



BIO-ZOOLOGY & ZOOLOGY

(SHORT VERSION AND LONG VERSION)

11th Standard

Based on the updated New Textbook

Salient Features

- Prepared as per the updated New Textbook.
- Exhaustive Additional MCQs (Questions, Match the following, Fill in the blanks, Choose the odd man out, Choose the incorrect/Correct pair, Assertion-Reason, Choose the correct or incorrect statement) are given in each chapter.
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- **Public Examination March 2020 Question Paper with Answers are given.**
- **Govt. Supplementary Exam (Short Version) Sept. - 2020, (Long Version) Oct. - 2020 Question Paper is given.**
- Govt. Supply. Exam September 2020 question paper is given with answers.



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Sura's Zoology 11th Standard Guide encompasses all the requirements of the students to comprehend the text and the evaluation of the textbook.

It will be a teaching companion to teachers and a learning companion to students.

As the guide has been framed based on the '**New 100 Marks Pattern**' and the public exam question paper is for short version 35 Marks & Long version 70 Marks, it provides a precise and clear understanding of text and exercises from the examination perspective.

- ▲ Chapter Snapshot, Concept Map, Must know Definitions are given in all chapters.
- ▲ Exhaustive Additional MCQs, VSA, SA, LA, HOTS questions with answers are given in each chapter.
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I sincerely believe this guide satisfies the needs of the students and bolsters the teaching methodologies of the teachers.

I pray the almighty to bless the students for consummate success in their examinations.

Subash Raj, B.E., M.S.

- Publisher

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All the Best

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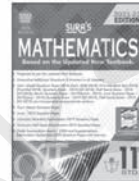
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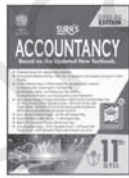
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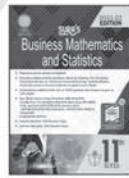
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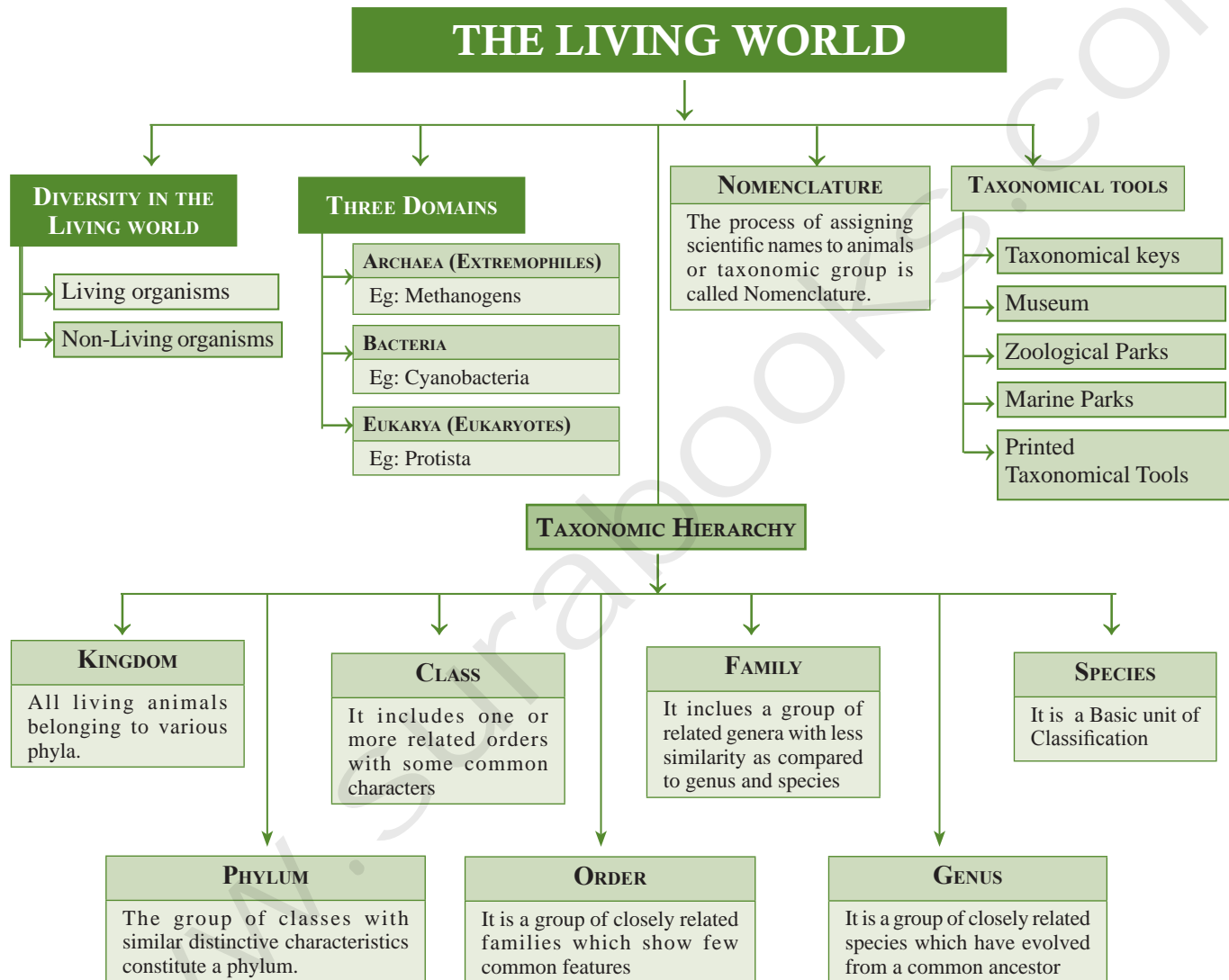
**Chapter
1**

UNIT - I

THE LIVING WORLD

CHAPTER SNAPSHOT

- 1.1 Diversity in the Living World
- 1.2 Need for Classification
- 1.3 Taxonomy and Systematics
- 1.4 Three Domains of Life
- 1.5 Taxonomic hierarchy
- 1.6 Nomenclature
- 1.7 Concept of Species
- 1.8 Tools for Study of Taxonomy



MUST KNOW DEFINITIONS

Bio-diversity	: The presence of a large number of species in a particular ecosystem is called ' Biological diversity ' or in short Bio-diversity.
Taxonomy	: It is the process of classifying living organisms into different taxa.
Systematics	: The branch of science which deals with different features of species, their diversities, and relationships with other species is referred to as Systematics .
Species	: Species is the basic unit of Classification .
Genus	: It is a group of closely related species which have evolved from a common ancestor.
Monotypic genus	: In some genus there is only one species which is called as Monotypic genus .
Polytypic genus	: If there are more than one species in the genus it is known as Polytypic genus .
Family	: It is a taxonomic category which includes a group of related genera with less similarity as compared to genus and species.
Order	: One or more similar families are grouped together to form an order.
Class	: This category includes one or more related orders with some common characters.
Phylum	: The group of classes with similar distinctive characteristics constitute a Phylum.
Kingdom	: All living animals belonging to various phyla are included in the Kingdom Animalia and it is the top most of the taxonomic hierarchy.
Nomenclature	: The process of assigning scientific names to animals or taxonomic group is called Nomenclature .
ICZN	: International Code of Zoological Nomenclature.
Tautonymy	: The practice of naming the animals in which the generic name and species name are the same is called Tautonymy . Eg: Naja naja (Indian Cobra).
Taxonomical keys	: Keys are based on comparative analysis of the similarities and dissimilarities of organisms.
DNA Barcoding	: Short genetic marker in an organism's DNA which helps in identification.
DNA hybridization	: Measures the degree of genetic similarity between pools of DNA sequences.
DNA finger printing	: To identify an individual from a sample of DNA by looking at unique patterns in their DNA.
RFLP	: 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.
Polymerase chain Reaction (PCR) Sequencing	: To amplify a specific gene, or portion of gene.
ALIS	: Automated Leafhopper Identification System.
DAISY	: Digital Automated Identification System.

ABIS	: Automatic Bee Identification System.
SPIDA	: Species Identified Automatically. Eg: Spiders, Wasp and Bee wing Characters.
Draw wing	: Honey bee wing identification.
INOTAXA	: IN tegrated O pen TAX onomic A ccess.

EVALUATION

1. A living organism is differentiated from non-living structure based on

- (a) Reproduction (b) Growth
(c) Metabolism (d) All the above

[Ans. (d) All the above]

2. A group of organisms having similar traits of a rank is

- (a) Species (b) Taxon
(c) Genus (d) Family

[Ans. (b) Taxon]

3. Every unit of classification regardless of its rank is

[June-2019]

- (a) Taxon (b) Variety
(c) Species (d) Strain

[Ans. (a) Taxon]

4. Which of the following is not present in same rank?

[March-2019]

- (a) Primata (b) Orthoptera
(c) Diptera (d) Insecta

[Ans. (d) Insecta]

5. What taxonomic aid gives comprehensive information about a taxon?

[March 2020]

- (a) Taxonomic Key (b) Herbarium
(c) Flora (d) Monograph

[Ans. (a) Taxonomic Key]

6. Who coined the term Bio-diversity?

- (a) Walter Rosen (b) AG Tansley
(c) Aristotle (d) AP de Candole

[Ans. (a) Walter Rosen]

7. Cladogram considers the following characters

- (a) Physiological and Biochemical
(b) Evolutionary and Phylogenetic
(c) Taxonomic and systematic
(d) None of the above

[Ans. (b) Evolutionary and Phylogenetic]

8. Molecular taxonomic tool consists of

- (a) DNA and RNA *[Govt.MQP-2018]*
(b) Mitochondria and Endoplasmic reticulum
(c) Cell wall and Membrane proteins
(d) All the above **[Ans. (a) DNA and RNA]**

9. Differentiate between probiotics and pathogenic bacteria.

[QY-2018]

Ans.	S.No.	Probiotic bacteria	Pathogenic bacteria
	1.	Beneficial bacteria.	Disease Causing bacteria.
	2.	Converts Milk into Curd	Causes Disease in plants & animals
	3	Eg: Vibrio cholerae (cholera)	Eg: Lactobacillus

10. Why mule is sterile in nature?

Ans. Mules are produced by mating of male donkey and female horse. Mules are sterile animals because they cannot produce gametes due to problems in pairing up of chromosomes. They have odd number of chromosomes.

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

Ans. Salient features of the family Felidae :

- They are commonly called as wild cat family. They have adaptations to detect and hunt prey.
- They are meat eaters (carnivores).
- They have cutting teeth to shear meat. Canine teeth are large and sharp.
- Their sizes vary from 2 kgs to 300 kgs.
- They have acute senses - hearing, smell, vision and touch.
- They have well padded toes with powerful and flexible bodies. Eg: **Lion, Tigers, Cats.**

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

- Ans. 1.** Charles Darwin visited the Galapagos Islands as a naturalist on a five year voyage around South America. He found 13 types of "Mocking birds" on the same island but in different habitats.
- 2.** He brought back the different types and studied them. He found that only the beak pattern and usage was different in these different varieties.
- 3.** This made him think that adaptation to suit a particular habitat (for food) had brought about such changes in these birds which lived in different habitats.
- 4.** After some time they evolved into different species. The formation of new species or 'speciation' is brought about by Natural selection (Nature being the deciding factor).
- 5.** Hence Darwin gets this credit of attempting to explain how species evolved and role of Natural selection. The birds are referred to as Darwin's finches. In 1859 Charles Darwin in his book **Origin of Species** 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?

- Ans. 1.** Man is destroying forests. Deforestation is increasing due to rapid urbanisation and increase in human population.
- 2.** When habitats are destroyed, the animals living there could not find food and shelter.
- 3.** They tend to wander outside of forest in search of food or shelter and enter into human living area.
- 4.** Decrease in availability of clean water due to pollution.
- 5.** The reality is that we have entered into the habitats of animals.

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

Ans. Zoo:

- 1.** A Zoo is a place where animals are held in captivity and Public is allowed to visit and see the animals. It is a artificially created habitat.
- 2.** A Zoo can sell, buy, breed or trade animals.

Wild life sanctuary:

- 1.** A wild life sanctuary is a large area with natural surrounding where the animals are allowed to roam freely.

- 2.** A boundary wall/barrier is in place to ensure that humans cannot enter the area. The animal gets the feel of a natural surrounding.
- 3.** In many cases sanctuaries focus on maintaining and increasing the population of a particular species. Eg: **Kaziranga sanctuary in Assam focuses on Rhinoceros population.**

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

Name the molecular taxonomical tool and their application. [QY-2018]

Ans. Yes, we can.

