- **Epiglottis –** a thin elastic cartilaginous flap which covers the glottis and prevents the entry of food into the larynx.
- **Haemoglobin –** iron containing red pigment of RBCs of vertebrates, gives red colour to blood.
- **Herring-Breuer reflex –** a defensive mechanism against over dilation of lungs.
- **Hypoxia –** the failure of tissues for any reason to receive an adequate supply of oxygen.
- **Pneumothorax –** presence of air in the pleural cavity which causes collapsing of lungs.
- **Yawning –** prolonged inspiration due to increase in CO_2 concentration.

Chapter 7; Body Fluids and Circulation

Evaluation

1. What is the function of lymph? -c. Bring interstitial fluid in blood
2. Which one of the following plasma proteins is involved in the coagulation of blood? - - b. Fibrinogen
3. Which of the following WBCs are found in more numbers? - b. Neutrophil
4. Which of the following is not involved in blood clotting? - d. Bilirubin
5. Lymph is colourless because -c. Heamoglobin is absent
6. Blood group is due to the presence or absence of surface -c. Antigens of the surface of RBC
7. A person having both antigen A and antigen B on the surface of RBCs belongs to blood group - c. AB
8. Erythroblastosis foetalis is due to the destruction of -a. Foetal RBCs
9. Dub sound of heart is caused by - c. Closure of semi-lunar values
10. Why is the velocity of blood flow the lowest in the capillaries?

c. The total surface area of the capillaries is larger than the total surface area of the arterioles.

11. An unconscious patient is rushed into the emergency room and needs a fast blood transfusion. Because there is no time to check her medical history or determine her blood type, which type of blood should you as her doctor, give her? - d. O_2

12. Which of these functions could or could not be carried out by a red blood cell? Briefly justify your answer .- d. Active transport
13. At the venous end of the capillary bed, the osmotic pressure is - a. Greater than the hydrostatic pressure
14. A patient's chart reveals that he has a cardiac output of 7500mL per minute and a stroke volume of 50 mL. What is his pulse rate (in beats / min) - c. 150
15. At any given time there is more blood in the venous system than that of the arterial system. Which of the following features of the veins allows this? -b.presence of Volves

16.Distinguish between Arteries and Vein;

Arteries

-The blood vessels that carry blood away from the heart are called arteries.
-The arteries usually lie deep inside the body.

-The walls of the arteries are thick, non- collapsible to withstand high pressure.
-Valves are absent and have a narrow lumen.
-All arteries carry oxygenated blood, except the pulmonary artery.

Veins

-Veins have thinner walls and a larger lumen and hence can be easily stretched.

- They carry deoxygenated blood except, the pulmonary vein.

-The blood pressure is low and the lumen has a wide wall which is collapsible.

-Tunica media is thinner in veins than in arteries.

-Unidirectional flow of blood in veins is due to the presence of semilunar valves that prevents backflow of blood.

17. . Distinguish between open and closed circulation

-Open circulatory system

-Has haemolymph as the circulating fluid and is pumped by the heart, which flows through blood vessels into the sinuses.
-Sinuses are referred as haemocoel.
-Open circulatory system is seen in Arthropods and most Molluscs.

- Closed circulatory system

- blood is pumped by the heart and flows through blood vessels.
-Closed circulating system is seen in Annelids, Cephalopods and Vertebrates.

18. Distinguish between mitral valve and semi lunar valve

Bicuspid (two flaps or cusps)

-or **mitral valve** guards the opening between the left atrium and left ventricle.
-The valves of the heart allows the blood to flow only in one direction,
-i.e., from the atria to the ventricles and from the ventricles to the pulmonary artery or the aorta. -These valves prevent backward flow of blood.

Semilunar valve

-The opening of right and left ventricles into the pulmonary artery and aorta are guarded by aortic and pulmonary valves and are called **semilunar valves**.

-Each semilunar valve is made of three half-moon shaped cusps.

