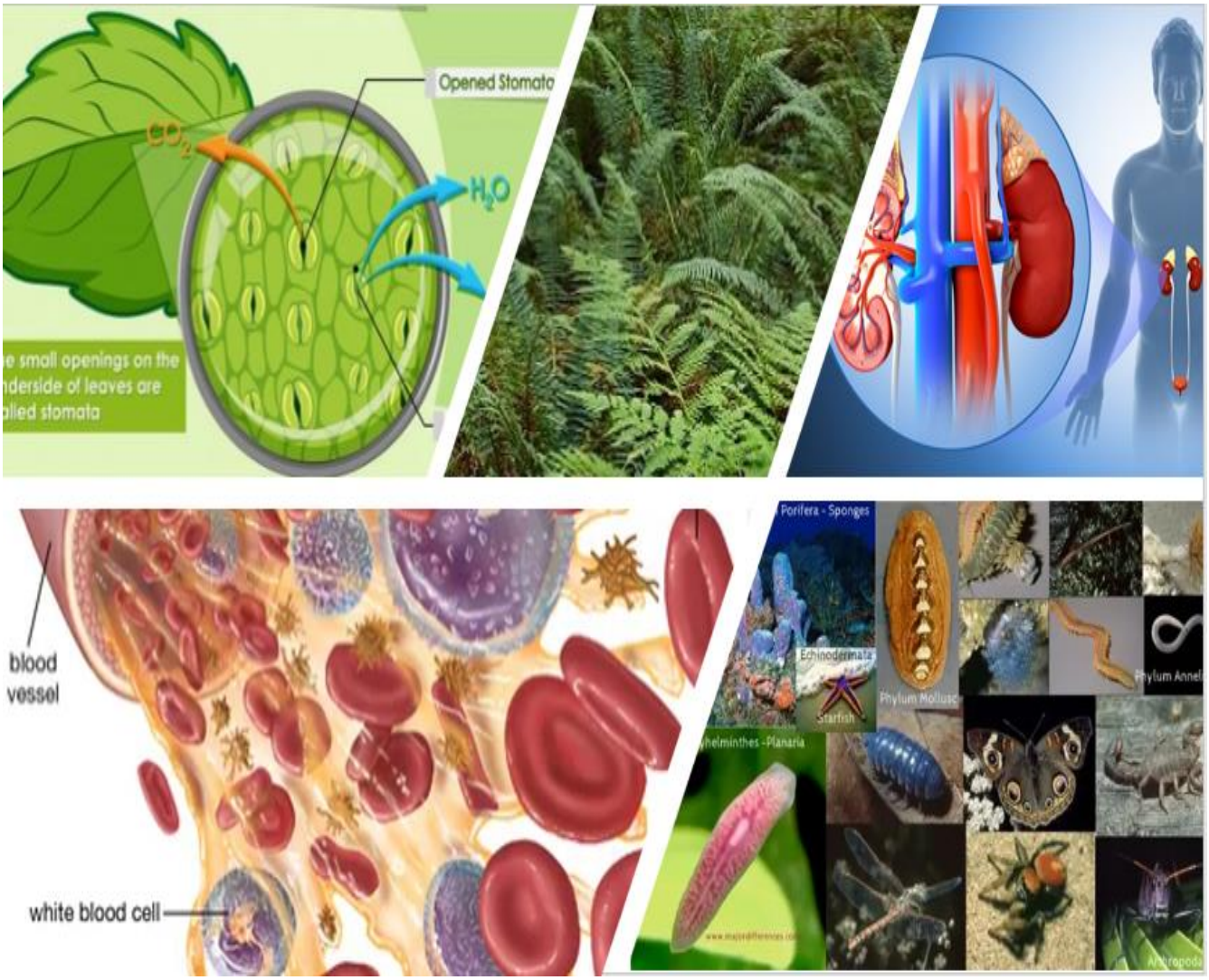
ACADEMIC WINDOW



BIOLOGY

GRADE XI (2023 -2024)

A word from HOD

Science is beautiful when it makes simple explanations of phenomena or connections between different observations. Examples include the double helix in biology and the fundamental equations of physics. .....Stephen Hawking

Biology, it's the technology which builds our world, and we can harness it to shift humanity from a scarcity to an abundance economy. Intrinsic motivation arises from a desire to learn a topic due to its inherent interests, for self-fulfillment, enjoyment and to achieve a mastery of the subject.

This support material is prepared by the faculty members of the Department of Biology at Delhi Private School Sharjah. This is composed and compiled based on the latest syllabus prescribed By CBSE and will be updated as and when required. The content focusses on the following key points.

- Learning objectives
- Synopsis lessons/chapter
- Important questions
- Sample Question papers

A lot of activity-based questions and high order thinking questions are included for analytical thinking. Students are suggested to go through the support material. Regular reading and practice will help them to score very good marks.

All the Best!

Ms. ANJUM HASAN

(HOD BIOLOGY)

DPS SHARJAH

Chapter-1

The Living World

Plants, animal bacteria and fungi are living organisms whereas bricks, stones and rocks are non living; viruses are neither nor animals.

- The virus is a lifeless particle by itself, but it becomes active and multiples rapidly when inside a living cell.
- Fungi, plants, insects and vertebrates-are built of cells that are similar in their internal structure and function.
- The basic features of living organisms are listed below:
  - (i) Highly organized and complex entities formed of one or more cells.
  - (ii) Carry out and control numerous chemical processes.
  - (iii) Acquire and use energy for metabolism.
  - (iv) Respond to changes in environment and maintain a constant internal environment.
  - (v) Grow in size ,develop produce offspring similar to them ,
  - (vi) Adapt to environmental changes and gradually evolve into new types of organism.
- Biological organization starts with submicroscopic **molecular level,** passes through microscopic **cellular level** microscopic or macroscopic organismic **level** and ends in **ecosystems** and the **biosphere.**
- Atoms are the lowest unit the molecular level, whereas the cells are the smallest unit at organismal level.
- Atoms combine to form molecules, which undergo chemical reactions to form organelles. Several organelles are contained in its.
- A group of cells meant for a specific function constitute tissue. In the organisms above the tissue level of organization, many tissue become engaged to form organs constitute a system and there are many system to take up the life process.
- Within the echo system, an individual forms the smallest units.
- Individual forms population.
- **Populations** of different species living in the same area make up a biological community.
- The community interactions integrated with non-living (abiotic) features of the environment forms an echo system.
- Living systems have regulatory mechanism for adjusting with the fluctuation of their external environment. Many organisms maintain a steady-state internal environment by employing physiological and morphological or behavioral mechanism.
- Growth occurs due to synthesis of protoplasmic and apoplasmic substances. organisms grow by cell proliferation, cell enlargement and secretion. It's the results of a process called metabolism.
- Development involve growth, morphogenesis and different.