Molecular taxonomical tools :

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

I. The following methods are being used for taxonomical classification.

- a) DNA barcoding** - Uses short genetic marker in an organism's DNA to identify it as belonging to a particular species.
- b) DNA hybridization** - measures the degree of genetic similarity between pools of DNA sequences.
- c) DNA fingerprinting** - to identify an individual from a sample of DNA by looking at unique patterns in their DNA.
- d) 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.
- e) Polymerase Chain Reaction (PCR)** - sequencing to amplify a specific gene, or portion of gene.
- II.** Neo taxonomical tools – This is based on Electron Microscopy images to study the molecular structures of cell organelles.

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

- Ans. 1.** Knowledge of prefixes and suffixes in biology makes it easy to understand unfamiliar words. Biology involve lot of descriptive words and it is easy to adopt names from Greek and Latin. Many words used in Biology are derived from Greek or Latin.
- Eg: 'autos' is greek word which means self.

autophagy Biological terms having
autotroph 'auto' as prefix

Autophagy means self destruction.

Autotroph means manufacture of own food.

'bis' is a latin word which means twice.

Binary fission, Bicuspid valve are Biological terms based on this.

Meaning:

Binary fission - Divide in two

Bicuspid - Two flaps.

2. Usage of Greek and Latin words also finds universal application.

GOVERNMENT EXAM QUESTIONS

Bio-Zoology (Short version)

CHOOSE THE CORRECT ANSWERS 1 MARK

1. The seven kingdom system of classification was proposed by _____. [First Mid-2018]

(a) Coral Woese (b) R.H. Whittaker
(c) John ray (d) Cavalier Smith

[Ans. (b) R.H. Whittaker]

2. The mind map Cladogram was introduced by [QY-2018]

(a) Aristotle (b) R.H. Whittaker
(c) Earnest Hackel (d) Carlous L nnaeus

[Ans. (a) Aristotle]

3. The beneficial bacterias are known as [HY-2018]

(a) pathogens (b) probiotic
(c) cyanobacteria (d) plasmid

[Ans. (b) probiotic]

4. The cross between male lion and female tiger results in the production of [QY-2019]

(a) Hinny (b) Mule
(c) Tigon (d) Liger [Ans.(d) Liger]

5. Three domain classification was proposed by : [March-2019]

(a) Cavalier Smith (b) R.H. Whittaker
(c) Carolus Linnaeus (d) Carl Woese

[Ans. (d) Carl Woese]

6. The zoological name of National Bird is: [June-2019]

(a) *Pavo Cristatus* (b) *Zoothera Salimalii*
(c) *Columba livia* (d) *Chalcophaps indica*

[Ans. (a) *Pavo Cristatus*]

7. Match the following: [March 2020]

(1) Parathyroid hormone	(i) Addison's disease
(2) Glucocorticoid hormone	(ii) Endemic goitre
(3) Thyroxine hormone	(iii) Tetany
(4) Growth hormone	(iv) Acromegaly
(a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)	
(b) (1) - (iii), (2) - (iv), (3) - (ii), (4) - (i)	
(c) (1) - (iv), (2) - (i), (3) - (ii), (4) - (iii)	
(d) (1) - (i), (2) - (iii), (3) - (iv), (4) - (ii)	

[Ans. (a) (1) - (iii), (2) - (i), (3) - (ii), (4) - (iv)]

8. According to Aristotle, animal without red blood is called as : [Sep. 2020]

(a) Enaima (b) Anaima
(c) Erythima (d) Polycythemia

[Ans. (b) Anaima]

VERY SHORT ANSWERS 2 MARKS

1. Expand the abbreviations DAISY and ABIS. [Govt. MQP-2018]

Ans. DAISY → Digital Automated Identification System.
ABIS → Automatic Bee Identification System.

2. What are methanogens? [HY-2018]

Ans. The domain archaea includes single celled organisms, the prokaryotes which have the ability to grow extreme conditions like polar ice caps, volcano vents, etc., Some of them produced methane is called methanogens.

3. What is Trinomen classification? [QY-2019]

Ans. 1. This naming system was proposed by Huxley and stricklandt, Trinomen means, three names: generic name, species name and sub-species name.

2. When members of any species which have large variations then trinomial system is used.

4. What is the connection between taxonomy and publishing of book "Origin of Species"? [HY-2019]

Ans. Charles Darwin in his book "Origin of species" explains the evolutionary connection of species by the process of natural selection.

5. Why do we call Carolus Linnaeus as the 'Father of modern taxonomy'? [March 2020]

Ans. Carolus Linnaeus is the founder of modern systematics developed a scientific system of taxonomy and binomial nomenclature which is still in use. So Carolus Linnaeus is called the father of modern taxonomy.

SHORT ANSWERS

3 MARKS

1. Construct a Cladogram with the given examples. (Catfish, Frog, Crocodile, Crow, Rabbit and Monkey)

[Govt.MQP-2018]

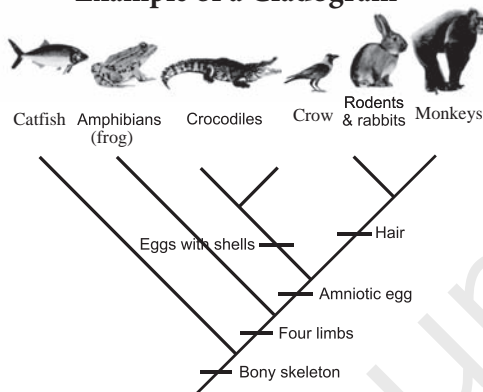
(OR)

What is cladogram? Draw a model cladogram.

[QY-2019]

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

Example of a Cladogram



LONG ANSWERS

5 MARKS

1. How do you distinguish shark fish from cat fish?

Ans. [Govt.MQP-2018]

No	Shark fish	Cat fish
1.	It is a cartilaginous fish and belongs to the class chondrichthyes	It is a bony fish and belongs to the class osteichthyes.
2.	The skeleton is made of cartilage	The skeleton is made of calcified bones.
3.	Upper Jaw of shark is not attached to the skull and moves independently.	Some bony fishes also have a second set of jaws (Pharyngeal Jaws)

No	Shark fish	Cat fish
4.	The gill slits of shark are visible and not protected	The gills are covered by a bony plate.
5.	Presence of third eyelid to protect the eye.	The eye has no protective coverings.

2. What are the rules of Nomenclature? [QY-2018]

Ans. Rules of Nomenclature :

1. The scientific name should be italicized in printed form and if handwritten, it should be underlined separately.
2. The generic name's (Genus) first alphabet should be in uppercase.
3. The specific name (species) should be in lowercase.
4. The scientific names of any two organisms are not similar.
5. The name or abbreviated name of the scientist who first publishes the scientific name may be written after the species name along with the year of publication.
6. **Eg:** Lion-Felis leo Linn., 1758 or Felis leo L., 1758.
7. If the species name is framed after any person's name the name of the species shall end with i, ii or are.
8. **Eg:** A new species of a ground-dwelling lizard (Cyrtodactylus) has been discovered and named after Scientist Varad Giri, Cyrtodactylus varadgiri.

3. Naja Naja is an example for a particular type of nomenclature. Identify and define the nomenclature type. [March 2020]

Ans. The practice of naming the animals in which the generic name and species name are the same, is called Tautonymy.
Eg: Naja naja (The Indian Cobra).

GOVERNMENT EXAM QUESTIONS

Zoology (Long version)

CHOOSE THE CORRECT ANSWERS 1 MARK

- 1.
- | | |
|---------------------|-----------------------------------|
| 1. Carl woese | (i) Father of modern taxonomy |
| 2. R. H. whittaker | (ii) Father of taxonomy |
| 3. Aristole | (iii) Three domain classification |
| 4. Carolus Linnaeus | (iv) Five kingdom classification. |

- | | | | | |
|---------|-----|----|-----|--|
| 1 | 2 | 3 | 4 | |
| (a) i | ii | iv | iii | |
| (b) iii | i | iv | ii | |
| (c) iii | iv | ii | i | |
| (d) ii | iii | iv | i | |

[Sep. 2020]

[Ans. (c) 1 - iii, 2 - iv, 3 - ii, 4 - i]

VERY SHORT ANSWERS 2 MARKS

1. Find out p, q, r, s from the given tabulation. [Sep. 2020]

Male organism	Female organism	Hybrid
Horse	Donkey	p
Donkey	Horse	q
r	Tiger	Liger
Tiger	Lion	s

Ans.

p: Hinny

q: Mule

r: Lion

s: Tigon

SHORT ANSWERS 3 MARKS

1. Describe the automated species identification tools. [Sep. 2020]

Ans. Automated species identification tools:

It consists of Cyber tools. For example: ALIS, DAISY, ABIS, SPIDA, Draw wing, etc.

ALIS → Automated Leafhopper Identification System.

DAISY → Digital Automated Identification System.

ABIS → Automatic Bee Identification System.
SPIDA → Species Identified Automatically (spiders, wasp and bee wing characters).

Draw wing → Honey bee wing identification.

ADDITIONAL

CHOOSE THE CORRECT ANSWERS 1 MARK

I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW QUESTIONS:

1. Who coined the word Taxonomy?

- | | |
|---------------|--------------|
| (a) Linnaeus | (b) Candolle |
| (c) Aristotle | (d) John Ray |

[Ans. (b) Candolle]

2. Who is the father of Taxonomy?

- | | |
|---------------|--------------|
| (a) Aristotle | (b) Linnaeus |
| (c) Bauhin | (d) John Ray |

[Ans. (a) Aristotle]

3. Who is known as father of botany?

- | | |
|------------------|--------------|
| (a) Aristotle | (b) Linnaeus |
| (c) Theophrastus | (d) John Ray |

[Ans. (c) Theophrastus]

4. Who introduced the concept of a Cladogram?

- | | |
|---------------|--------------|
| (a) Haeckel | (b) Woese |
| (c) Whittaker | (d) John Ray |

[Ans. (a) Haeckel]

5. Who introduced the seven kingdom system of classification?

- | | |
|--------------|--------------|
| (a) John Ray | (b) Smith |
| (c) Bauhin | (d) Linnaeus |

[Ans. (b) Smith]

II. CHOOSE THE CORRECT OPTIONS FOR THE BELOW FILL IN THE BLANKS:

1. _____ is the father of modern taxonomy and found of systematics.

- | | |
|--------------|---------------|
| (a) Linnaeus | (b) Aristotle |
| (c) John Ray | (d) Bauhin |

[Ans. (a) Linnaeus]

2. Book written by Darwin _____.

- | | |
|------------------------|-------------------------|
| (a) Historia Generalis | (b) Origin of species |
| (c) Systema Naturae | (d) Phylogeny of plants |

[Ans. (b) Origin of species]

3. _____ was developed by Natural History Museum, London.

- (a) SPIDA (b) ABIS
(c) DAISY (d) INOTAXA

[Ans. (d) INOTAXA]

4. _____ is called the bird man of India.

- (a) Dr. Subramaniam (b) Dr. Salim Ali
(c) Whittaker (d) Varad Giri

[Ans. (b) Dr. Salim Ali]

5. *Species plantarum* was written by _____

- (a) Linnaeus (b) Woese
(c) Theophrastus (d) Darwin

[Ans. (a) Woese]

6. _____ established species as the ultimate unit of taxonomy. (He coined the term species).

- (a) Aristotle (b) Linnaeus
(c) John Ray (d) Bauhin

[Ans. (c) John Ray]

7. Cladistics is based on _____.

- (a) Natural characters (b) Reproductive organs
(c) Molecular studies (d) Phylogeny

[Ans. (d) Molecular studies]

8. _____ was the first to classify animals.

- (a) Aristotle (b) Linnaeus
(c) Theophrastus (d) Haeckel

[Ans. (a) Aristotle]

9. Five kingdom system of classification was given by _____.

- (a) Woese (b) Whittaker
(c) Linnaeus (d) Cronquist

[Ans. (b) Whittaker]

10. Genus *Felis* refers to _____.

- (a) Dogs (b) Sparrow
(c) Cat (d) Monkeys

[Ans. (c) Cat]

11. "*Historia Generalis Plantarum*" was written by _____.

- (a) Linnaeus (b) Aristotle
(c) John Ray (d) Bauhin

[Ans. (c) John Ray]

III. IDENTIFY THE CORRECT STATEMENTS:

1. Identify the correct statements from the below

- (I) Binomial Nomenclature popularised by Carolus Linnaeus.

(II) Kingdom Animalia is the top most of taxonomic hierarchy.

(III) Genus is the basic unit of classification.

(IV) Curd is one of the best sources of probiotics.

(a) I, II and IV only (b) I and IV only

(c) II and IV only (d) I and III only

[Ans. (a) I, II and IV only]

2. Identify the correct statements from the below

(I) Species is the basic unit of classification.