19. Right ventricular wall is thinner than the left ventricular wall. Why?

- In systemic circulation, the oxygenated blood entering the aorta from the left ventricle is carried by a network of arteries, arterioles and capillaries to the tissues..
-to this process aorta need much pressure that's the way left ventricular wall is thicker then right ventricular wall.

20. What might be the effect on a person whose diet has less iron content?

-**RBC** decreases in blood, Anemia, due to low iron content in RBC, decreasing oxygen carrying capacity .

21. Describe the mechanism by which the human heart beat is initiated and

controlled.

-The heart in human is myogenic (cardiomyocytes can produce spontaneous rhythmic depolarisation that initiates contractions).
-The sequence of electrical conduction of heart is
-SA node →AV node→ Bundle of His →Purkinje fibres
- The cardiac cells with fastest rhythm are called the Pacemaker cells, since they determine the contraction rate of the entire heart.
- These cells are located in the right sinuatrial (SA) node/ Pacemaker.
-On the left side of the right atrium is a node called auriculo ventricular node (AV node). -Two special cardiac muscle fibres originate from the auriculo ventricular node and are called the bundle of His which runs down into the interventricular septum and the fibres spread into the ventricles.
-These fibres are called the Purkinje fibres.
-Pacemaker cells produce excitation through depolarisation of their cell membrane.
-Early depolarisation is slow and takes place by sodium influx and reduction in potassium efflux.

22. What is lymph? Write its function.

-The fluid inside the lymphat cs is called **lymph.**
Functions:
-lymph transport food,co2 & o2 in body cells.
-It retain our body cell moisture.
-Cells found in the lymphatics are the lymphocytes.
-Lymphocytes collected in the lymphatic fluid are carried via the arterial blood and are recycled back to the lymph.
-Fats are absorbed through lymph in the lacteals present in the villi of the intestinal wall.

23. What are the heart sounds? When and how are these sounds produced

-During each cardiac cycle two sounds are produced that can be heard through a **stethoscope.**
Lub ;The first heart sound (lub) is associated with the closure of the tricuspid and bicuspid valves .
Dub; second heart sound (dub) is associated with the closure of the semilunar valves.

24. Select the correct biological term.

Lymphocytes, red cells, leucocytes, plasma, erythrocytes, white cells, haemoglobin, phagocyte, platelets, blood clot.

a. Disc shaped cells which are concave on both sides - **red cells**
b. Most of these have a large, bilobed nucleus - **white cells**
c. Enable red cells to transport blood - **haemoglobin**

d. The liquid part of the blood -**plasma**
e. Most of them move and change shape like an amoeba. –**white cells**
f. Consists of water and important dissolved substances. -**plasma**
g.Destroyed in the liver and spleen after circulating in the blood for four months-**red cells**
h. The substances which gives red cells their colour. -**haemoglobin**
i. Another name for red blood cells. -**Erythrocytes**
j. Blood that has been changed to a jelly. –**blood clot**
k. A word that means cell eater. -**Phagocytes**
l. Cells without nucleus. –**red cells**
m. White cells made in the lymphatic tissue. -**lymphocytes**
n. Blocks wound and prevent excessive bleeding. –**blood clot**
o. Fragment of cells which are made in the bone marrow. -**platelets**
p. Another name for white blood cells. -**leucocytes**
q. Slowly releases oxygen to blood cells. -**haemoglobin**
r. Their function is to help blood clot in wounds. –**platelets**.

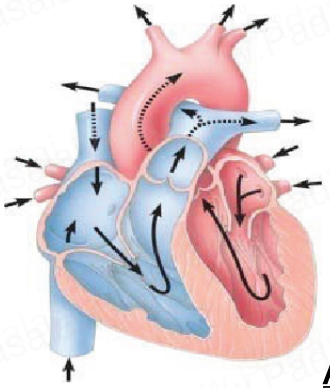
25. Select the correct biological term.