- Reproduction involves the production of organism and in necessary for a continuation of life and to compensate for the loss of life. Organisms reproduce by asexual or sexual means and pass their hereditary material to their offspring.
- The diversity of life has arisen and fallen naturally and drastically in the past, but is now declining rapidly as a result of human activity.
- Loss of biodiversity would check the evolutionary capability of biota to cope up with environmental change.
- Biodiversity matters to the health forest, grasslands, rivers, oceans and other ecosystem on which human society depends. There for, biodiversity matters to the health of humans.
- Species of animals are assigned unique scientific names. A species' name always consists of two parts. The genus and specific epithet. The genus name is always first and capitalized. The specific epithet is second and not capitalized. Following Linnaeus, who used Latin for species names, the genus and/or species name is idolized or underlined.
- **Taxonomists** have developed variety of taxonomic tool/aids to facilitate identification, naming and classification of organisms. These studies are carry out from actual specimens, which are collected from the field and preserved as referrals in the form of herbaria, museums, botanical gardens and zoological parks.
- **Keys** are the devices used for identification. They are based on contrasting characters.

1 Mark Questions- MCQs

1.Linnaeus is credited with

a) Binomial nomenclature

b) Theory of biogenesis

c) Discovery of microscope

d) Discovery of blood circulation

2. Animals are classified into hierarchical groups. In which one of the following the largest number of species is found.

a) Genus

b) Order

c) Family

d) Cohort

3. Which is an exclusive trait of living things?

a) Isolated metabolic reactions occur in vitro

b) Increase in mass from inside body

c) Perception of events happening in the environment and their memory

d) Increase in mass by accumulation of material both on surface as well as internally.

4. Which taxonomic aid gives comprehensive account of complete compiled information of genus or family at a particular time?

a) Taxonomic key

b) Herbarium

c) Monograph

d) Flora

5. ICBN is

a) International Code of Biological Naming

b) International Code of Biological Nomenclature

c) International Class of Biological Nomenclature.

d) International Classification of Biological nomenclature

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1.Assertion: Classification is necessary to study all living organisms.
Reason: Individuals are grouped into categories in classification.

2. Assertion: Binomial nomenclature is system of providing name with two.
Reason: Each name consists first of a specific name and second of a generic name

3.Assertion: Herbarium is also known as "Dry Garden".
Reason: It is a collection of plant parts that have been dried, pressed, preserved on sheets.

4. Assertion: Keys are analytical in nature.
Reason: These are based on couple

5.Assertion: Flora contains the actual account of habitat and distribution of plants of a given area.
Reason: Monographs contain detailed information on any taxon.

Case study

Taxonomic studies of various species of plants, animals and other organisms are useful in agriculture, forestry, industry and in general in knowing our bio-resources and their diversity. These studies would require correct classification and identification of organisms. Identification of organisms requires intensive laboratory and field studies. The collection of actual specimens of plant and animal species is essential and is the prime source of taxonomic studies. These are also fundamental to studies and essential for training in systematics. It is used for classification of an organism, and the information gathered is also stored along with the specimens. In some cases the specimen is preserved for future studies

1. What are taxonomical aids?
2. Herbarium is a _____
   a) store house of all animal specimens
   b) place where fresh plants are kept to attract visitors
   c) sheets in which different dried plant specimens pressed against the papers are stored for taxonomical study
   d) a devotional place where people offer their prayers for the sacred trees
3. How do museums preserve birds and animals?
4. What provides Information on any of the taxon ?
5. The pair of options used in keys to determine the taxonomy of an organism is called _____
   a) Doublet
   b) Couplet
   c) Manuals
   d) Description

2 marks questions

1.Who is regarded father of taxonomy and why?

2.Why species are considered as dynamic groups?

3.Distinguish between:

i. Systematic and taxonomy
ii. Species and taxon

4.Mention the uses/advantages of taxonomy.

5.Write the phylum and order of - i.Wheat

ii.Housefly

3 marks questions

1.Botanical gardens are living herbaria. Comment.

2.Explain briefly about hierarchical system of classification?

3.What is meant by taxonomical aids? Explain the different types?

4.Explain the importance of Binomial Nomenclature?

5.Taxonomy is a fast-growing field of science. Why? Justify your answer.

5marks questions

1.Explain in detail the steps in the preparation of herbarium.

2.What is a key? Explain its use giving an example.

3.How zoological parks can be helpful in classification?

HOTS questions

1.A student of taxonomy was puzzled when told by his professor to look for a key to identify a plant. He went to his friend to clarify what 'Key' the professor was referring to? What would the friend explain to him?

2.What is the similarity and dissimilarity between "whole moong daal" and "broken moong daal" in terms of respiration and growth? Based on these parameters classify them into living or nonliving?

CHAPTER 2

BIOLOGICAL CLASSIFICATION

SYNOPSIS

There are millions of living organisms with vast variety of shape, size and forms.They occur in range of habitats. It is hard to identify and describe them at random, so they are classified into various categories.

- For identification and classification different types of classification are necessary.
- Some classifications are based on external, simply observable characters known as Artificial and Natural Classification and others are based on evolutionary relationships.ie. phylogenetic classification. With increasing knowledge in various fields of Biology like Cytology, Biochemistry, Anatomyetc the classifications are modified and they tend to classify the organisms more aptly.
- In two Kingdom classification, all the living organisms of the world have been identified into two Kingdoms Animalia and Plantae.
- R.H.Whittaker, an American taxonomist, proposed five kingdom classification in 1969.In this arrangement, the separation into five kingdom is made on the following three criteria.
    - i) complexity of cell structure.
    - ii) Complexity of organisms body
    - iii) Mode of obtaining nutrition,life style
    - iv) Phylogenetic relationships.

- The five Kingdoms are MONERA, PROTISTA, FUNGI, PLANTAE and Animalia. In the five kingdom classification, bacteria are included in Kingdom Monera.

- Kingdom Protista includes all single celled eukaryotes such as Chrysophytes,Dianiflagellates,Euglenoids,Slime moulds and Protozoans.
- Fungi are achlorophyllous,spore bearing,non vascular plants. They are important decomposers in the biosphere and help in the recycling of inorganic resources.
- Fungi have two phases. The assimilative phase, during which the hyphal mass grows in the substratum. During the reproductive phase, the mycelium grows aerially and produces fruiting bodies and reproductive cells or spores.
- Yeasts are unicellular ascomycetes, which normally reproduce asexually by budding. Yeats are used in baking, brewing and production of ethanol.
- Pencillium produces the antibiotic pencillin. Some ascomycetes produce diseases in plants.
- Lichens are an intimate symbiosis, in which two species live together as a type of composite organism. Lichens show obligate mutulism between a fungus mycobiont and an alga or blue green bacterium phycobiont.

