### **1.THE LIVING WORLD**

#### **Evaluation**

- 1. A living organism is differentiated from non-living structure based on
- a. Reproduction b. Growth c. Metabolism <u>d. non of above</u>
- 2. A group of organisms having similar traits of a rank is
- a. Species b. Taxon c. Genus d. Family
- 3. Every unit of classification regardless of its rank is
- <u>a. Taxon</u> b. Variety c. Species d. Strain
- 4. Which of the following is not present in same rank?
- a. Primata b. Orthoptera c. Diptera d. Insecta
- 5. What taxonomic aid gives comprehensive information about a taxon?
- <u>a. Taxonomic Key</u>b. Herbarium c. Flora d. Monograph
- 6. Who coined the term biodiversity?
- a. Walter Rosen b. AG Tansley c. Aristotle d. AP de Candole
- 7. Cladogram considers the following characters
- a. Physiological and Biochemical b. Evolutionary and Phylogenetic
- c. Taxonimic and systematic d. None of the above
- 8. Molecular taxonomic tool consists of
- a. DNA and RNA b. Mitochondria and Endocplamicreticulum
- c. Cell wall and Membrane proteins d. All the above

#### 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.

#### <u>13. Why elephants and other wild animals are entering into human</u> <u>living area?</u>

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	
1.Animals are kept for public	1.Animals protected from possible	
exhibition	dangers	
2.Zoo is an Artificial Habitat	2.Natural Habitat of the animals	

#### <u>15. Can we use recent molecular tools to identify and classify</u> <u>organisms?</u>

-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 instended 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  $\rightarrow$  Automated Leafhopper Identification System.

 $17.DAISY \rightarrow Digital Automated Identification System.$ 

18.ABIS  $\rightarrow$  Automatic Bee Identification System.

19.SPIDA  $\rightarrow$  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.

**<u>3.Taxonomy</u>**-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 - <u>c. Coelenterata</u>

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 <u>b. Flame cells of</u> <u>Planaria</u>

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 –<u>Non of the above</u>
- 12. Exoskeleton of which phylum consists of chitinous cuticle? <u>c. Arthropoda</u>
- 13. Lateral line sense organs occur in d. Fish
- 14. The limbless amphibian is -<u>a. Icthyophis</u>
- 15. Four chambered heart is present in <u>d. Crocodile</u>
- 16. Which of the following is not correctly paired? -<u>d. Whale Ammonotelic</u>
- 17. Which of the following is an egg laying mammal? <u>c. Ornithorhynchus</u>
- 18. Pneumatic bones are seen in **b. Aves**
- 19.Match the

<u>b</u>.

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? -<u>**a. Physalia – Portugese man of**</u> <u>war</u>

#### 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.

#### **<u>24. List the features that all vertebrates show at some point in their</u></u> <u><b>development**</u>.

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) <u>Closed type</u>: 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.

<u>32. Concept Mapping -</u> Use the following terms to create a concept map that shows the major characteristic features of the phylum nematoda:

Round worms  $\rightarrow$  pseudocoelomates  $\rightarrow$  digestive tract  $\rightarrow$  cuticle  $\rightarrow$  parasite  $\rightarrow$  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.

#### <u>38. Write the characteristics that contributes to the success of reptiles on</u>

<u>land.</u>

- 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
  - <u>6.Segmentation</u>- 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
- $\bullet_{\mathcal{T}}$  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

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#### 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 and triploblastic
- 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 and coelomate
- 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 fertilization is external, development is indirect with free swimming
  - larva Ex. Starfish, sea urchin, sea lily, sea cucumber

#### 9.Phylum – Hermichordata

- Under non chordate
- Worm like marine animals
- Organ system level of organization
- 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

- 1. Notochord present 1. Notochord is absent
- 2. Central nervous system is dorsal
- 2. Central nervous system is ventral, solidand double

Non chordates

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

#### <u>Jaw) Class – Cyclostomata</u>

- 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
- V 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

#### <u>Class – Reptilia</u>

- 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 and eggiscovered 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 ovoviviliparous 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- <u>b.</u> <u>Adhering junction</u>
- 5. Non-shivering thermogenesis in neonates produces heat through -<u>b. Brown</u> <u>fat</u>

#### 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** <u>different epithelia.</u>

-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.

#### 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.