Cardiac muscle, atria, tricuspid systole, auricles, arteries, diastole, ventricles, bicuspid valve, pulmonary artery, cardiac cycle, semi lunar valve, veins, pulmonary vein, capillaries, vena cava, aorta.

a. The main artery of the blood.-**aorta**
b. Valves between the left atrium and ventricle.-**bicuspid valve**
c. Technical name for relaxation of the heart.-**diastole**
d. Another name for atria.-**auricles**
e. The main vein.-**vena cava**
f. Vessels which carry blood away from the heart.-**aorta**
g. Two names for the upper chambers of the heart.-**auricles**
h. Thick walled chambers of the heart.-**ventricle**
i. Carries blood from the heart to the lungs.-**pulmonary artery**
j. Takes about 0.8 sec to complete.-**cardiac cycle**
k. Valves situated at the point where blood flows out of the heart.-**semi lunar valve**
l. Vessels which carry blood towards the heart.-**veins**
m. Carries blood from the lungs to the heart.-**pulmonary veins**
n. The two lower chambers of the heart.-**left & right ventricles**
o. Prevent blood from re entering the ventricles after entering the aorta.-**semilunar valve**
p. Technical name for one heart beat.-**cardiac cycle**
q. Valves between right atrium and ventricles.-**tri cuspid valve**

r. Technical name for contraction of the heart.-**systole**
s. Very narrow blood vessels.-**blood capillaries**

26. Name and Label the given diagrams to show A, B, C, D, E, F, and G



A-AORTA, B-LEFT PULMONARY ARTERY, C.PULMONARY VEIN, D-SEMILUNAR VALVE, E-BICUSPID VALVE OR LEFT VENTRICLE, F-TRICUSPID VALVE, G-INFERIOR VENACAVA.

EXTRA QUESTIONS

- Three types of **plasma proteins** synthesized in the liver are albumin, globulin, prothrombin and fibrinogen.
- The ratio of red blood cells to blood plasma is expressed as **Haematocrit** (packed cell volume).
- In the sinusoids of the liver the Macrophages are called '**Kupffer cells'**
- The **blood vessels** in humans are composed of three layers, **tunica intima, tunica media** and **tunica externa**.
- **1.Albumin -** osmotic pressure of blood.
- 2.**Globulin -** immune function.
- 3.**Prothrombin** and **Fibrinogen-** involved in blood clotting.
- **What are anas¬tomoses?**

These are connections of one blood vessel (arter¬ies) with another blood vessel. They provide alternate route of blood flow if the original blood vessel is blocked.

- **Angina pectoris** (ischemic pain in the heart muscles) is experienced during early stages of coronary heart disease.
- **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.
- **Aneurysm** The weakened regions of the wall of the artery or veins bulges to form a balloon like sac.
- **Cardio pulmonary resuscitation (CPR)** – Serves as a life saving measure until appropriate therapy can restore the heart to normal function.
- **Papillary muscles** – small nipple shaped muscles protrude from the inner surface of the ventricular walls. Papilla means 'nipple'.

- **Stroke volume (SV)** – The amount of blood pumped out of each ventricle with each contraction, SV = EDV-ESV
- **Chordae tendinae** – tendon like cords which are connected to the tip of the cuspid valves
- **Lub sound** – is associated with the closure of the AV valves.
- **Dub sound** – is associated with the closure of the semilunar valves.
- The contraction of the heart is called **systole** and the relaxation of the heart is called **diastole**.
- **Plasma mainly consists** of water (80- 92%) in which the plasma proteins, inorganic constituents (0.9%), organic constituents (0.1%) and respiratory gases are dissolved.

- **Electrocardiogram (ECG)** records the electrical activity of the heart over a period of time using electrodes placed on the skin, arms, legs and chest.