(II) Only one species in the genus is called monotypic genus.

(III) More than one species in the genus is called polytypic genus.

(IV) Male tiger and female lion results in Liger.

(a) I, II and IV only (b) I and II only

(c) I and III only (d) I, II and III only

[Ans. (d) I, II and III only]

3. Identify the correct statements from the below "Domain Archaea"

(I) This domain includes single celled organism, prokaryotes.

(II) Prokaryotes have the ability to grow in extreme conditions, like volcano vents etc.,

(III) They are capable of synthesizing their food without sunlight.

(IV) Their wall contains peptidoglycans.

(a) I and III only (b) I, II and III only

(c) I and IV only (d) I and II only

[Ans. (b) I, II and III only]

4. Identify the correct statements from the below.

(a) Group of classes with similar distinctive characteristics.

(b) These classes share some common features like notochord.

(c) It is the top most of the taxonomic hierarchy.

(d) Also share common features like dorsal tubular nerve cord. [Ans. (c) It is the top most of the taxonomic hierarchy]

5. Identify the correct statements from the below

(I) Monera is the kingdom of Prokaryotes

(II) Protista is the kingdom of unicellular eukaryotes.

(III) Fungi is the kingdom of multicellular Eukaryotes.

(IV) Plantae is the autotrophic and animalia is the consumers of multicellular eukaryotic kingdoms.

(a) I, III and IV only (b) I, II and IV only

(c) I, II, III and IV (d) II, III and IV only

[Ans. (c) I, II, III and IV]

6. Identify the correct statements from the below

- (I) *Thermus aquaticus* is a bacterium which can tolerate high temperatures.
 - (II) The first DNA polymerase enzyme was isolated from *Thermus aquaticus*.
 - (III) *T. aquaticus* used in polymerase chain reaction (PCR) for DNA amplification.
 - (IV) Cyanobacteria are photosynthetic blue green algae.
- (a) I and IV only (b) II and III only
(c) I and II only (d) I, II, III and IV

[Ans. (d) I, II, III and IV]

IV. IDENTIFY THE WRONG STATEMENTS :

1. Identify the wrong statement from the below.

- (a) Binomial Nomenclature was proposed by Huxley and Stricklandt.
- (b) The scientific names of any two organisms are not similar.
- (c) Generic name's first alphabet should be in uppercase.
- (d) The scientific name ensures that each organism has only one name.

[Ans. (a) Binomial Nomenclature was proposed by Huxley and Stricklandt]

2. Identify the wrong statement from the below.

- (a) DNA barcoding is a short genetic marker in an organisms.
- (b) DNA hybridisation measures the degree of genetic similarity.
- (c) ABIS is Automatic Bird Identification system.
- (d) DNA fingerprinting to identify an individual from a sample of DNA.

[Ans. (c) ABIS is Automatic Bird Identification system]

3. Identify the wrong statement from the below.

- (a) The scientific name *Homo sapiens* denotes human.
- (b) Animals with blood is classified as *Enaima*.
- (c) Aristotle would have not classified Ostrich, emu and penguin as birds.
- (d) The species name should be in uppercase.

[Ans. (d) The species name should be in uppercase]

V. MATCH THE FOLLOWING :

- | | | | |
|-----------|---------------------|-------|------------------------|
| 1. | 1. Huxley | (i) | Origin of species |
| | 2. John Ray | (ii) | Trinomial Nomenclature |
| | 3. Carolus Linnaeus | (iii) | Species |
| | 4. Charles Drawin | (iv) | <i>Systema naturae</i> |
-
- | | | | | |
|-----|----|-----|-----|-----|
| | 1 | 2 | 3 | 4 |
| (a) | i | ii | iii | iv |
| (b) | ii | iii | iv | i |
| (c) | ii | iv | i | iii |
| (d) | i | iv | iii | ii |

[Ans. (b) 1 - ii, 2 - iii, 3 - iv, 4 - i]

- 2.**
- | | | |
|----------------------|-------|------------------|
| 1. Tautonymy | (i) | Cats |
| 2. Monotypic genus | (ii) | Tigon |
| 3. Polypic genus | (iii) | Red pande |
| 4. Sterile offspring | (iv) | The Indian cobra |
-
- | | | | | |
|-----|----|-----|-----|-----|
| | 1 | 2 | 3 | 4 |
| (a) | i | ii | iii | iv |
| (b) | iv | iii | i | ii |
| (c) | i | ii | iv | iii |
| (d) | ii | iii | iv | i |

[Ans. (b) 1 - iv, 2 - iii, 3 - i, 4 - ii]

- 3.**
- | | | |
|---------------------------------|-------|-------|
| 1. Male horse and female Donkey | (i) | Mule |
| 2. Male Donkey and female Horse | (ii) | Hinny |
| 3. Male Lion and female Tiger | (iii) | Tigon |
| 4. Male Tiger and female Lion | (iv) | Liger |
-
- | | | | | |
|-----|----|-----|-----|-----|
| | 1 | 2 | 3 | 4 |
| (a) | i | ii | iii | iv |
| (b) | ii | iii | i | iv |
| (c) | ii | i | iv | iii |
| (d) | i | iii | iv | ii |

[Ans. (c) 1 - ii, 2 - i, 3 - iv, 4 - iii]

- 4.**
- | | | |
|----------------------------|-------|------------------|
| 1. <i>Felis margarita</i> | (i) | The Indian Cobra |
| 2. <i>Felis silvestris</i> | (ii) | Red panda |
| 3. <i>Ailurus fulgens</i> | (iii) | Wild cat |
| 4. <i>Naja naja</i> | (iv) | Jungle cat |

- | | | | |
|---------|-----|----|----|
| 1 | 2 | 3 | 4 |
| (a) iv | iii | ii | i |
| (b) iii | ii | iv | i |
| (c) iv | iii | ii | i |
| (d) i | iii | iv | ii |

[Ans. (c) 1 - iv, 2 - iii, 3 - ii, 4 - i]

VI. IDENTIFY THE CORRECT ASSERTION AND REASON:

1. **Assertion (A) :** The Prokaryotes which have the ability to grow in extreme condition.

Reason (R) : Prokaryotes can grow in volcano vents, hot springs and polar ice caps, hence are called extremophiles.

They are capable of synthesizing their food without sunlight and oxygen by utilizing hydrogen sulphide and other chemicals from the volcanic vents.

- (a) Both (A) and (R) are wrong
(b) (A) is correct and (R) explains (A)
(c) (A) is wrong and (R) is correct
(d) (R) is wrong and (A) is correct

[Ans. (b) (A) is correct and (R) explains (A)]

2. **Assertion (A) :** Group of classes with similar distinctive characteristics constitute a phylum.

Reason (R) : These classes share some common features like presence of a notochord and a dorsal tubular nerve cord.

- (a) Both (A) and (R) are wrong
(b) (A) is correct and (R) is wrong
(c) (A) is correct and (R) explains (A)
(d) (A) is wrong and (R) is correct

[Ans. (c) (A) is correct and (R) explains (A)]

3. **Assertion (A) :** Cyanobacteria are photosynthetic blue green algae which produce oxygen.

Reason (R) : Cyanobacteria played a key role in the changes of atmospheric oxygen levels from anaerobic to aerobic during the geologic periods.

- (a) (A) is correct and (R) explains (A)
(b) Both (A) and (R) are wrong
(c) (A) is correct and (R) does not explain (A)
(d) (A) is wrong and (R) is correct

[Ans. (a) (A) is correct and (R) explains (A)]

VII. IDENTIFY THE CORRECT OPTIONS FOR THE PARTS OF THE DIAGRAM :

1. Identify the name of the sterile offsprings from the below diagram



- (a) Mule
(b) Liger
(c) Tigon
(d) Hinny

[Ans. (d) Hinny]

2. Identify the correct option from the below about "Red panda".



- (a) Monotypic genus
(b) Polytypic genus
(c) Sterile offspring
(d) Tautonymy

[Ans. (a) Monotypic genus]

3. Identify the correct option from the below diagram.



- (a) John Ray
(b) Carolus Linnaeus
(c) Dr. Subramaniam Bhupathy
(d) Walter Rosen

[Ans. (c) Dr. Subramaniam Bhupathy]

VIII. IDENTIFY THE CORRECT PAIR FROM THE BELOW:

1. (a) Monera - Eukaryotic
(b) Protista - Prokaryotic
(c) Fungi - Prokaryotic
(d) Plantae - Eukaryotic

[Ans. (d) Plantae - Eukaryotic]

2. (a) Animalia - Heterotrophic
(b) Plantae - Heterotrophic
(c) Biodiversity - Aristotle
(d) Taxonomy - Walter Rosen

[Ans. (a) Animalia - Heterotrophic]

IX. IDENTIFY THE INCORRECT PAIR FROM THE BELOW:

1. (a) Cytosol ribosomes - 80s type
(b) Chloroplast ribosomes - 70s type
(c) Curd - Probiotics
(d) Cyanobacteria - *Lactobacillus* sp
[Ans. (d) Cyanobacteria - *Lactobacillus* sp]
2. (a) Polar ice caps - Extremophiles
(b) Domain Bacteria - Peptidoglycans
(c) Domain Eukaryo - True nucleus
(d) 3 domains of life - Cavalier-smith
[Ans. (d) 3 domains of life - Cavalier-smith]

X. IDENTIFY THE ODD-MAN OUT FROM THE BELOW :

1. Identify the odd-man out from the below.
(a) Bacteria (b) Chromista
(c) Eukarya (d) Archaea
[Ans. (b) Chromista]
Reason: Chromista is in the "The Seven - Kingdom system". Others are included in the "The Six - Kingdom system".
2. Identify the odd-man out from the below.
(a) Mule (b) Liger
(c) Red Panda (d) Tigon
[Ans. (c) Red Panda]
Reason: Except Red Panda, all others are Sterile offsprings.

VERY SHORT ANSWERS 2 MARKS

1. What is Biodiversity?
Ans. 1. The presence of a large number of species in a particular ecosystem is called '**Biological diversity**' or in short '**Biodiversity**'.
2. The term Biodiversity was first introduced by Walter Rosen (1985), and defined by E.D. Wilson.
2. Define Taxonomy.
Ans. 1. 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.
2. The word taxonomy was coined by Augustin Pyramus de Candolle (1813).

3. How did Aristotle classify animals based on the presence or absence of red blood?

Ans. Based on the presence or absence of red blood he classified the animals into two categories.

1. *Enaima* - with blood
2. *Anaima* - without blood.

4. Mention the subdivisions of Five Kingdom classification.

- Ans. 1.** R.H. Whittaker (1969) proposed the Five Kingdom Classification.
2. 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.

5. How do Bacteria differ from Eukaryotes?

Ans.

No.	Bacteria	Eukaryotes
1.	No defined Nucleus, circular DNA seen.	Defined nucleus with nuclear membrane and linear chromosomes.
2.	70s Ribosomes are seen in the cell.	80s Ribosomes are seen in the cell.

6. Which is the basic unit of classification?

Ans. Species is the basic unit of classification in the taxonomic hierarchical system. It is a group of animals having similar morphological features (traits) and is reproductively isolated to produce fertile offspring.

7. What is Binomial Nomenclature?

- Ans. 1.** Biologists follow universally accepted principles to provide scientific names to known organisms.
2. Each name has two components, a generic name and a specific epithet. This system of naming the organism is called **Binomial Nomenclature** which was popularised by Carolus Linnaeus.

Eg: The National Bird (Indian Peafowl) – *Pavo cristatus*,
The National Animal (tiger) – *Panthera tigris*,
The Tamil Nadu State bird (common Indian dove) – *Chalcophaps indica*.

8. Name the classical taxonomical tools.

- Ans. 1.** Taxonomical keys
2. Museum
 3. Zoological park
 4. Printed Taxonomical tools
 5. Marine parks

9. Name some Molecular taxonomic tools used.

- Ans.** 1. DNA barcoding
2. DNA hybridization
3. DNA Finger printing
4. Polymerase chain Reaction (PCR)
5. Restriction Fragment Length Polymorphisms analysis (RELP).

10. Give examples of Cyber tools employed in taxonomic studies. (any two)

- Ans.** 1. ALIS - Automated Leaf hopper Identification System.
2. DAISY - Digital Automated Identification System.

11. What is INOTAXA?

- Ans.** 1. e-Taxonomic resources – INOTAXA is an electronic resource for digital images and description about the species which was developed by Natural History Museum, London.
2. INOTAXA means **IN**tegrated **O**pen **TAX**onomic **A**ccess.

12. Name the books written by Linnaeus.

- Ans.** **Species Plantarum** (1753) and **Systema Naturae** (1758).