- Lichens containing cyanobacteria are important sources of nitrogen in certain forest and desert ecosystems. The ground dwelling boreal lichens preserve the ground'smoisture. Lichens growing in the dry soils of the interior prairies and foothills prevent erosion.
- The **three-domain system** is a biological classification introduced by Carl Woese in 1977 that divides cellular life forms into **archaea**, **bacteria**, and **eukaryote** domains. In particular, it emphasizes the separation of prokaryotes into two groups, originally called *Eubacteria* (now *Bacteria*) and *Archaebacteria* (now *Archaea*).
- **Archaea Domain** – prokaryotic, no nuclear membrane, distinct biochemistry and RNA markers from eubacteria, possess unique ancient evolutionary history for which they are considered some of the oldest species of organisms on Earth; traditionally classified as archaebacteria; often characterized by living in extreme environments Kingdom Archaebacteria

Examples:Methanogens – metabolize hydrogen and carbon dioxide into methane Halophiles – thrive in salt, Thermoacidophiles – thrive in acid and high temperatures (up to 110 degrees Celsius)

- **Bacteria Domain** – prokaryotic, no nuclear membrane, traditionally classified as bacteria, contain most known pathogenic prokaryotic organisms studied far more extensively than Archaea Kingdom Eubacteria

Examples:Cyanobacteria – photosynthesizing bacteria, Spirochaete – Gram- negative bacteria that include those causing syphilis and Lyme disease Firmicutes – Gram-positive bacteria including *Bifidobacterium animalis* which is present in the human large intestine.

- **Eukarya Domain** – eukaryotes, nuclear membrane Kingdom Fungi or fungi

Examples: Saccharomycotina – includes true yeasts, Basidiomycota – includes shiitake mushrooms

Kingdom Plantae or plants

Examples: Bryophyta – mosses, Magnoliophyta – flowering plants Kingdom Animalia or animals

Examples: Arthropoda – includes insects, arachnids, and crustaceans,
Chordata – includes vertebrates and, as such, human beings

Kingdom Protista or protists (recognized to be paraphyletic, and thus subject to dissolution and/or redefinition)

Examples: Rhodophyta – red algae, Chromalveolata – includes dinoflagellate

1Mark questions- MCQs

1.Which of the following organisms can be found in extreme saline conditions?

a) Eubacteria

b) Archaebacteria

c)Cyanobacteria

d)Mycobacteria

2. What is the main basis of classification in the five kingdom system?

a. Structure of nucleus
b. Structure of cell wall
c. Asexual Reproduction
d. Mode of Nutrition

3.African Sleeping Sickness is caused by

a. Trypanozoma cruzi
b. T. tangela
c. T. rhodesiense
d. T. gambiense

4. In which kingdom are Archaea and Nitrogen-fixing organisms classified?

a. Animalia
b. Plantae
c. Monera
d. Fungi

5.What is a taxon?

a. A group of related families
b. A type of living organisms
c. A group of related species
d. A group of any ranking

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion : TMV is a virus which causes mosaic disease.
Reason : TMV has RNA as genetic material.

2. Assertion: Mycoplasmas are pathogenic in animals and plants.
Reason: Mycoplasmas lack cell wall and can survive without oxygen.

3. Assertion: "Contagium Vivum Pasteur Fluidum" was coined by Pasteur.
Reason: Pasteur found that virus infected plant of tobacco can cause infection in healthy plant

4.Assertion: Phycomycetes are commonly known as sac fungi.
Reason: In phycomycetes, ascospore (sexual spores) are produced endogenously in sac like asci.

5. Assertion: Deuteromycetes is known as fungi imperfecti.
Reason: In Deuteromycetes, only the asexual phase is known

Case study

A virus is the smallest type of parasite to exist and is typically within the size range of 0.02 to 0.3 micrometers (μm) in size; however, some viruses can be as large as 1 μm.A virus is often classified according to its physicochemical properties, genome structure, size, morphology, and molecular processes. In terms of their genetic material, viruses are classified according to whether they are RNA or DNA viruses and the strandedness of their genetic material, which can include double-stranded (ds), single-stranded (ss), or partially ds. Furthermore, ss viruses will also be classified as to whether they are positive ss, negative

1. The word "Virus" means _____
2. Why are viruses not included in any of the five kingdoms?
3. Who proved that viruses are crystalline like structures?
4. Viruses that infect plants have _____
   a) single stranded RNA
   b) double stranded RNA
   c) single stranded DNA
   d) double stranded DNA
5. What are bacteriophages?

2 mark questions

1.Which organism was earlier placed in plants as well as animal kingdoms and Why?
2.Draw and label the structure of bacteriophage?
3.Lichens are symbiotic association of Algae and Fungi. a) What is symbiosis?
b) Write the economic importance of Lichens?
4.What do the terms phycobiont and mycobiont signify?
5.Write down the characters of archea domain?
6.Write examples of gram +ve and gram-ve bacteria?
7.Viruses and viroids differ in structure and diseases they cause. How?

3 mark questions

6.Write about the classification of fungi?
7.Explain the different types of protozoans with examples?
8.What is dikaryon? How dikaryotisation takes place in fungi?
9.Write the classification eukarya domain?
10.Some symbiotic organisms are very good pollution indicators and composed of a chlorophyllous and a non-chlorophyllous member. Describe them.

5 Mark questions

1. Compare the Salient Features of Monera and Protista.
2. With the help of well labeled diagram describe the structure of a typical bacterial cell.
3. Explain the process of sexual reproduction taking place in fungi?
4. Differentiate between various classes or kingdom Fungi on the basis of their- a) Mycelium b) Types of spores and c)Type of fruiting body. Also give two examples for each class.

HOTS Questions

1. There is a myth that immediately after heavy rains in forest, mushrooms appear in large number and make a very large ring or circle, which may be several metres in diameter. These are called as 'Fairy rings'. Can you explain this myth of fairy rings in biological terms?

2. Neurospora - an ascomycetes fungus has been used as a biological tool to understand the mechanism of plant genetics much in the same way as Drosophila has been used to study animal genetics. What makes Neurospora so important as a genetic tool?

3.Cyanobacteria and heterotrophic bacteria have been clubbed together in Eubacteria of kingdom Monera as per the "Five Kingdom Classification" even though the two are vastly different from each other. Is this grouping of the two types of taxa in the same kingdom justified? If so, why?

Chapter 3

Plant Kingdom

SYNOPSIS

- Plant kingdom includes algae, bryophytes, pteridophytes, gymnosperms and angiosperms.
- There are two types of vascular plants: cryptogams or non-seed plants and plants and phanerogams or plants with seeds.
- Based on the type of pigment possessed and the type stored food, algae are classified in to three classes, namely Chlorophycease and Rhodophyceae.
- Bryophytes are plants that can live on land but are depended on water for sexual reproduction. It is thallus –like and prostrate or erect and attached to the substratum by rhizoids. They posses root like, leaf-like and stem-like structures. The bryophytes are divided in to liverworts and mosses.
- In bryophytes, the life cycle consists of an alternation of heteromorphic generation. The gametophyte is the larger and more persistent and photo synthetically active phase; the saprophyte depends almost entirely on the gametrophyte for carbon, energy and minerals.
- In pteridophytes the main plant is a saprophyte, which is differentiated into true root, stem and leaves. These organs possess well differentiated vascular tissues. The saprophytes bear sporangia, which produce spores. The spores germinate to form gametophytes, which require cool, damp places to grow. The gametophyte bear male and female sex organs called antheridia and archegonia, respectively. Water is required for transfer of male gamete to archegonium where zygote is formed after fertilization. The zygote produces a saprophyte.
- The **seed habit** originated in pteridophyta. The development of seed -bearing habits has released seed plants from dependence on the availability of the water for their reproductive phase, thus opening up new habitats for colonization.
- The evaluation of vascular tissue had profound consequences: relatively strong, vertical stems could be supported, large plant bodies could be integrated , and parts could differentiate and specialize.
- The gymnosperms are the plants in which ovules are not enclosed by any ovary wall. After fertilizations the seed remain exposed and there for these plants are called naked-seeded plants.
- In angiosperms, the male sex organs (stamen) and female sex organs (pistil) are born in a flower.