- **Formed elements** Red blood cells/corpuscles (erythrocytes), white blood cells/corpuscles (Leucocytes) and platelets are collectively called formed elements.
- The fluid inside the lymphatics is called lymph. Fats are absorbed through lymph in the lacteals present in the villi of the intestinal wall.
- **Pulmonary circulation** – consists of closed loop of vessels carrying blood between the heart and lungs.
- **Systemic circulation** – is a circuit of vessels carrying blood between the heart and other parts of body systems..
- **Liver receives its blood suppiy from two sources:** the hepatic artery brings oxygenated blood from the heart, while the hepatic portal vein brings blood from the intestine and other abdominal organs. The blood is re¬turned from the liver to the heart by the hepatic veins.
- **Open circulatory system has** haemolymph as the circulating fluid and is pumped by the heart, which flows through blood vessels into the sinuses. Sinuses are referred as haemocoel. Open circulatory system is seen in Arthropods and most Molluscs.
- In **closed circulatory system** blood is pumped by the heart and flows through blood vessels. Closed circulating system is seen in Annelids, Cephalopods and Vertebrates.
- During subsequent pregnancies the Rh antibodies from the mother (Rh_2) 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**
- **Hypertension** is the most common circulatory disease. The normal blood pressure in man is 120/80 mmHg. In cases when the diastolic pressure exceeds 90 mm Hg and the systolic pressure exceeds 150 mm Hg

persistently, the condition is called hypertension.

- **Coronary heart disease** occurs when the arteries are lined by **atheroma**. The build-up of atheroma contains cholesterol, fibres, dead muscle and platelets and is termed Atherosclerosis. Thrombus in a coronary artery results in heart attack.
- **Angina pectoris** (ischemic pain in the heart muscles) is experienced during early stages of coronary heart disease. Atheroma may partially block the coronary artery and reduce the blood supply to the heart.
- **Myocardial infarction (Heart failure)**

The prime defect in heart failure is a decrease in cardiac muscle contractility.

- **Rheumatoid Heart Disease**

Rheumatic fever is an autoimmune disease which occurs 2-4 weeks after throat infection usually a streptococcal infection.

Composition of blood

- **Formed elements**

Red blood cells/corpuscles (erythrocytes), white blood cells/corpuscles (Leucocytes) and platelets are collectively called formed elements.

- **Red blood cells**

Red blood cells are abundant than the other blood cells. There are about 5 million to 5.5 millions of RBC mm_{23} of blood in a healthy man and 4.5-5.0 millions of RBC mm_{23} in healthy women.
Haemoglobin plays an important role in the transport of respiratory gases and facilitates the exchange of gases with the fluid outside the cell (tissue fluid).
The average life span of RBCs in a healthy individual is about 120 days after which they are destroyed in the spleen (graveyard / cemetery of RBCs) and the iron component returns to the bone marrow for reuse.

- **White blood cells** (leucocytes) are colourless, amoeboid, nucleated cells devoid of haemoglobin and other pigments. Approximately 6000 to 8000 per cubic mm of WBCs are seen in the blood of an average healthy individual.

Depending on the presence or absence of granules, WBCs are divided into two types, granulocytes and agranulocytes.
The granulocytes include neutrophils, eosinophils and basophils.
Neutrophils are also called heterophils or polymorphonuclear (cells with 3-4 lobes of nucleus connected with delicate threads) cells which constitute about 60%- 65% of the total WBCs. They are phagocytic in nature and appear in large numbers in and around the infected tissues.

Eosinophils have distinctly bilobed nucleus and the lobes are joined by thin strands. They are non-phagocytic and constitute about 2-3% of the total WBCs.

Eosinophils increase during certain types of parasitic infections and allergic reactions.

Basophils are less numerous than any other type of WBCs constituting 0.5%-1.0% of the total number of leucocytes. The cytoplasmic granules are large sized, but fewer than eosinophils. Nucleus is large sized and constricted into several lobes but not joined by delicate threads. Basophils secrete substances such as heparin, serotonin and histamines. They are also involved in inflammatory reactions.

Agranulocytes are characterised by the absence of granules in the cytoplasm

These are of two types, lymphocytes and monocytes. Lymphocytes constitute 28% of WBCs. These have large round nucleus and small amount of cytoplasm. The two types of lymphocytes are B and T cells. Both B and T cells are responsible for the immune responses of the body. B cells produce antibodies to neutralize the harmful effects of foreign substances and T cells are involved in cell mediated immunity.