SHORT ANSWERS

3 MARKS

1. What is the need for classification?

- Ans.** The basic need for classification is:
1. To identify and differentiate closely related species.
 2. To know the variation among the species.
 3. To understand the evolution of the species.
 4. To create a phylogenetic tree among the different groups
 5. To easily study living organisms

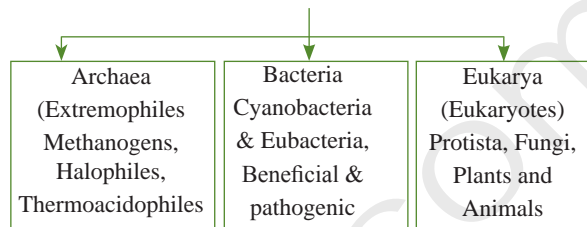
2. Are Cladograms and cladistics trees the same?

- Ans.** 1. Studies on the evolutionary and genetic relationships among organisms, led to the emerge of **phylogenetic classification** or **cladistics**.
2. It is an evolutionary classification which summarizes the genetic differences between all species in the 'phylogenetic tree'.
3. Ernst Haeckel introduced the method of representing evolutionary relationships with the help of a tree diagram known as **cladogram**.

3. Give a Schematic representation of Three domain classification.

Ans.

**Three Domains
(Carl Woese, 1977)**

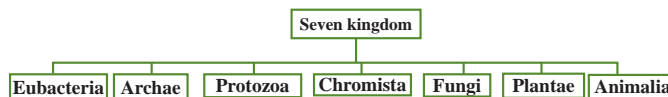


4. What are the salient features of Three domain classification.

- Ans.** 1. Carl Woese and his coworkers classified organisms based on the difference in 16s rRNA genes.
2. This system adds the taxon 'domain' higher than the kingdom.
3. Prokaryotes are separated into two domains - Bacteria and Archaea and all the Eukaryotes are placed in the domain Eukarya.
4. Archaea appears to have more in common with the Eukarya than the Bacteria.
5. Archaea differ from bacteria in cell wall composition and differs from bacteria and eukaryotes in membrane composition and rRNA types

5. Mention the Subdivisions of the seven kingdom classification.

- Ans.** 1. **Cavalier-Smith** revised the six kingdom system to Seven Kingdom system.
2. The concept of super kingdom was introduced and revised to seven kingdom classification.
3. The classification is divided into two Super Kingdoms (Prokaryota and Eukaryota) and seven kingdoms, two Prokaryotic Kingdoms (Eubacteria and Archaeobacteria) and five Eukaryotic Kingdoms (Protozoa, Chromista, Fungi, Plantae and Animalia).



6. How does monotypic genus differ from polytypic genus?

- Ans.** **Genus:** It is a group of closely related species which have evolved from a common ancestor. In some genus there is only one species which is called as monotypic genus Eg: Red Panda

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.

7. What is Phylogeny?

Ans. Phylogeny – Relationships among various biological species based upon similarities and differences in their physical or genetic characteristics.

8. What are Threatened species?

Ans. Threatened species – Species which are vulnerable to endangerment in the near future.

9. What is the purpose of phylogenetic tree?

Ans. A phylogenetic tree or evolutionary tree is a branching diagram or "tree" showing the inferred evolutionary relationships upon similarities and differences in their physical or genetic characteristics. It is applicable to biological species in cladistics.

10. Distinguish between Shared character and Derived character?

- Ans.**
1. In a cladogram a shared character is one that two lineages have in common
 2. Derived character is one that evolved in the lineage leading up to a clade.

11. What is Systematics?

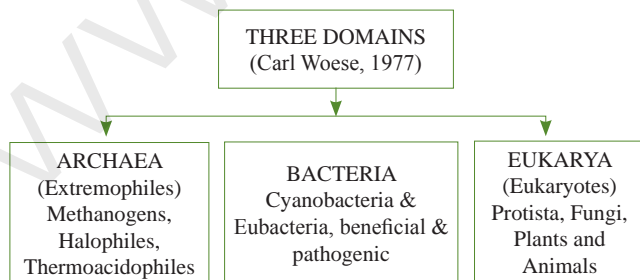
- Ans.**
1. The main criteria of systematics is identifying, describing, naming, arranging, preserving and documenting the organisms.
 2. Evolutionary history of the species and the environmental adaptations and interrelationship between species are also being investigated in systematics.

LONG ANSWERS

5 MARKS

1. What are the three Domain system of classification based on the difference in 16S rRNA?

Ans. Three domain classification was proposed by **Carl Woese** (1977) and his co-workers. They classified organisms based on the difference in 16S rRNA genes. The three domain system adds the taxon 'domain' higher than the kingdom.



Domain Archaea:

1. Single celled organisms, the prokaryotes which have the ability to grow in extreme conditions like volcano vents, hot springs and polar ice caps, hence are also called **extremophiles**.
2. Capable of synthesizing their food without sunlight and oxygen by utilizing hydrogen sulphide and other chemicals from the volcanic vents.
3. Some of them produced methane (methanogens).

Domain Bacteria:

1. Bacteria are prokaryotic, their cells have no definite nucleus and DNA exists as a circular chromosomes and do not have histones associated with it.
2. Do not possess membrane bound organelles except for ribosome (70S type). Their cell wall contains peptidoglycans.
3. Many are decomposers, some are photosynthesizers and few cause diseases. There are beneficial **probiotic** bacteria and harmful **pathogenic** bacteria.
4. Cyanobacteria are photosynthetic blue-green algae which produce oxygen. It played a key role in the changes of atmospheric oxygen levels from anaerobic to aerobic during the early geologic periods.

Domain Eukarya (Eukaryotes):

1. Eukaryotes are animals which have true nucleus and membrane bound organelles.
2. DNA in the nucleus is arranged as a linear chromosome with histone proteins, ribosomes of 80S type in the cytosol and 70S type in the chloroplast and mitochondria.
3. Animals in this domain are classified under kingdoms, namely, Protista, Fungi, Plantae and Animalia.

2. List the rules of Nomenclature as given by ICZN?

Ans. Rules of Nomenclature :

1. The scientific name should be italicized in printed form and if handwritten, it should be underlined separately.
2. The generic name's (Genus) first alphabet should be in uppercase.
3. The specific name (species) should be in lowercase.
4. The scientific names of any two organisms are not similar.
5. The name or abbreviated name of the scientist who first publishes the scientific name may be written after the species name along with the year of publication. Eg: Lion-Felis leo Linn., 1758 or Felis leo L., 1758.

6. If the species name is framed after any person's name the name of the species shall end with i, ii or ae.
7. Eg: A new species of a ground-dwelling lizard (*Cyrtodactylus*) has been discovered and named after Scientist Varad Giri, *Cyrtodactylus varadgiri*.

3. Write a note on the classical taxonomical tools.

Ans. The classical taxonomical tools :

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

HOTS

1. What are extremophiles?

Ans. Prokaryotes which have the ability to grow in extreme conditions like volcano vents, hot springs and polar ice caps are called extremophiles. They have adaptations such as :

1. Capacity to synthesize their food without sunlight and oxygen by utilizing hydrogen sulphide and other chemicals from the volcanic vents.
2. Some of them produce methane (Methanogens).
3. Some live in salty environments (Halophiles).
4. Some are thermoacidophiles which thrive in acidic environments and at high temperature.

2. What is the Significance of Bhupathy's purple frog?

Ans. 1. Purple pig nosed Frog was discovered in the Western Ghats.

2. It has shiny purple skin and spends its entire adult life underground.
3. It is called Bhupathy's purple frog by the scientists in memory of Subramaniam Bhupathy a respectable herpetologist who lost his life in the Western Ghats.

3. What is the Significance of *Thermus aquaticus*?

1. *Thermus aquaticus* is a bacterium which can tolerate high Temperatures.

2. The first DNA polymerase enzyme was isolated from *T. aquaticus*. It is used in PCR (Polymerase Chain Reaction) for DNA amplification.

4. How can we save endangered species?

Ans. Saving Endangered Species :

1. The greatest threat to survival is destruction of habitat. It is important to conserve the habitat or the special places where the species live.
2. The animals must have places to find food, shelter and care for their young ones.
3. Setting up Zoological parks and nature reserves will help to conserve the species.
4. Mutual agreement between countries can help to save forests and species in coastal waters.
5. Scientists are setting up gene banks to conserve animals of a species.
6. Several organisations are also working for the protection of endangered species.
7. Hot spots/areas with high biodiversity must be protected from human intervention to conserve the animal and plant species.

5. Why are sparrows listed as endangered species?

Ans. Reasons for reduction in Population of sparrows :

1. Absence of native plants which provide habitats (shelter, insects as food etc.)
2. Grocery stores being replaced with Super markets (gunny bags were pecked by sparrows for grains earlier.)
3. Cell phone radiation from Towers. Sparrow population is disappearing fast. Thus it is important to conserve sparrows which is becoming endangered because every animal is an important link in an ecosystem.

6. Reproduction cannot be considered as a character to define living organism. Do you agree with this statement.

Ans. There are many organisms like the Mules, worker bees etc. which are sterile but they show the characteristics of living organism. Hence, Reproduction cannot be considered as a character to define living organisms.

7. Name the kingdom in Five Kingdom Classification in which organisms lack a nuclear membrane.

Ans. Kingdom Monera includes bacteria which are prokaryotic organisms lacking a nuclear membrane.



**Chapter
3**

UNIT - II

TISSUE

LEVEL OF ORGANISATION

CHAPTER SNAPSHOT

3.1 Animal Tissue

3.2 Epithelial Tissue

- * Simple Epithelium
- * Compound Epithelium
- * Transitional Epithelium

3.3 Connective Tissue

- * Components of connective tissues
- * Loose connective tissues
- * Dense connective tissues
- * Specialised connective tissues