1 <u>Mark Questions- MCQs</u>

1.Which plant kingdom can survive both on land and in water?

a) Tracheophyta

b)Pteridophyta

c)Thallophyta

d)Bryophyta

2. Most primitive vascular plants?

a)Mosses

b)Cycads

c)Kelps

d)Ferns

3. Angiosperms are the dominant flora because of

a)Domestication by man

b)Power of adapting in diverse habitats

c)Self-pollination property

d)Property of producing a large number of seeds

4. A colonial alga is

a)Volvox

b)Chlorella

c)Ulothrix

d)Spirogyra

5. Conifers can tolerate extreme environments because of

a) Presence of vessels

b) thick cuticle

c)Superficial stomata

d)Broad hardy leaves

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true

E. Both A and R are false

1. Assertion: Algae and fungi are grouped in thallophyta.
Reason :Algae and fungi show no differentiation in thallus.

2.Assertion : Members of phaeophyceae vary in colour from olive green to various

shades of brown
Reason : Phaeophyceae possess chlorophyll a, c, carotenoids an xanthophylls.

3.Assertion: Stamens are comparable to microsporophylls.
Reason: Ovules are comparable to megasporophylls.

4. Assertion: The bryophytes exist in two phases gametophyte and sporophyte.
Reason: The sporophyte is nutritionally independent

5. Assertion: Gymnosperms do not produce fruit.
Reason: Ovules of gymosperms are enclosed within the ovaries.

Case study

Bryophytes thrive in a wide variety of habitats, range of elevations, temperatures and moisture. They can be seen growing in shady and damp environments, in extreme and diverse habitats such as arctic and deserts regions. It can grow where vascularized plants cannot as it does not depend on roots for the uptake of nutrients from the soil.

Some of the bryophytes remarkably tolerate lengthy periods of freezing and dry conditions and when moisture returns, the process of photosynthesis resumes. Several bryophytes thrive on persistent remains of its own growth or on soil and on decomposing or living matter of other plants. A few grow on bare surface of rock and some are aquatic in nature.

Their chief requirement to grow seems to be comparatively stable substratum to attach, a medium that retains moisture for long periods, appropriate temperature, enough sunlight, humid ambience would be lush for it to thrive.

1. Why are bryophyte called plant amphibians?

2. What are Gemmae? Give their function.
3.Write two uses of bryophytes?
4.Write two differences between mosses and liverworts.
5.The female sex organs in bryophytes are called as _____
a) Antheridium
b) Archegonium
c) Basiogonium
d) Thallogonium

2 Marks Questions

1. Pteris is given to you.

   a)Give the major group in which the plant belongs? b)How does it differ from the plant body of moss?

2. How is leafy stage formed in mosses? How is it different from protonema?

3. Diagrammatically represent haplo-diplontic life cycle?

4. Analyse the table and arrange in an appropriate order?

a) Floridian starch	a) Phycoerythrin	a) Gymnosperms
b) Flowers	b) Naked seeds	b) Red algae
c) Sporophyll	c) Gametophyte	c) Angiosperm
d) Strobilus	d) Fruit	d) Fern

5. What is meant by double fertilization?

3 Marks Questions

1. What are the differences between liverworts and mosses?

2. Write short notes about the pigments in different Algae?

3. What are the economic importance of Gymnosperms?

4. Mention any three characters that are considered in cytotaxonomic studies

5 Marks Questions

1-Each plant or group of plants has some phylogenetic significance in relation to evolution. Cycas, one of the few living members of gymnosperms is called as the 'relic of past'. Can you establish a phylogenetic relationship of Cycas with any

other group of plants that justifies the above statement?

CHAPTER-4
ANIMAL KINGDOM

SYNOPSIS

- Porifera includes multicellular animals, which exhibit cellular level of organization and have characteristics flagellated choanocytes.
- The coelenterates have tentacles and bear cnidoblasts.
- The platy helminthes have flat body and exhibit bilateral symmetry. The parasitic forms show distinct suckers and hooks.
- Aschelminthes are pseudocoelomates and include parasitic as well as non-parasitic roundworms.
- Annelids are metamerically segmented animals with a true coelom.
- The arthropods are the most abundant group of animals characterized by the presence of joined appendages; body surrounded by a tough organic or organic -mineral cuticle which functions as an exoskeleton; growth is by moulting (ecdysis),or moulting.
- The mollusks have a soft body surrounded by an external skeleton made of chitin.
- The echinoderms possess a spiny skin. Their most distinctive feature is the presence of water vascular systems.
- The hemichodertas are a small group of worm-like marine animals. They have a cylindrical body with proboscis, collar and trunk.
- Phylum Chordate includes animals. Which possess a notochord either through outor during early embryoniclife.
- Some of the vertebrates do not possess jaws (Anita) whereas most of them possess a jaw (Gnanosthamata).
- Agnatha is represented by the class Cyclostomata. They are the most primitive chordates and are ecto-parasites on fishes.
- Gnathostomata has two super classes, Pisces and Tetrapoda.
- Classes Chondrichthyes and Osteichthyes bear fins for locomotion and are grouped under Pisces.
- The Chondrichthyes are fishes with cartilaginous endoskeleton and are marine.
- Classes, Amphibian, Reptilian, Aves and Mammalia have two pairs of limbs and are thus grouped under Tetrapoda.
- The Amphibians have adapted to live both in land and water.
- Reptiles are characterized by the presence of dry and cornified skin. Limbs are absent in snakes. All reptiles are cold-blooded, which is why they warm themselves in the sun, and have bodies covered in dry, horny scales.
- Aves are warm-blooded animals with feathers on their bodies and fire limbs modified into wings for flying. Hind limbers are adapted for walking, swimming, perching, or clasping. Apart from mammals, birds are the only other class of warm-blooded vertebrates, thus able to survive in greater climatic extremes than for example reptiles and amphibians.