Monocytes (Macrophages) are phagocytic cells that are similar to mast cells and have kidney shaped nucleus. They constitute 1-3% of the total WBCs. 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'.

- **Platelets** are also called thrombocytes that are produced from megakaryocytes (special cells in bone marrow) and lack nuclei. Blood normally contains 1, 50,000 -3, 50,000 platelets mm^{-3} of blood. They secrete substances involved in coagulation or clotting of blood. The reduction in platelet number can lead to clotting disorders that result in excessive loss of blood from the body.

❖ Strcture of Heart

Human heart is made of special type of muscle called the cardiac muscle.

- It is situated in the thoracic cavity and its apex portion is slightly tilted towards left. It weighs about 300g in an adult.

-The size of our heart is roughly equal to a closed fist.

Heart is divided into four chambers, upper two small auricles or atrium and lower two large ventricles.

-The walls of the ventricles are thicker than the auricles due to the presence of papillary muscles. The heart wall is made up of three layers, the outer epicardium, middle myocardium and inner endocardium.

-The space present between the membranes is called pericardial space and is filled with pericardial fluid.

-The two auricles are separated by inter auricular septum and the two ventricles are separated by inter ventricular septum The separation of chambers avoids

mixing of oxygenated and deoxygenated blood.
-The auricle communicates with the ventricle through an opening called auriculo ventricular aperture which is guarded by the auriculo ventricular valves.
-The opening between the right atrium and the right ventricle is guarded by the **tricuspid valve** (three flaps or cusps), whereas a **bicuspid** (two flaps or cusps) or **mitral valve** guards the opening between the left atrium and left ventricle.
- The valves of the heart allows the blood to flow only in one direction, i.e., from the atria to the ventricles and from the ventricles to the pulmonary artery or the aorta. These valves prevent backward flow of blood.
-The opening of right and left ventricles into the pulmonary artery and aorta are guarded by aortic and pulmonary valves and are called **semilunar valves**. Each semilunar valve is made of three half-moon shaped cusps.
-The myocardium of the ventricle is thrown into irregular muscular ridges called **trabeculae corneae**. The trabeculae corneae are modified into **chordae tendinae**.
-The opening and closing of the semilunar valves are achieved by the chordae tendinae. -The chordae tendinae are attached to the lower end of the heart by papillary muscles. -Heart receives deoxygenated blood from various parts of the body through the inferior venacava and superior venacava which open into the right auricle. Oxygenated blood from lungs is drained into the left auricle through four pulmonary veins.

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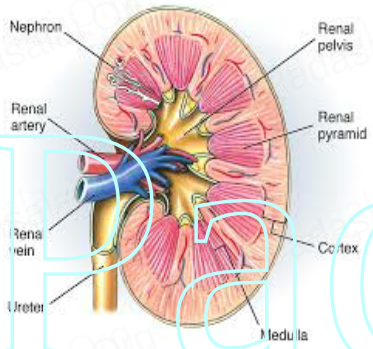
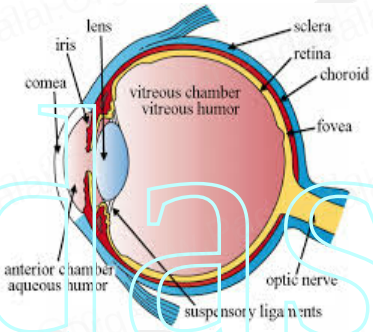
IN PEOPLE SERVICE

SANTHAVASAL M.MURUGAN, M.SC,MPHIL,B.ED.