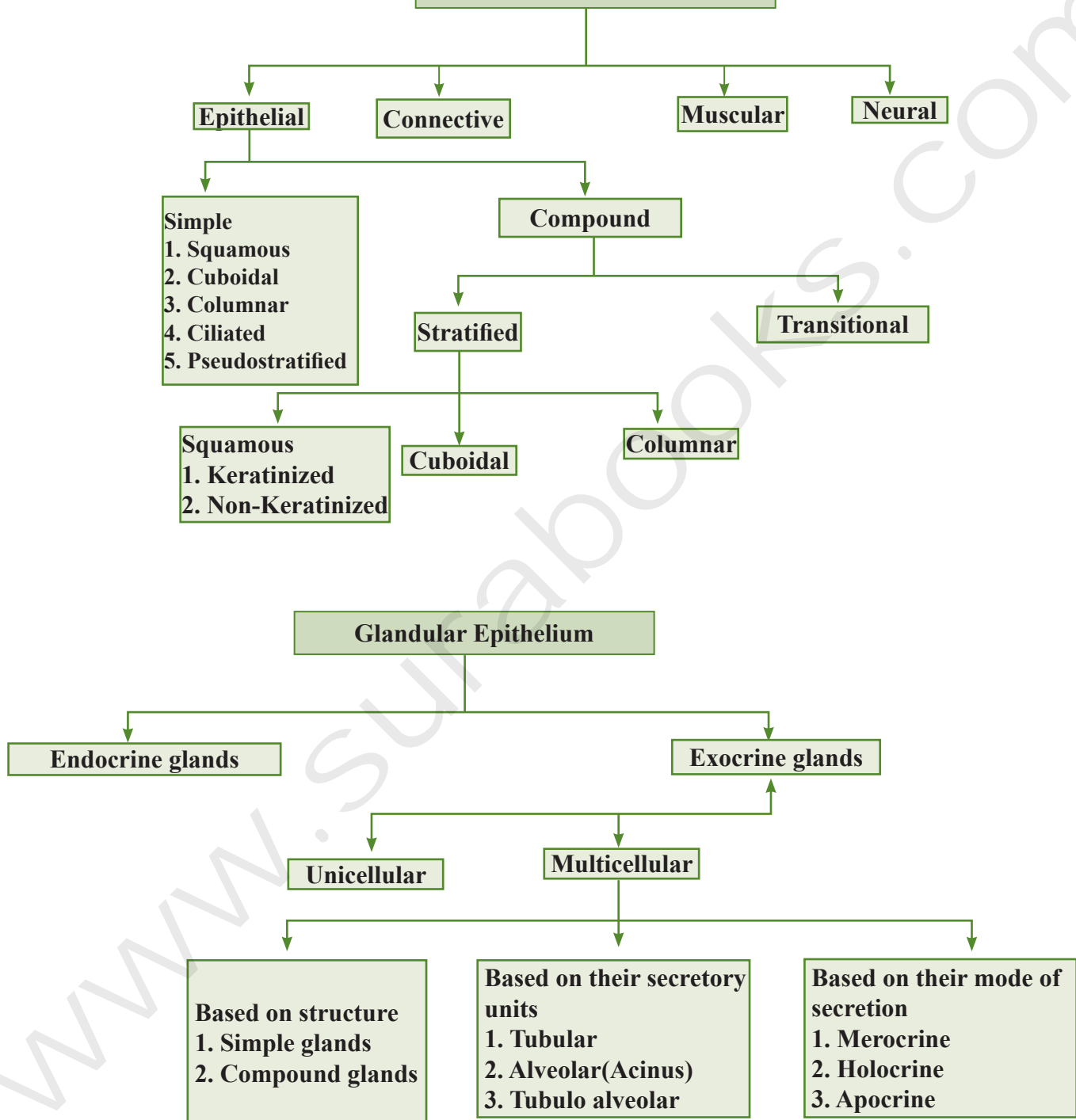
3.4 Muscle Tissue

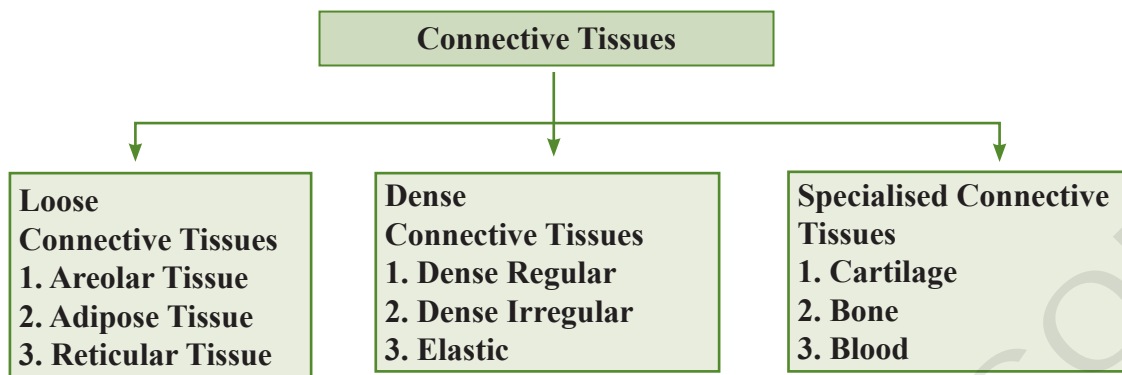
- * Skeletal muscle
- * Smooth muscle
- * Cardiac muscle

3.5 Neural Tissue

CONCEPT MAP

Classification of Animal Tissues





MUST KNOW DEFINITIONS

Tissue	: Group of cells that are similar in structure and perform common functions.
Epithelium	: Covering or lining tissue.
Simple Epithelium	: Single layer of cells.
Squamous Epithelium	: Single thin layer of flattened cells with irregular boundaries.
Cuboidal Epithelium	: Single layer of cube like cells.
Columnar Epithelium	: Single layer of tall cells.
Goblet cells	: Modified columnar epithelial cells which secrete mucus.
Ciliated Epithelium	: Columnar epithelial cells with cilia.
Pseudo-Stratified epithelium	: Columnar cells of unequal size and appears to be multilayered.
Glandular epithelium	: Cuboidal or Columnar epithelial cells specialised for secretion.
Compound epithelium	: Epithelium made of more than one layer and mainly provides protection.
Cell junctions	: Structural and functional link between individual cells.
Connective tissue	: Has three main components (fibres, ground substance and cells).
Specialised connective tissue	: This includes cartilage, bone and blood.
Muscular tissue	: Made of many long cylindrical fibres composed of fine myofibrils.
Cardiac muscle	: Contractile tissue present only in heart.

EVALUATION

1. The main function of the cuboidal epithelium is

- (a) Protection (b) Secretion
(c) Absorption (d) Both (b) and (c)

[Ans. (d) Both (b) and (c)]

2. The ciliated epithelium lines the

- (a) Skin (b) Digestive tract
(c) Gall bladder (d) Trachea

[Ans. (d) Trachea]

3. What type of fibres are found in connective tissue matrix?

- (a) Collagen (b) Areolar
(c) Cartilage (d) Tubular

[Ans. (a) Collagen]

4. Prevention of substances from leaking across the tissue is provided by

- (a) Tight junction (b) Adhering junction
(c) Gap junction (d) Elastic junction

[Ans. (b) Adhering junction]

5. Non-shivering thermogenesis in neonates produces heat through

- (a) White fat (b) Brown fat
(c) Yellow fat (d) Colourless fat

[Ans. (b) Brown fat]

6. Some epithelia are pseudostratified. What does this mean?

Ans. 1. Epithelium is said to be pseudo - stratified when the cells are columnar but unequal in size.

- 2.** Although the epithelium is single layered yet it appears to be multilayered because the nuclei lie at different levels in different cells.

7. Differentiate White adipose tissue from Brown adipose tissue.

[Sep. 2020]

Ans.

S.No	White adipose Tissue	Brown adipose Tissue
1.	The adipose tissue which is found in subcutaneous tissue surrounding the kidneys, eyeball, heart etc is called 'white fat' or white adipose tissue.	The adipose tissue which contains abundant mitochondria is called 'Brown fat' or Brown adipose tissue.
2.	It stores nutrients.	It is used to heat the blood stream to warm the body.

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

Ans. 1. Blood is a fluid connective tissue derived from the mesoderm.

- 2.** Further like connective tissues it has a matrix (Plasma) with cells such as RBC, WBC and Platelets.

- 3.** It circulates in the body and takes part in transport of substances and Respiratory gases.

- 4.** Hence it is considered as a connective tissue.

9. Differentiate between elastic fibres and elastic connective tissue.

Ans. 1. **Elastic connective** tissue is a type of Dense connective tissue and contains a high proportion of elastic fibres. It allows recoil of tissues following stretching. **Eg:** The wall of large arteries.

- 2.** **Elastic Fibres** are the fibrous component of all types of dense connective tissues. The stretching property of elastic connective tissue is because of the presence of elastic fibres. The proportion of elastic fibres is less in Dense regular and Dense irregular connective tissues when compared to elastic connective tissue.

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

[March 2020]

Ans. The functions of epithelial tissues are :

a) Protection :

The compound epithelium is multilayered and gives protection to the underlying tissues against chemical and mechanical stresses. Eg: Stratified squamous epithelium which forms the dry epidermis of the skin.

b) Absorption and Secretion:

The goblet cells found in the epithelial lining of the digestive tract in the stomach secrete the protective lubricating mucus. This epithelium helps in absorption and secretion.

c) Filtration:

The squamous epithelium found in the glomeruli in the kidneys form a diffusion boundary and aids filtration.

d) Sensory reception:

The ciliated epithelium occurs in the inner lining of trachea (Wind Pipe). By ciliary movement they help to trap microbes and dust particles.

11. Write the classification of connective tissue and their functions. [QY-2019 ; Sep. 2020]

Ans. Connective tissues are classified into

- I. Loose connective tissue
- II. Dense connective tissue
- III. Specialized connective tissue

Connective tissues

Loose Connective tissues	Dense Connective tissues	Specialised Connective tissues
1. Areolar Tissue	1. Dense Regular	1. Cartilage
2. Adipose Tissue	2. Dense irregular	2. Bone
3. Reticular Tissue	3. Elastic	3. Blood

I. Loose connective tissues:

The cells and fibres are loosely arranged in a semi fluid ground substance. They are classified as

1. Areolar connective tissue:

It lies beneath the skin

Functions :

Acts as a support for epithelium. Acts as reservoir of water and salts for the surrounding body tissues. Hence it is called tissue fluid.

2. Adipose Tissue :

Found below the skin. 90% of the tissue contains Adipocytes or fat cells.

Functions:

Richly vascularised and supplies energy to the body while fasting.

(i) **White fat :** (White adipose tissue) Found in subcutaneous tissue surrounding kidneys, eye ball etc.

Functions: Store nutrients.

(ii) **Brown fat :** (Brown adipose tissue) contains abundant mitochondria.

Functions: Used to heat the blood stream to warm the body.

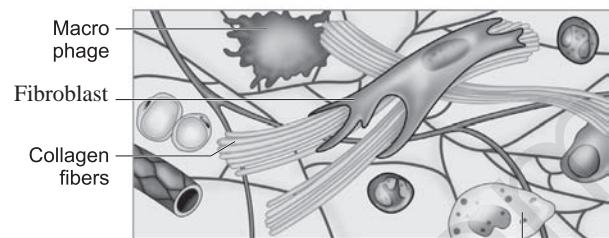
3. Reticular connective tissue :

Matrix is filled with fibroblasts called reticular cells.

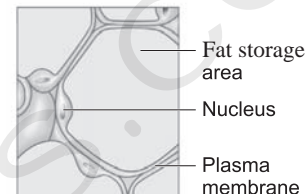
Functions:

Forms an internal framework that supports the blood cells in the lymph nodes, spleen and bone marrow.

Loose connective tissues:



Areolar tissue



Adipose tissue

II. Dense connective tissues :

Fibres and fibroblasts are compactly packed based on orientation of fibres it is divided into:

1. Dense regular connective tissues :

Primarily collagen fibres are arranged in rows between parallel bundles of tissues and few elastic fibres.

Fibroblast is the major cell type.

Functions:

Present in tendons that attach skeletal muscles to bones and ligaments.

Bones are attached to one another by ligaments. The tissue withstands tensile strength when pulling force is applied in one direction.

2. Dense irregular connective tissues :

Have bundles of thick collagen fibres and fibroblasts arranged irregularly. Fibroblast is the major cell type.

Functions:

The tissue can withstand tension exerted in many directions. Some elastic fibres are also present.

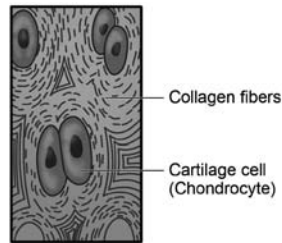
3. Elastic connective tissue:

It contains high proportion of elastic fibres and allows recoil of tissues following stretching. Eg: Walls of arteries.

III. Specialised connective tissues : Classified as cartilage, bones and blood.

1. Cartilage :

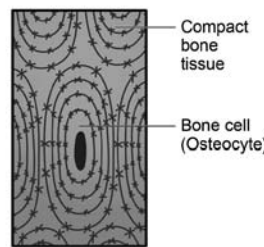
Intercellular material is solid and pliable and resists compression. Cells of this tissue (Chondrocytes) are enclosed in small cavities within the matrix secreted by them.



Eg: Cartilage in ear pinna, Tip of nose etc.

2. Bones :

Hard and non pliable ground substance rich in calcium salts and collagen fibres which gives strength. Bone cells or osteocytes are present in spaces called lacunae.



Functions:

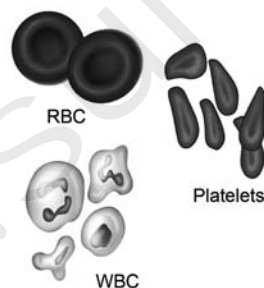
Bones support and protect softer tissues and organs. **Bone marrow** is site of production of blood cells.

3. Blood :

Fluid connective tissue containing plasma, RBC, WBC and platelets.

Functions:

Transport medium for the cardiovascular system carrying nutrients, wastes, respiratory gases throughout the body.

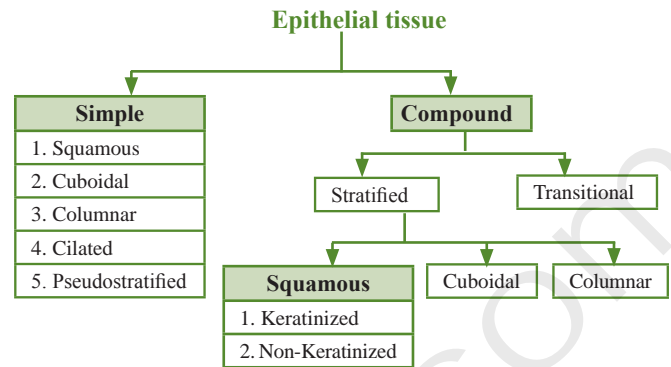


12. What is an epithelium? Enumerate the characteristic features of different epithelia. [March 2020]

Ans. Epithelial tissue is a sheet of cells that covers the body surface or lines the body cavity. It occurs in the body as a covering, as a lining epithelium and as glandular epithelium.

Functions: Protection, absorption, filtration, excretion, secretion and sensory reception.