1 Mark questions MCQs

1. Identify the animal shown in diagram

   a. Tape worm
   b. pleurobrachia
   c. Neris
   d. Octopus

2. In the given diagram what does 'A' represent?

   a. Hooks

b. suckers
c. Flame cell
d. Ostia

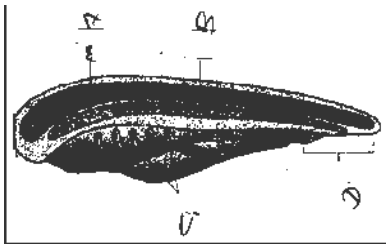
3. In which of the following phyla, while the adult shows radial symmetry, the larva shows bilateral symmetry?

a- Mollusca
b- Echinodermata
c- Arthropoda
d- Annelida

4. An excretory system is absent in

a. (A)Sepia
b. Crab
c. Starfish
d. Earthworm

5. Select the correct option for the region labeled as A, B and C in the given diagram?



a- A-nerve cord
B-Notochord
C-Gill slits
D-post anal part

b- A- nerve cord
B-Notochord
C-Post anal part
D-Gill slits

c- A- Notochord
B-Gill slits
C- Nerve cord
D- Post anal part

d- A- post anal part
B-Gill slits
C- Nerve cord
D- Notochord

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1.Assertion: Cnidoblasts are present on the tentacles and the body in cnidarians.
Reason: Cnidoblasts are used for anchorage defence and capture of the prey.
2. Assertion: Coelenterates are known as Radiata.
Reason: These are bilaterally symmetrical organism.
3.Assertion: The body of hemichordates is divisible into proboscis, collar and trunk.
Reason: Proboscis gland helps in digestion.
4. Assertion: Metamerism is the characteristic of phylum annelida.
Reason: Metamerism is one type of body segmentation.
5. Assertion: Aschelminthes are called as pseudocoelomates.
Reason: In aschelminthes, mesoderm is present as scattered pouches in between ectoderm and endoderm.

Case study

The organisms belonging to the phylum Echinodermata are exclusively marine. Till date, there have been no traces of any terrestrial or freshwater Echinoderms.

These are multicellular organisms with well-developed organ systems. All the animals belonging to this phylum share the same characteristics features. They are colourful organisms with unique shapes. They are ecologically and geologically very important.

The Echinoderms are found in sea-depths as well as in the intertidal zones. An interesting feature of the phylum Echinodermata is that all the organisms belonging to this phylum are marine. None of the organisms is freshwater or marine.

The water vascular system present in echinoderms accounts for gaseous exchange, circulation of nutrients and waste elimination.

1.What are the basic morphological features of echinoderms?

2. What type of digestive system echinoderms contain?

3.What system allows echinoderms to move around and attach to certain substances?

4. why are echinoderms called spiny-skinned animals?

5.Echinodermata are marine with

a. cell level organisation
b. tissue level organisation
c. organ level organisation
d. organ – system level of organisations

2 mark questions

1. Match the following.

A	B
1.Sea Horse	1. Clarius
2.2.Flyingfish	2.Hippocapus
3.AngelFish	3.Exocoetus
4.Magur	4.Pterophyllum

3. Write four differences between chordates and non-chordates?
4. Circulatory system in animals is of two types. Explain?
5. Distinguish between radial and bi-lateral symmetry?
6. Why is Ornithorhynchus considered as an exceptional mammal?
7. What is the a) protochordates
   b) homeotherms

3 Mark questions

1. There are two types of animals based on the arrangement of cells. Explain?
2. Cnidarians exhibit two basic body forms. Explain?
3. Condrichthyes and Osteichthyes are two classes of Pisces. Differentiate?
4. What is elephantiasis? How is it caused?
5. Write down the schematic classification of vertebrata
6. What are-
   a)nephridia b)Parapodia
7. What are the flying adaptations of Aves?
8. What are the basic fundamental features of animal classification?

5-mark questions

1. Mammals are the highly evolved among animals. Write the distinguishing features of them.
2. Compare a) Chordates and non-chordates
   b) Chondrichthyes and Osteichthyes.
3. Give an example for each of the following

A. A viviparous animal
B. A fish possessing a poison sting
C. A fish possessing an electric organ
D. An organ, which regulates buoyancy
E. Animal, which exhibits alternation of generation

3. (a)Provide appropriate technical term in the space provided.

a. Blood-filled cavity n arthropods_____.

b. Free-floating form of cnidaria_____.

c. Stinging organ of jellyfishes_____.

d. Lateral appendages in aquatic annelids_____.

(b)Give an example of the following

a. Roundworm

b. Fish possessing poison sting

c. A limbless reptile/amphibian

d. An oviparous mammal

CHAPTER-5

MORPHOLOGY OF FLOWERING PLANTS

SYNOPSIS

• The study of various external features of the plant is known as Plant morphology.

• The root system of the flowering plant begins its development from the hypocotyls of the embryo of the seed which gives rise to the primary root.

• Roots generally grow downwards in the soil (positively geotropic) and upwards (negatively geotropic). Root does not bear leaves and there of no nodes are present. Two kinds of root system can be distinguished in flowering plants: tap root system and adventitious root systems. Usually dicotyledons possess tap root system and monocotyledons adventitious root system.

• Flowering plants or angiosperms are the most recent, most advanced, most evolved, most conspicuous and abundant of all the plants. They appeared about 130 million years back but comprise about 3, 00,000 species with a marked diversity in their form and structure.

• A typical angiospermic plant has a distinct underground root system and aerial shoot system. The shoot system consists of branched or unbranched stem bearing leaves. The organs of a plant that serve sexual reproduction are the flowers. Part of the pollinated flower ripens and become the fruit.

1 Mark questions MCQs

1. The morphological nature of the edible part of coconut is

a) Perisperm

b) Cotyledon

c) Endosperm

d) Pericarp

2. In Bougainvillea thorns are the modifications of

a) Stipules

b) Adventitious root

c) Stem

d) Leaf

3. Coconut fruit is a

a) Drupe

b) Berry

c) Nut

d) Capsule

4. The term 'polyadelphous' is related to

a) Corolla

b) Calyx

c) Gynoecium

d) Androecium

5. Stems modified into flat green organs performing the functions of leaves are known as

a) Cladodes

b) Phyllodes

c) Phylloclades

d) Scales

6. Cotyledon of maize grain is called: -

a) plumule

b) coleorhiza

c) coleoptile

d) scutellum

7. Leaves become modified into spines in:

a) Silk Cotton

b) Opuntia

c) Pea

d) Onion

8. Which one of the following statements is correct

a) A proteinaceous aleurone layer is present in maize grain.

b) A sterile pistil is called a staminode.

c) The seed in grasses is not endospermic.

d) Mango is a parthenocarpic fruit.

9. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as :

a) Twisted

b) Valvate

c) Vexillary

d) Imbricate

10. Placenta and pericarp are both edible portions in:

a) Tomato

b) Potato

c) Apple

d) Banana

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1.Assertion: Leaves of monocot plants generally possess reticulate venation.

Reason: Leaves of dicot plants generally possess parallel venation

2.Assertion: The symbol for inferior ovary is G.

Reason: Adhesion is indicated by enclosing the figure within bracket

3.Assertion: The cymose type of inflorescence has limited growth.

Reason: In cymose inflorescence, the main axis terminates in a flower.

4.Assertion: In some flowers like lily, perianth is a term used when calyx and corolla are not distinct.