PG TEACHER IN ZOOLOGY


Nephron
Renal pelvis
Renal artery
Renal pyramid
Cortex
Medulla


lens
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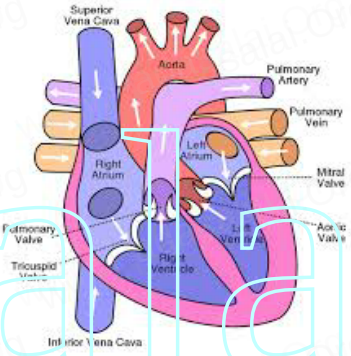
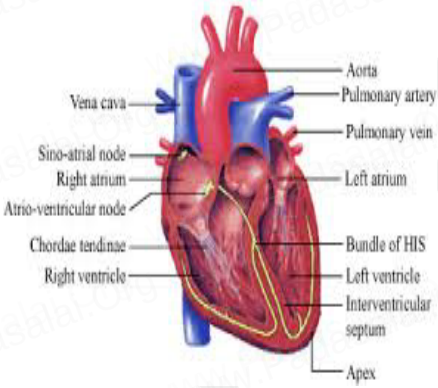
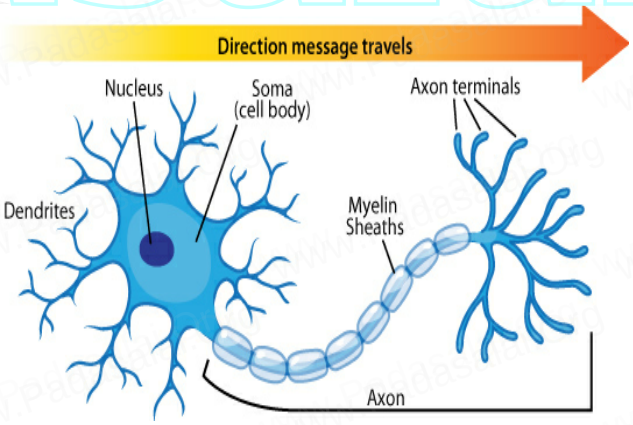
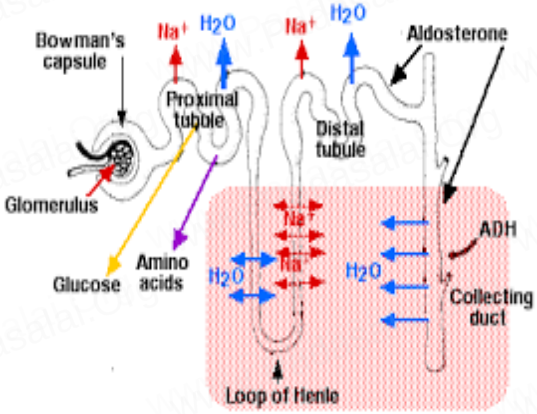
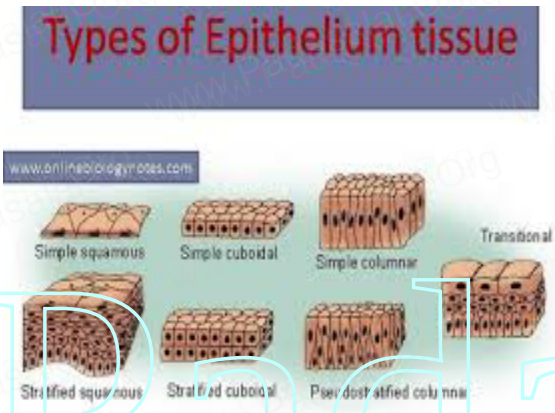
fovea
optic nerve
suspensory ligaments


Superior Vena Cava
Aorta
Pulmonary Artery
Pulmonary Vein
Right Atrium
Mitral Valve
Pulmonary Valve
Tricuspid Valve
Right Ventricle


Aorta
Vena cava
Pulmonary artery
Pulmonary vein
Sino-atrial node
Right atrium
Left atrium
Atrio-ventricular node
Chordae tendinae
Bundle of HIS
Right ventricle
Left ventricle
Interventricular septum
Apex


Direction message travels
Nucleus
Soma (cell body)
Axon terminals
Dendrites
Myelin Sheaths
Axon





DRAW AND LABEL THE ABOVE DIAGRAMS & GET 3 MARKS

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