Based on structural modification of the cells, epithelial tissues are classified as follows :

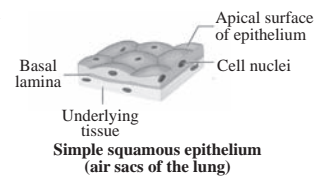


1. Simple Epithelium : Single layer of cells found in organs of absorption, secretion and filtration. They are classified into :

1. Squamous epithelium : Single thin layer of flattened cells with irregular boundaries.

Function:

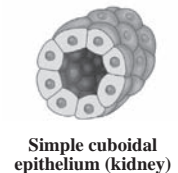
It forms a diffusion boundary and help in filtration.



2. Cuboidal epithelium : Single layer of cube like cells.

Function:

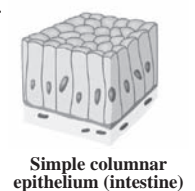
Main function is secretion and absorption.



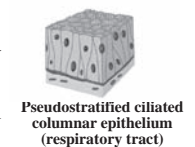
3. Columnar epithelium : Composed of single layer of tall cells with round to oval nuclei at base.

Function:

Functions are absorption, secretion of mucus etc.



4. Ciliated epithelium: Propels mucus by ciliary actions and occur in bronchi, uterus etc. Non-ciliated type is seen in gall bladder.



5. Pseudo-stratified epithelium : Columnar cells but unequal in size. Although epithelium is single layered, it appears to be multilayered because the nuclei lie at different levels in different cells.

Function:

Functions are protection, secretions, movement of secretions from glands etc.



6. Some of the cuboidal or columnar epithelial cells get specialised for secretion.
- i) Unicellular - Isolated glandular cells.
Eg: **Goblet cells of alimentary canal.**
- ii) Multicellular - Cluster of cells. Eg. **Salivary glands.**
7. The glands may be exocrine or endocrine in function. The secretions of exocrine glands are carried by tubes/ducts. The exocrine glands are further classified into different types. Eg: **Thyroid gland.**
8. The secretion of endocrine glands are poured into blood stream.

II. Compound epithelium: Multilayered tissue.

Function:

Main function is to provide protection against chemical and mechanical stresses. They occur in dry surface of the skin, moist surface of buccal cavity etc., Compound epithelium is divided into the three types.

1. **Stratified squamous epithelium :**
- a) **Keratinized type :** Eg: Dry epidermis of the skin.
- b) **Non keratinized type:** Eg: Moist lining of the oesophagus, mouth, conjunctiva of the eyes and vagina.
2. **Stratified cuboidal epithelium:** Eg: Ducts of sweat glands.
3. **Stratified columnar epithelium:**
Eg: Pharynx.
4. **Transitional epithelium:** Eg: Urinary bladder.

Function:

Allows stretching and protective.

GOVERNMENT EXAM QUESTIONS

Bio-Zoology (Short version)

CHOOSE THE CORRECT ANSWERS 1 MARK

1. **Select the wrongly matched pair** [Govt.MQP-2018]
- (a) Exocrine gland – Salivary gland
- (b) Endocrine gland – Hormones
- (c) Bones – Adipose tissue
- (d) Blood – Fluid connective tissue

[Ans. (c) **Bones – Adipose tissue**]

2. **Choose the correct pair** [QY-2019]

- A Compound epithelium – Respiratory tract
- B Ciliated epithelium – Kidney
- C Columnar epithelium – Digestive tract
- D Pseudo stratified epithelium – Heart

[Ans. (C) **Columnar epithelium - Digestive tract**]

3. **Which one of the following is not true to simple epithelial tissue?** [June-2019]

- (a) It is composed of a single layer of cells.
- (b) Squamous epithelium is a type of simple epithelium which has flattened cells.
- (c) Simple epithelium covers dry surface of the skin.
- (d) Pseudo-stratified is a type of simple epithelium which lines the epididymis.

[Ans. (c) **Simple epithelium covers dry surface of the skin.**]

VERY SHORT ANSWERS

2 MARKS

1. **Mention any two functions of elastic connective tissue.** [QY-2018]

Ans. It maintains the pulsatile flow of blood through the arteries and the passive recoil of lungs following inspiration.

2. **What is Brown Fat? Write its functions.**

[Fist Mid-2018, June-2019]

Ans. 1. The adipose tissue which contains abundant mitochondria is called 'Brown fat' or Brown adipose tissue.

2. White fat stores nutrients whereas brown fat is used to heat the blood stream to warm the body.

3. Brown fat produces heat by non-shivering thermogenesis in neonates.

3. **Write the significance of the followings. i. Microvilli ii. Goblet cells.** [Govt.MQP-2018]

Ans. (i) Significance of Microvilli :

✦ Absorbs the digested food

(ii) Significance of Goblet cells :

✦ Goblet cells secrete the protective lubricating mucus.

✦ Function of the goblet cells include absorption, secretion of mucus, enzymes and other substances.

Chapter
5

DIGESTION AND ABSORPTION

CHAPTER SNAPSHOT

5.1 Digestive System

5.1.1 Structure of the Alimentary Canal

5.1.2 Histology of the gut

5.1.3 Digestive Glands

- * Salivary Glands
- * Gastric Glands
- * Liver
- * Pancreas

5.2 Digestion of food and role of digestive enzymes

- * Digestion in the buccal cavity
- * Digestion in the stomach
- * Digestion in the small intestine

5.3 Absorption and assimilation of Proteins, Carbohydrates and Fats.

5.4 Egestion

5.5 Caloric value of Carbohydrates, Proteins and Fats.

* Carbohydrates

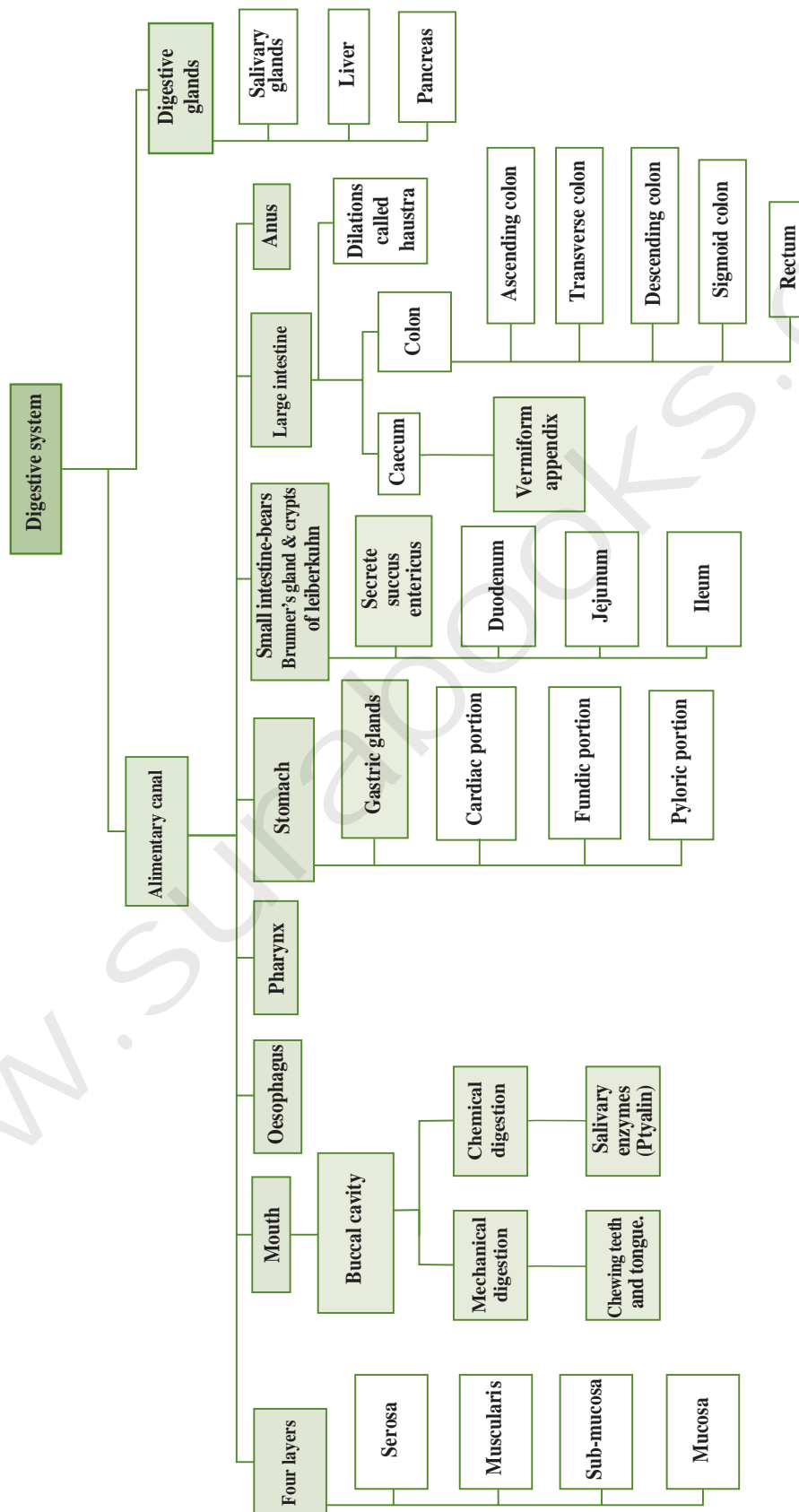
* Lipids

* Proteins

5.6 Nutritional and Digestive disorders

- * Protein energy malnutrition
- * Indigestion
- * Constipation
- * Vomiting
- * Jaundice
- * Liver Cirrhosis
- * Gall Stones
- * Appendicitis
- * Hiatus Hernia
- * Diarrhoea
- * Peptic Ulcer
- * Obesity

CONCEPT MAP



MUST KNOW DEFINITIONS

Physiology	: Study of functioning of organs and organ systems.
Gastric rugae	: The inner wall of stomach has many folds called Gastric rugae .
Digestive glands	: Digestive glands are exocrine glands which secrete biological catalysts called enzymes .
Gastric glands	: The wall of the stomach is lined by gastric glands.
Balanced diet	: A diet which can provide all the metabolic requirements of the body in a right proportion is called balanced diet .
PEM	: Protein Energy Malnutrition
Appendicitis	: It is the inflammation of the vermiform appendix.
Peptic ulcer	: It refers to an eroded area of the tissue lining (mucosa) in the stomach or duodenum.
GERD	: Gastro Oesophagus Reflex Disorder
Peyer's patches	: Lymphoid tissue present in ileum.
Piles/Haemorrhoids	: Enlargement of anal column.
Thecodont dentition	: Each tooth is embedded in a socket.
Diphyodont	: Two sets of teeth seen in human beings and mammals during their life time.
Heterodont dentition	: The permanent teeth are of four different types.
Epiglottis	: Cartilaginous flap which prevent entry of food into glottis.
Oxyntic cells	: Cells in stomach wall which produce HCl.
Deglutition	: The act of swallowing.
Chyme	: Food mixed with gastric juices forming a creamy liquid called chyme.
Succus entericus	: Intestinal juice which contains enzymes for digestion.
Absorption	: Process by which end product of digestion passes into blood and lymph.
Egestion	: Removal of digestive waste from the body.

EVALUATION

1. Choose the incorrect sentence from the following:

- (a) Bile juice emulsifies the fat.
 - (b) Chyme is a digestive acidic food in stomach.
 - (c) Pancreatic juice converts lipid into fatty acid and glycerol.
 - (d) Enterokinase stimulates the secretion of pancreatic juice.
- [Ans. (d) Enterokinase stimulates the secretion of pancreatic juice]**

2. What is chyme.....?

- (a) The process of conversion of fat into small droplets.
- (b) The process of conversion of micelles substances of glycerol into fatty droplet.

- (c) The process of preparation of incompletely digested acidic food through gastric juice.
- (d) The process of preparation of completely digested liquid food in midgut.

[Ans. (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?