Reason: Calyx and corolla are the reproductive organs.

5. Assertion: Seed coat is the outermost covering of a dicotyledonous seed.
Reason: The seed coat has two layers-outer testa and inner hilum

Case study

The flower is the reproductive unit in the angiosperms. It is meant for sexual reproduction. A typical flower has four different kinds of whorls arranged successively on the swollen end of

the stalk or pedicel, called thalamus or receptacle. These are calyx, corolla, androecium and gynoecium. Calyx and corolla are accessory organs, while androecium and gynoecium are reproductive organs. In some flowers like lily, the calyx and corolla are not distinct and are termed as perianth. A flower may be trimerous, tetramerous or pentamerous when the floral appendages are in multiple of 3, 4 or 5, respectively. Androecium is composed of stamens. Each stamen which represents the male reproductive organ consists of a stalk or a filament and an anther. Gynoecium is the female reproductive part of the flower and is made up of one or more carpels. A carpel consists of three parts namely stigma, style and ovary. Ovary is the enlarged basal part, on which lies the elongated tube, the style. ovules within the ovary is arranged in a special manner.

1. Why is date palm referred to as dioecious?

2.What is placentation?
3.What is the term used for a plant bearing both male & female flowers?
4.What is the name given to the cotyledon in the case of Monocots?

5.Which among the following is not correct about embryo inside the seed?

a) An embryo contains cotyledons, radicle and plumule

b) Cotyledons store food and provide nourishment to the developing plumule and radicle

c) A plumule develops into roots

d) Cotyledons are also called as seed leaves

2 marks Questions

1. Write briefly about two different types of compound leaf with suitable example?

2. What are the modifications of a root? Give an example.

3. Differentiate between stolon and sucker.

4. Provide the scientific terms for the following:

(i) The leaf without a petiole (stalk)

(ii) The flat and expanded portion of a leaf

(iii) Orderly arrangement of leaves on the node

(iv) Lateral appendages on either side of the leaf

3 marks Questions

1. There are three types of flowers based on the position of ovary. Explain?

2. Generally there are three types of placentation in the ovary. Explain it with suitable example?

3. Androecium is composed of stamens. There are three types of stamens based on the union. Explain with suitable examples?

4. Potato is a stem and sweet potato is a root.' Justify the statement on the basis of external features.

5 Mark Questions

1. What is placentation? Explain the different types with suitable diagrams?
2. Explain the different types of stem modifications with suitable examples?
3. What is inflorescence? Explain the types with suitable examples?
4. Represent diagrammatically the ovaries with parietal and free central placentations and name an example for each of them.
5. Write five differences between a dicot seed and a maize seed.
6. Draw floral diagrams of Solanaceae.

HOTS QUESTIONS

1. Sunflower is not a flower. Explain.
2. How do you distinguish between hypogeal germination and epigeal germination? What is the role of cotyledon (s) and the endosperm in the germination of seeds?
3. Seeds of some plants germinate immediately after shedding from the plants while in other plants they require a period of rest before germination. The later phenomenon is called as dormancy. Give the reasons for seed dormancy and some methods to break it.

CHAPTER 6

ANATOMY OF FLOWERING PLANTS

SYNOPSIS

• Plant anatomy is regarded as the branch of botany, which considers the internal structure and organization of the plant.

• The group of cells at the growing points of a plant that are capable of cell division called meristem.

• Cells and tissue produced by apical meristems are primary tissue, whereas those produced by the vascular cambium and cork cambium are secondary tissue.

• The vascular cambium contains fusiform initials that produce the elongated cells of secondary xylem and phloem and ray initials that produce ray cells.

• The secondary xylem contains the same type of cells as the primary xylem, but the arrangement differs.

• In an old trunk, branch or root, the central xylem is heartwood and is dry with dead parenchyma. The outer, younger xylem is sapwood it is involved in water conduction and its parenchyma is alive.

• Cork cambium produce water resistant cork cells: the cork and all external tissue are the productive outer bark. Lenticels permit oxygen diffusion into the organ.

1-mark questions-MCQs

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B. Both A and R are true and R is not the correct explanation of A.
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D. A is False but R is true
E. Both A and R are false

1.Assertion: Each stoma is composed of two bean shaped cells known as guard cells.
Reason: Guard cells regulate the opening and closing of stomata.

2.Assertion: In a dicot stem, vascular bundles are conjoint, collateral and closed.
Reason: Vascular bundles are conjoint, collateral and open in monocot stem.

3.Assertion: Cuticle is also present in lower epidermal region of the leaf.
Reason: The lower epidermis contains a large number of stomata.

4.Assertion: The trichomes in the shoot system are usually multicellular.
Reason: These help in preventing water loss due to evaporation

5. Assertion: A simple tissue is made of only one type of cells.
Reason: Various simple tissues in plants are parenchyma, collenchyma and sclerenchyma

Case study

The epidermis covers the upper and lower surface of a leaf. The epidermis is usually a single layer of densely packed cells. It manages exchange between the plant and its environment by limiting water loss,

managing gas exchange, transmitting sunlight for photosynthesis, and deterring herbivores. The epidermis secretes a special waxy suberin cuticle, preventing water from evaporating from the leaf tissue. This layer may be thicker in the top epidermis in dry regions than in wet climates. The cuticle prevents water loss while also preventing carbon dioxide absorption and oxygen excretion. Stomata (singular, stoma), or "little mouths," perform these duties via regulating water loss, O2 release, and CO2 intake. Stomata are more plentiful in the lower epidermis of most leaves, decreasing water loss due to direct sunlight. The veins of leaves are predominantly made up of vascular tissue, with parenchymal pith and collenchyma around them

1.Name the type of tissue present in between upper and lower epidermis.

2.Write one structural difference between palisade and spongy parenchyma.

3.Name the parts of a leaf where you find vascular bundle.

4.Name one factor which determines the size of the vascular bundle in al eaf.

5.The upper and lower surface of the dicots leaf are known as

(1) adaxial and abaxial respectively

(2) abaxial and adaxial respectively

(3) Both A and B

(4) anterior and posterior respectively

2 Marks Questions

1. Write down the difference between stomata in dicot and monocot Plants?
2. Where are companion cells located in flowering plants? What is their function?
3. Name the kind of tissues that

a) Store starch in potato and

b) form the shell in nuts.

4. Give the structural and functional differences between parenchyma and collenchyma.
5. Mention two differences between shoot apex and root apex.
6. Where are companion cells located in flowering plants? What is their function?
7. What are sieve elements? How do they help the plants?
8. Differentiate between the pericycle of dicot root and that of a monocot root.
9. Why is heart wood dark in colour?
10. What are trichomes? State their functions.