- (a) Angiotensin and epinephrine
- (b) Gastrin and insulin
- (c) Cholecystokinin and secretin
- (d) Insulin and glucagon

[Ans. (c) Cholecystokinin and secretin]

4. The sphincter of Oddi guards

- (a) Hepatopancreatic duct
(b) Common bile duct
(c) Pancreatic duct
(d) Cystic duct **[Ans. (a) Hepatopancreatic duct]**

5. In small intestine, active absorption occurs in case of

- (a) Glucose (b) Amino acids
(c) Na⁺ (d) All the above
[Ans. (c) Na⁺]

6. Which one is incorrectly matched?

- (a) Pepsin – stomach (b) Renin – liver
(c) Trypsin – intestine (d) Ptyalin – mouth
[Ans. (b) Renin – liver]

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

- (a) Lymph vessels within villi
(b) Walls of stomach
(c) Colon
(d) Capillaries within villi
[Ans. (a) Lymph vessels within villi]

8. First step in digestion of fat is

- (a) Emulsification
(b) Enzyme action
(c) Absorption by lacteals
(d) Storage in adipose tissue
[Ans. (a) Emulsification]

9. Enterokinase takes part in the conversion of

- (a) Pepsinogen into pepsin
(b) Trypsinogen into trypsin
(c) Protein into polypeptide
(d) Caseinogen into casein
[Ans. (b) Trypsinogen into trypsin]

10. Which of the following combinations are not matched?

Column I	Column II
(a) Bilirubin and biliverdin	i) Intestinal juice
(b) Hydrolysis of starch	ii) Amylases
(c) Digestion of fat	iii) Lipases
(d) Salivary gland	iv) Parotid

[Ans. (a) Bilirubin and biliverdin-Intestinal juice]

11. Match column I with column II and choose the correct option

Column I	Column II
(P) Small intestine	i) Largest factory
(Q) Pancreas	ii) Absorption of water
(R) Liver	iii) Carrying electrolytic solution
(S) Colon	iv) Digestion and absorption

- (a) (P-iv) (Q -iii) (R- i) (S - ii)
(b) (P-iii) (Q -ii) (R- i) (S - iv)
(c) (P-iv) (Q -iii) (R- ii) (S - i)
(d) (P-ii) (Q -iv) (R- iii) (S - i)
[Ans. (a) (P-iv) (Q -iii) (R- i) (S - ii)]

12. Match column I with column II and choose the correct option

Column I	Column II
(P) Small intestine	i) 23 cm
(Q) Large intestine	ii) 4 meter
(R) Oesophagus	iii) 12.5 cm
(S) Pharynx	iv) 1.5 meter

- (a) (P-iv) (Q -ii) (R- i) (S - iii)
(b) (P-ii) (Q -iv) (R- i) (S - iii)
(c) (P-i) (Q -iii) (R- ii) (S - iv)
(d) (P-iii) (Q -i) (R- ii) (S - iv)
[Ans. (a) (P-iv) (Q -ii) (R- i) (S - iii)]

13. Match column I with column II and choose the correct option [June-2019]

Column I	Column II
(P) Lipase	i) Starch
(Q) Pepsin	ii) Cassein
(R) Renin	iii) Protein
(S) Ptyalin	iv) Lipid

- (a) (P-iv) (Q -ii) (R- i) (S - iii)
(b) (P-iii) (Q -iv) (R- ii) (S - i)
(c) (P-iv) (Q -iii) (R- ii) (S - i)
(d) (P-iii) (Q -ii) (R- iv) (S - i)
[Ans. (c) (P-iv) (Q -iii) (R- ii) (S - i)]

14. Which of the following is not the function of liver?

- (a) Production of insulin (b) Detoxification
(c) Storage of glycogen (d) Production of bile
[Ans. (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. [Sep. 2020]

- (a) Both A and B are true and B is the correct explanation of A
- (b) Both A and B are true but B is not the correct explanation of A
- (c) A is true but B is false
- (d) A is false but B is true

[Ans. (d) A is false but B is true]

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

- (a) They possess microvilli.
- (b) They increase the surface area.
- (c) They are supplied with capillaries and the lacteal vessels.
- (d) They only participate in digestion of fats.

[Ans. (d) They only participate in digestion of fats]

17. Why are villi present in the intestine and not in the stomach? [Sep. 2020]

- Ans. 1.** The villi are the units of absorption consisting of the lacteal duct in the middle surrounded by a fine network of blood capillaries.
- 2.** Digestion is completed in the small intestine and maximum absorption takes place in the small intestine only.
- 3.** Hence, the villi are found only in small intestine. A very small amount of substance is absorbed from the stomach.

18. Bile juice contains no digestive enzymes, yet it is important for digestion. Why? [Sep. 2020]

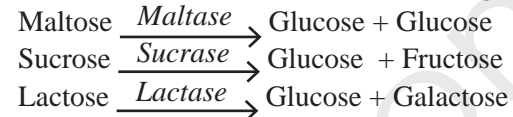
- Ans. 1.** Bile is produced by the **Liver**. The Bile duct from the liver joins the pancreatic duct and pours its secretions into the duodenum.
- 2.** The bile contains bile pigments (**bilirubin** and **biliverdin**) as the break down products of haemoglobin of dead RBCs, bile salts, cholesterol and phospholipids but has no enzymes.
- 3.** Bile helps in emulsification of fats. Bile salts reduce the surface tension of fat droplets and break them into small globules. Bile also activates lipases to digest lipids.
- 4.** Thus the bile is very important for digestion through it does not contain any enzyme.

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

- Ans. 1.** When the food reaches the first part of the small intestine i.e. the duodenum, pancreatic juices and bile juice act on it.

2. Enzymes for starch digestion are present in the pancreatic juice. Pancreatic amylase converts glycogen and starch into maltose.

3. The enzymes in the intestinal juice (succus entericus) act further on the products of pancreatic digestion. *Maltase, Lactase, Sucrase* act on the sugars.



4. As a result of digestion, all macromolecules of food are converted into their corresponding monomeric units.



The simple substances thus formed are absorbed in the jejunum and ileum region of the small intestine.

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

Ans.

S. No.	Proteins Energy value	Fats Energy value
1.	The caloric value and physiological fuel value of 1 gram of protein is 5.65 Kcal and 4 Kcal respectively.	Fat has a caloric value of 9.45 Kcal and a physiological fuel value of 9 Kcal per gram.
	Role in the body	Role in the body
1.	Proteins are required for growth and repair of body cells.	Fats are their derivatives are the best reserve food stored in our body which is used for production of energy.
2.	They are stored in the body only to a certain extent. The body requires 65 - 75 gm of proteins per day.	The body requires 60 - 70 gm of fats per day.

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

- Ans.** The activities of the gastro-intestinal tract are carried out by the neural and hormonal control for proper coordination of different parts. Gastric and intestinal secretions are stimulated by neural signals. Hormonal control of the secretion of digestive juices is carried out by local hormones produced by the gastric and intestinal mucosa. Only presence of food in the alimentary canal triggers the corresponding neural and hormonal controls.

ZOOLOGY LONG VERSION QUESTIONS (FOR PURE SCIENCE GROUP)

Long Version Evaluation

Q.No. 1 to 9 Refer Evaluation.

10. Which of the following combinations are not matched?

- (a) Vitamin D - Rickets
- (b) Thiamine - Beriberi
- (c) Vitamin K - Sterility
- (d) Niacin - Pellagra

[Ans. (c) Vitamin K - Sterility]

11. Refer Evaluation Q.No.10

12. Refer Evaluation Q.No.11

13. Refer Evaluation Q.No.12

14. Refer Evaluation Q.No.13

15. Refer Evaluation Q.No.14

16. Refer Evaluation Q.No.15

17. Refer Evaluation Q.No.16

18. Refer Evaluation Q.No.17

19. Refer Evaluation Q.No.18

20. Refer Evaluation Q.No.19

21. Refer Evaluation Q.No.20

22. Refer Evaluation Q.No.21

GOVERNMENT EXAM QUESTIONS

Bio-Zoology (Short version)

CHOOSE THE CORRECT ANSWERS 1 MARK

1. Goblet cells secrete [QY-2018]

- (a) Simple protein
- (b) Structural protein
- (c) Derived protein
- (d) Conjugated protein

[Ans. (c) Derived protein]

2. Match the following: [HY-2018]

A		B	
1. Jaundice	(i)	Cholesterol	
2. Liver cirrhosis	(ii)	Asprin	
3. Gall stone	(iii)	Alcoholism	
4. Peptic ulcer	(iv)	Viruses	
1	2	3	4
(a) iii	iv	i	ii
(b) iv	ii	iii	i
(c) iv	iii	i	ii
(d) i	ii	ii	iv

[Ans. (a) 1-iii, 2-iv, 3-i, 4-ii]

3. Which one of the following is incorrectly matched?

[Govt.MQP-2018]

- (a) Succus entericus - Intestine
- (b) Renin - Kidney
- (c) Rennin - Stomach
- (d) Ptyalin - Mouth

[Ans. (c) Rennin - Stomach]

4. Assertion (A) : Maximum absorption takes place in the small inte. [QY-2019]

Reason (R) : Absorption of simple sugars, alcohol and medicine etc take place in small intestine

- (a) Both (A) and (R) are true, (R) is the correct explanation of (A).
- (b) Both (A) and (R) are true, (R) is the incorrect explanation of (A).
- (c) (A) is a true statement buy (R) is false.
- (d) (A) and (R) both are false.

[Ans. (c) (A) is a true statement buy (R) is false]

VERY SHORT ANSWERS 2 MARKS

1. What are the ducts present in the salivary glands?

Ans. 1. Stenson's duct, [QY-2019]

2. Wharton's duct and

3. Bartholin's duct or duct of Rivinis.

2. How does gall stones are formed? [June-2019]

Ans. Gall Stones:

- 1.** Any alteration in the composition of the bile can cause the formation of stones in the gall bladder.
- 2.** The stones are mostly formed of crystallized cholesterol in the bile.

3. In which part of the digestive system, absorption of following substances take place? [March 2020]

- (i) Water, some minerals and certain drugs.
- (ii) Simple sugar and alcohol.

Ans. (i) Large intestine, (ii) Stomach

4. What will happen when saliva pH ranges below 7?

[Sep. 2020]

- Ans. (i)** If the pH level of our saliva is less than 7, it indicates acidity.
- (ii)** Bicarbonates in the saliva make the pH 5.4 to 7.4.
- (iii)** If the bicarbonates level in saliva is reduced, the saliva becomes acidic and the tooth enamel may get dissolved.
- (iv)** This can lead to discomfort when consuming hot, cold, or sugary drinks.

SHORT ANSWERS

3 MARKS

1. Why, villi present in the intestine, are not present in the stomach?

[March-2019]

- Ans. 1.** In the stomach there is no absorption of food. Absorption takes place only in the intestine through villi. Absorption is a process by which the end product of digestion passes through the intestinal mucosa into the blood and lymph.
- 2.** The villi in the lumen of ileum are the absorbing units, consisting of lacteal duct in the middle surrounded by fine network of blood capillaries. The process of absorption involves active, passive and facilitated transport.
- 3.** Small amounts of glucose, amino acids and electrolytes like chloride ions are generally absorbed by simple diffusion. The passage of these substances into the blood depends upon concentration gradients.

LONG ANSWERS

5 MARKS

- 1. i. Write an account on protein energy malnutrition.**
ii. Add a note on role of pancreatic enzymes in protein digestion.

[Govt.MQP-2018]

- Ans. (i) Protein energy malnutrition (PEM) :**
- 1.** Growing children require more amount of protein for their growth and development.
- 2.** Protein deficient diet during early stage of children may lead to protein energy malnutrition such as **Marasmus** and **Kwashiorkor**.
- 3.** Symptoms are dry skin, pot-belly, oedema in the legs and face, stunted growth, changes in hair colour, weakness and irritability.
- 4.** Marasmus is an acute form of protein malnutrition. This condition is due to a diet with inadequate carbohydrate and protein.
- (ii) Role of pancreatic enzymes in digestion :**
- 1.** Pancreatic juice contains enzymes such as trypsinogen, chymotrypsinogen, carboxypeptidases for protein digestion.
- 2.** Trypsinogen is activated by an enzyme, enterokinase, secreted by the intestinal mucosa into active trypsin.

- 3.** This in turn activates the enzyme chymotrypsinogen in the pancreatic juice.

- 4.** The proteins and partially digested proteins in the chyme from the stomach are acted upon by the proteolytic enzymes of pancreatic juice in the small intestine.

- 5.** Proteins $\xrightarrow[\text{(hydrolysis)}]{\text{Trypsin}}$ Polypeptides + peptones

- 6.** Chymotrypsin hydrolyses peptide bonds associated with specific amino acids.

2. Explain the digestion and absorption of proteins in human intestine.

[HY-2018]

Ans. Digestion of proteins begin in the stomach

- 1.** The gastric juice contains HCl and proenzymes.
- 2.** The proenzyme pepsinogen on exposure to HCl gets converted into the active enzyme pepsin which converts proteins into proteoses and peptones (peptides).
- 3.** Rennin is a proteolytic enzyme found in the gastric juice of infants. It helps in digestion of milk protein caseinogen to casein in the presence of calcium ions.

Digestion in small intestine :

- 1.** The bile, pancreatic juice and intestinal juice are the secretions released into the small intestine.
- 2.** The pancreatic juice contains enzymes such as trypsinogen, chymotrypsinogen and carboxypeptidases for digestion of proteins. Bile plays no role in protein digestion.

Trypsinogen $\xrightarrow[\text{(Inactive)}]{\text{Enterokinase (Intestinal mucosa)}}$ Trypsin $\xrightarrow{\text{(Active)}}$

Chymotrypsinogen $\xrightarrow[\text{(Inactive)}]{\text{Trypsin}}$ Chymotrypsin $\xrightarrow{\text{(Active)}}$

Proteins and partially digested proteins in the chyme are acted upon by proteolytic enzymes of pancreatic juice.

Trypsin hydrolyses proteins into polypeptides and peptones.

Chymotrypsin hydrolyses peptide bonds associated with specific amino acids.

The enzymes in the intestinal juice (succus entericus) such as *dipeptidases* act on the end products of pancreatic digestion of proteins.

Dipeptides, Tripeptides $\xrightarrow{\text{Peptidase}}$ Amino acids

As a result of digestion, proteins are converted into their respective monomeric units.

Proteins \longrightarrow Amino acids

The simple substances are absorbed in the jejunum and ileum region of the small intestine.

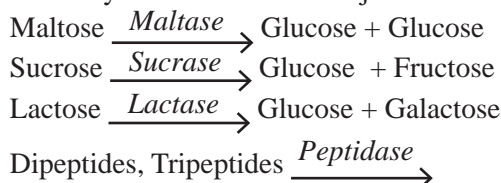
Absorption :

1. The villi in the lumen of ileum are the absorbing units which are supplied with blood capillaries.
2. Small amounts, of amino acids are generally absorbed by simple diffusion.
3. Nutrients like amino acids are absorbed into the blood against the concentration gradient by active transport.
4. Absorbed substances are transported through blood to the liver through the hepatic portal system.
5. From the liver, nutrients are transported to all other regions of the body for utilization.
6. All the body tissues utilize the absorbed substance for their activities and incorporate into their protoplasm. This process is called **assimilation**.

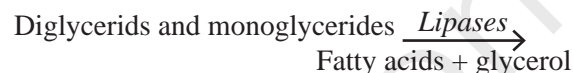
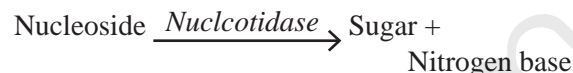
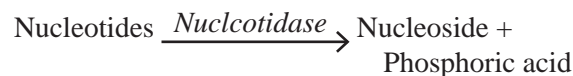
3. Explain the digestion in the small intestine.

[QY-2019]

- Ans. 1.** The bile, pancreatic juice and intestinal juice are the secretions released into the small intestine.
2. The pancreatic juice contains enzymes such as trypsinogen, chymotrypsinogen, carboxypeptidases, pancreatic amylases, pancreatic lipases and nucleases.
 3. Trypsinogen is activated by an enzyme, enterokinase, secreted by the intestinal mucosa into active trypsin, which in turn activates the enzyme chymotrypsinogen in the pancreatic juice.
 4. Bile helps in emulsification of fats.
 5. Bile salts reduce the surface tension of fat droplets and break them into small globules.
 6. Bile also activates lipases to digest lipids.
 7. Trypsin hydrolyses proteins into polypeptides and peptides, while chymotrypsin hydrolyses peptide bonds associated with specific amino acids.
 8. The pancreatic amylase converts glycogen and starch into maltose.
 9. Lipase acts on emulsified fat (triglycerides) and hydrolyses them into free fatty acid and monoglycerides. Monoglycerides are further hydrolysed to fatty acid and glycerol.
 10. Nucleases in the pancreatic juice break the nucleic acid into nucleotides and nucleosides.
 11. The enzymes in the intestinal juice.

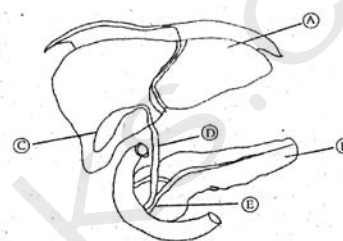


Aminoacids

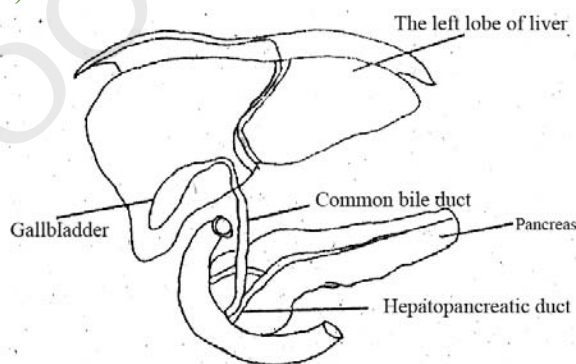


4. (i) Draw and label the given diagram.

(ii) List the function of the liver. [HY-2019]



Ans. (a)



- (b)**
1. Destroys aging and defective blood cells.
 2. Stores glucose in the form of glycogen or disperses glucose into the blood stream with the help of pancreatic hormones.
 3. Stores fat soluble vitamins and iron.
 4. Detoxifies toxic substances.
 5. Involves in the synthesis of non- essential amino acids and urea.

GOVERNMENT EXAM QUESTIONS

Zoology (Long version)

CHOOSE THE CORRECT ANSWERS 1 MARK

1. The opening of the hepato-pancreatic duct is guarded by: [March 2020]

- (a) Gastric rugae (b) Glisson's capsule
(c) Sphincter of Oddi (d) Crypts of Lieberkuhn

[Ans.(c) Sphincter of Oddi]

2. The enzyme which converts nectar to honey : [March 2020]

- (a) lipase (b) zymase
(c) invertase (d) amylase

[Ans.(c) invertase]

3. Which one of the following is not related to the stomach? [Sep. 2020]

- (a) Zymogen cells (b) Oxyntic cells
(c) Goblet cells (d) Glisson's capsule

[Ans.(d) Glisson's capsule]

VERY SHORT ANSWERS

2 MARKS

1. Write a note on GERD. [March 2020]

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

SHORT ANSWERS

3 MARKS

1. How it helps in Digestion of fats and other nutrients of food? [Sep. 2020]

Ans. The role of bile juice in digestion

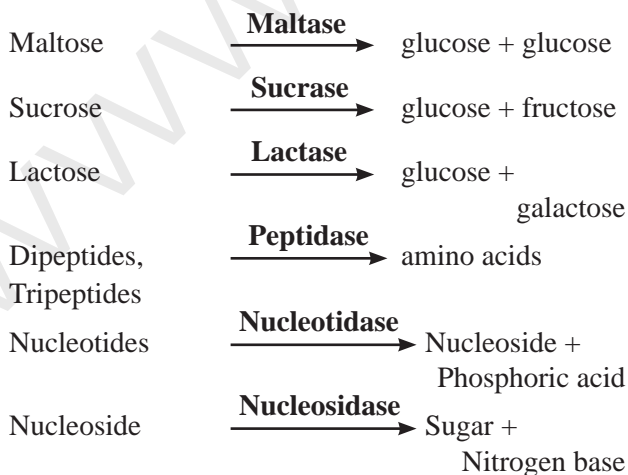
- (i) Bile helps in emulsification of fats.
- (ii) Bile salts reduce the surface tension of fat droplets and break them into small globules.
- (iii) Bile also activates lipases to digest lipids.

LONG ANSWERS

5 MARKS

1. Enumerate the chemical changes that take place with the help of succus entericus in the small intestine. [March 2020]

Ans. The secretions of the Brunner's gland along with the secretions of the intestinal glands constitute the intestinal juice or succus entericus. The enzymes in the intestinal juice such as maltase, lactase, sucrase (invertase), peptidases, lipases, nucleotidases and nucleosidases act on the breakdown products of bile and pancreatic digestion.



The mucus along with the bicarbonate ions from the pancreas provides an alkaline medium (pH 7.8) for the enzymatic action. As a result of digestion, all macromolecules of food are converted into their corresponding monomeric units.

2. A person's height is 180 cm. His body weight is 80 kg. Find out BMI and tell him whether he is normal or obese. [March 2020]

$$\text{Ans. BMI} = \frac{\text{Body weight}}{(1.8)^2}$$

$$\text{BMI} = \frac{\text{Body weight in kg}}{\text{Square of body height in meters}}$$

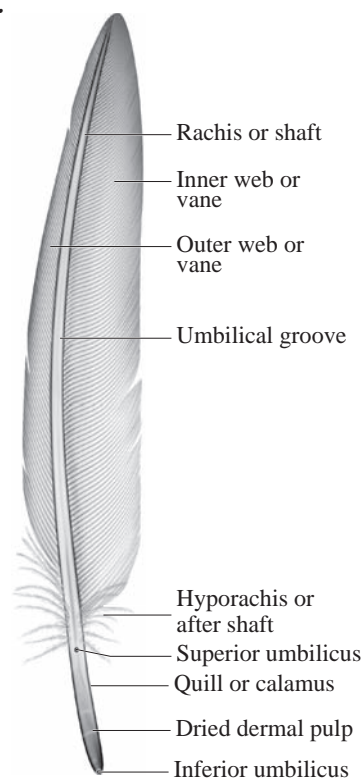
$$\text{BMI} = \frac{80}{(1.8)^2} = 24.69$$

His BMI is 24.69

A normal BMI range of adult is 19 - 25. Above 25 is considered as obese. His BMI is 24.69. So he is considered as normal.

3. Describe the quill feather of pigeon with a neat labelled sketch. [March 2020]

Ans.



Quill Feather

1. The quill feather has a stem or scapus and is divided into a lower hollow part called calamus or quill and an upper solid portion called rachis.
 2. Lower end of the stem has an opening called inferior umbilicus which receives a dermal papilla, supplying nutrients and pigments for the growing feathers.
 3. A second opening the superior umbilicus occurs at the junction of the quill and the rachis, on the inner face of the feather; close to this opening is a small tuft of soft feathers called after shaft.
 4. Attached to the rachis are small filament or barbs; the rachis with the barbs constitute the vane or the vexillum. Each barb is fringed with an oblique set of processes called barbules, which have minute hooklets or barbicels by which adjacent barbs are hooked together to form a continuous blade for striking the air during flight.
4. Assume that you are a Dietician and a person who is very health conscious comes to you as a Client. How will you explain about the Calorific Value of Carbohydrates, Proteins and Fats? [Sep. 2020]

Ans.

		Carbo hydrates	Fats	Proteins
1.	Percentage of Energy we obtain	50%	35%	15%
2.	Our daily require- ment	400 to 500 gm	60 to 70 gm	65 to 75 gm
3.	Caloric value	4.1 Kcal per gram	9.45 per gram	5.65 Kcal per gram
4.	Physiological Fuel value	4 Kcal per gram	9 Kcal per gram	4 Kcal per gram

- (i) Balanced diet of each individual will vary according to their age, gender, level of physical activity and other conditions such as pregnancy and lactation.
- (ii) **Carbohydrates** are sugar and starch. These are the major source of cellular fuel which provides energy.
- (iii) **Lipids** are fats and derivatives of fats, are also the best reserved food stored in our body which is used for production of energy.
- (iv) **Proteins** are source of amino acids required for growth and repair of body cells. They are stored in the body only to a certain extent large quantities are excreted as nitrogenous waste.
- (v) According to ICMR (Indian Council of Medical Research and WHO (World Health Organization), the daily requirement of protein for an average Indian is 1gm per 1 kg body weight.

ADDITIONAL

CHOOSE THE CORRECT ANSWERS 1 MARK

I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW

QUESTIONS:

1. What is length of the duodenum?
(a) 27 cm (b) 30 cm (c) 25 cm (d) 2.4 m
[Ans. (c) 25 cm]
2. Identify the part which is well developed in a herbivorous animal.
(a) haustra
(b) caecum
(c) jejunum
(d) colon
[Ans. (b) caecum]
3. Which enzyme is active in infants only?
(a) Pepsin
(b) Lysozyme
(c) Ptyalin
(d) Rennin
[Ans. (d) Rennin]

II. CHOOSE THE CORRECT OPTIONS FOR THE BELOW

FILL IN THE BLANKS:

1. The _____ teeth are chisel shaped.
(a) Incisor (b) Canine
(c) Premolar (d) Molar
[Ans. (a) Incisor]
2. Peyer's patches are seen in the _____.
(a) mouth (b) stomach
(c) ileum (d) duodenum
[Ans. (c) ileum]
3. Brunner's glands are seen in the _____.
(a) ileum (b) jejunum
(c) large intestine (d) duodenum
[Ans. (d) duodenum]
4. Deglutition refers to _____.
(a) swallowing (b) assimilation
(c) absorption (d) egestion
[Ans. (a) swallowing]
5. Sphincter of Oddi is seen between _____.
(a) ileum and jejunum
(b) small intestine and large intestine
(c) bile duct and duodenum
(d) pancreatic duct and bile duct
[Ans. (c) bile duct and duodenum]