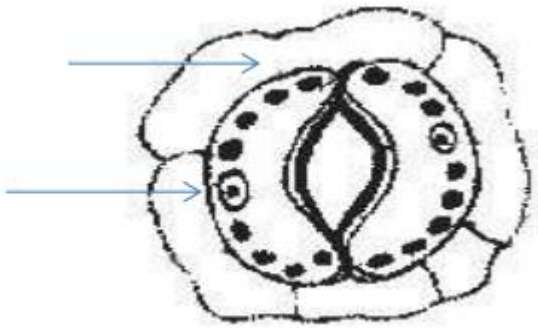
3 Marks Questions

1. What is cork cambium? Explain the functions?
2. What is annual ring? How is it formed?
3. State the differences in the function of collenchyma and aerenchyma.
4. What are medullary rays and what are their functions?
5. What is the difference between fibers and sclereids in plant histology? Give one example of each.
6. Differentiate between primary growth and secondary growth.
7. Differentiate between dicot stem and dicot root based on vascular bundles.
8. Observe the figure and answer the following questions:

   (i) Name parts which are shown.

   (ii) Are these types of stomata observed in monocot or in dicot plants?

   (iii)Which parts of stomata constitute the stomatal apparatus?



5 Marks Questions

1. Explain the anatomical structure of dicot leaf?
2. Describe three permanent tissues found in flowering plants. Write the functions of xylem and phloem.
3. Draw neat, labeled diagram of a cross section of maize root.
4. Describe secondary growth in a dicot root.

5. Describe the process of secondary growth in a dicot stem.

6. (i) Suppose you are examining a cross section of a stem under compound microscope; how would you determine whether it is monocot stem or dicot stem?

(ii) Write the characteristics of collenchyma.

HOTS QUESTIONS:

1.Deciduos plants shed their leaves during hot summer or in autumn This process of shedding of leaves are called abscission. Apart from physiological changes what anatomical mechanism is involved in the abscission of leaves?

2. Each of the following terms has some anatomical significance. What do these terms mean? Explain with the help of line diagrams.

a. Plasmadesmoses/ Plasmodesmata

b. Middle lamella

c. Secondary wall

CHAPTER 7

STRUCTURAL ORGANISATION IN ANIMALS

SYNOPSIS

• Histology is the study of the groups of specialized celled tissues that are found in most multicellular organisms. Histologists study the organization of tissues at all levels. From the whole organ down to the molecular components of cells.

• Cell of the epithelium are set very close to each other, separated by very thin films of extra cellular material. Cell junctions hold neighboring cells together. The epithelial tissue rest on a cellular basement membrane, which separates it from the underlying connective tissue.

• In holocrine glands the product of secretion is shed with the whole cell leading to its destruction e.g. Sebaceous glands.

• In merocrine glands, secretion accumulates below the free surface of the cell through which it is released with no loss of cytoplasm so the cell can function repeatedly, e.g.. Goblet cells.

• In apocrine glands only the portion of the cytoplasm is discharged along with the secretary product e.g. mammary gland.

• As the name suggest connective tissue provides the structural framework and support to different tissue forming an organ. It also places a role in body defense tissue repair fat storage.

• Haemoglobin is a conjugated protein made up a protein called globin and a Fe^{2+} (ferrous) containing tetrporphyrin ring called haeme. One molecule of haemoglobin binds four molecules of oxygen.

• Electron microscope reveals that the myofibrils are arranged in a number of sections, called sarcomeres, joined end-to-end all along the length of a muscle fiber. The sarcomeres are outlined by a very thin and comparatively dense Z-line. These are lined up adjacent t myofibrils and contribute to the striations visible with light microscope.

• Nerve fibers are collected in to bundles in a nerve in the same way as the muscle fibers in muscle. Each nerve fiber is covered with a continuous sheath, called neurolemma. The neurolemma sheath is made up of single layer of flat expanded Schwann cells.

• Morphology is the branch of biology that deals with the form and structure of an organism

or part, without regards to functions.

• Cockroaches possess three pairs of joined appendages, there are around 2600 species known throughout the world.

1 Mark questions MCQs

1. Which type of tissue correctly matches with its location?

a) Tissue: Smooth muscle; Location: Wall of intestine

b) Tissue: Areolar tissue; Location: Tendons

c) Tissue: Transitional epithelium; Location: Tip nose

d) Tissue: Cuboidal epithelium; Location: Lining of stomach

2. The function of the gap junction is to:

a) Stop substance from leaking across a tissue

b) Performing cementing to keep neighbouring cells together

c) Facilitate communication between adjoining cells by connecting the cytoplasm for rapid transfer of ions, small molecules and some large molecules

d) Separate two cells from each other.

3. Choose the correctly matched pair:

a) Areolar tissue - Loose connective tissue

b) Cartilage -Loose connective tissue

c) Tendon -Specialized connective tissue

d) Adipose tissue -Dense connective tissue

4. Ciliated columnar epithelium occurs in

a) Bile duct and oesophagus

b) Eustachian tube and stomach lining

c) Fallopian tubes and bronchioles

d) Fallopian tubes and urethra

5. Four healthy people in their twenties got involved in injuries resulting in damage and death of a few cells.Of the following, which cells are least likely to be replaced by new cells?

a) Osteocytes

b) Liver cells

c) Neurons

d) Malpighian layer of the skin

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1.Assertion: Frog has short alimentary canal.
Reason: Frogs are carnivores.

2.Assertion (A): Frog exhibit bilateral symmetry.
Reason (R): In bilateral symmetry, the body parts are arranged along a central axis. If the animal is cut through the central axis, we get two identical halves.

3.Assertion: There is hepatic portal system in frogs.

Reason : It is venous connection between liver and intestine in frog.

Case study

In frog the male and the female reproductive systems are well developed. The male reproductive system includes the following organs, a pair of testes, Vasa efferentia (10-12 in number) and a urinogenital duct that opens into the cloaca. The cloaca is a chamber which is used to pass the fecal matter, urine as well as sperms to the outside.The female reproductive system has a pair of ovaries, a pair of oviducts that open into the cloaca separately. A female frog can lay about 2500 to 3000 eggs at a time. External fertilization is seen in frogs and occurs in water.

1.How many pairs of cranial nerves arise from the brain of frog?

2.What is the shape of testes in male frogs?

3.Name the structures attach the testes to the kidneys in male frogs.

4.What are frog ears called and how do they work?

5.In frogs, vasa efferentia arises from the _____

a) Bidder's canal
b) Kidneys
c) Testes
d) Cloaca

2 Marks Questions

1. Write about the two different types of glandular epithelium?

2. Distinguish between

a. Simple epithelium and compound epithelium

b. Cardiac muscle and striated muscle

c. Dense regular and dense irregular connective tissues

3. Give the difference between simple epithelium and compound epithelium.
4. Draw the neat-labeled diagram of the following: i) Neural tissue ii) Areolar tissue.
5. Explain the structure of the following: i) adipose tissue ii) cartilage.
6. Write the names of appendages associated with the head of a cockroach.
7. Differentiate between male and female cockroach.

2 Marks Questions

1. Draw a neat diagram of digestive system of cockroach?
2. Explain the three different types of muscular tissue?
3. In animal tissues, specialized junctions provide both structural and functional links between individual cells. Explain the three different type of cell junctions?
4. Explain the three different types of epithelial tissues?
5. What are two kinds of glands? Give one example of each kind?
6. Write the functions of

   a) Spiracles

   a) Malpighian tubules

   b) Hepatic caeca

5 Marks Questions

1. Explain the mouth parts of Cockroach?
2. Describe the nervous system of any non-chordate you have studied
3. (a) Give the common name of Periplaneta americana.

   (b) How many spermathecae found in cockroach?

   (c) What is the position of ovaries in cockroach?

   (d) How many segments are present in the abdomen of cockroach?

   (e) Where do you find Malpighian tubules

CHAPTER 8 CELL: THE UNIT OF LIFE

SYNOPSIS

- All cells are prokaryotic. Prokaryotic lack membrane-bound organelles Specially, the DNA of prokaryotic cells is not enclosed within a membrane-limited nucleus. Eukaryotic ells have severed of membrane bound organelles, including a nucleus containing DNA.
- The cytoplasm of eukaryotic cells consists of a fluid cytosol and organelles located outside the nucleus. With rare exceptions, all eukaryotic cells contain a young nucleus, endoplasmic reticulum Golgi apparatus, various types of vesicles and mitochondria.
- The membrane system of a cell consists of the plasma membrane, endoplasmic reticulum Golgi complex and vesicles derived from these membranes
- All eukaryotic cells contain mitochondria, organelles that use oxygen to compete the metabolism of food molecules, capturing much of their energy has ATP. Cell of plant and some protests contain chloroplasts, which capture the energy of sunlight during Photosynthesis, enabling the cells to manufacture organic molecules particularly sugars from simple inorganic molecules.
- Genetic material DNA close is contain with in the nucleus, which bounded by the double membrane of nuclear envelope. Pores nuclear envelope regulates the movement of molecules between nucleus and cytoplasm. The genetic material of eukaryotic cell organized into linear strands called chromosomes, which consist of DNA and proteins.
- The nucleolus consists of the genes that code for ribosome synthesis, together with ribosomal RNA and ribosomal proteins. Ribosomes are particles of ribosomal RNA and protein that are the sites of protein synthesis.

1 Mark Questions- MCQs

1. Glycolipids in the plasma membrane are located at

a) Inner leaflet of the plasma membrane

b) The outer leaflet of the plasma membrane

c) Evenly distributed in the inner and outer leaflets

d) It varies according to cell types

2.The oxygen and carbon dioxide cross the plasma membrane by the process of

a) Active diffusion

b) Facilitated diffusion

c) Passive diffusion

d) Random diffusion

3. Microfilaments are composed of a protein called

a) Tubulin

b) Actin

c) Myosin

d) Chitin

4. Name an Organelle which serves as a primary packaging area for molecules that will be distributed throughout the cell?

a) Mitochondria

b) Plastids

c) Golgi apparatus

d) Vacuole

5. Name the process in which the membrane of a vesicle can fuse with the plasma membrane and extrude its contents to the surrounding medium?

a) Exocytosis

b) Endocytosis

c) Osmosis

d) Diffusion

6. The membrane around the vacuole is known as

a) Tonoplast

b) Elaioplast

c) Cytoplast

d) Amyloplast

7. Lysosomes are known as “suicidal bags” because

a) Parasitic activity

b) Presence of food vacuole

c) Hydrolytic activity

d) Catalytic activity

8. The fluidity of the plasma membrane increases with

a) Increase in unsaturated fatty acids in the membrane

b) Increase in saturated fatty acids in the membrane

c) Increase in glycolipid content in the membrane

d) Increase in phospholipid content in the membrane

9. _____ is the control center of the cell where DNA is found.

a) Nucleus

b) Lysosome

c) Ribosome

d) Vacuole

10. This is the organelle found in both plant and animal cells. It is responsible for producing energy for the cell.

a) Endoplasmic Reticulum

b) Chloroplast

c) Mitochondria

d) Golgi Apparatus

ASSERTION AND REASONING

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1.Assertion: Mesosomes are the infoldings of cell membrane. They helps in cell wall formation, DNA replication and respiration.
Reason: They increase the area of surface membrane.
2.Assertion : Cell wall is not found in animal cell.
Reason : Animal cells are covered by cell membrane.
3. Assertion: The endomembrane system comprises endoplasmic reticulum (ER), Golgi complex, lysosomes and vacuoles.
4.Reason: Mitochondria, chloroplast and peroxisomes are not the part of endomembrane system as their functions are not coordinated with the same
5.Assertion: The content of inner compartment of mitochondria is called matrix.
Reason: The outer membrane forms a number of infoldings called cristae.

Case study

Mitochondria have an inner and outer membrane, with an **intermembrane space** between them. The **outer membrane** contains proteins known as porins, which allow movement of ions into and out of the mitochondrion. Enzymes involved in the elongation of fatty acids and the oxidation of adrenaline can also be found on the outer membrane.The space within the inner membrane of the mitochondrion is known as the **matrix**, which contains the enzymes of the Krebs (TCA) and fatty acid cycles, alongside DNA, RNA, ribosomes and calcium

granules.The **inner membrane** contains a variety of enzymes. It contains ATP synthase which generates ATP in the matrix, and transport proteins that regulate the movement of metabolites into and out of the matrix.The inner membrane is arranged into **cristae** in order to increase the surface area available for energy production via **oxidative phosphorylation**.

1. What cell process occurs in the mitochondria?

2.Why do some cells have MORE mitochondria? Give an example.

3.What simple sugar is broken down in the mitochondria?

4.Where is this energy stored in glucose?

5.Why is the inner mitochondrial membrane folded?

2 Marks Questions

1.Are the different types of plastids interchangeable? If yes, give examples where they are getting converted from one type to another.

2. What are cell organelles? Name any two cell organelles that are commonly found in cells.

3. Differentiate between pili and fimbriae of bacteria.

4. What are plasmodesmata? What is their function?

5.What is middle lamella? What is it made of?

6. Name any four groups of organisms that have a cell wall.

7.Differentiate primary and secondary cell wall.

3 Marks Questions

1. What is meant by SAT chromosome? Explain with suitable diagram?

2. What is polysome? How is it formed?

3. Name and describe the different type of leucoplasts.

4. Describe the structure of a centriole.

5. What features show that the prokaryotic cells are primitive to the eukaryotic cells?

5 Marks Questions

1.Explain the structure of following with of suitable diagram:

a) Nucleus

b) Chloroplast

2. Describe the fluid mosaic model of membrane (supported by suitable diagram).

3. What is a centromere? Explain with a diagram the different positions of the centromere.

4. Draw the structure of –

a. Plant cell

b. Animal cell

5(a) Give the structural details of chloroplst.

(b) Draw its diagram.

CHAPTER 9

BIOMOLECULES

SYNOPSIS

- Living organisms contains huge range of macromolecules but they are built from a small Number of simple molecules
- The most abundant chemical in living organisms is water. There are thousands of small molecular weight (<1000 Da) biomolecules. Amino acids monosaccharide and disaccharide sugars fatty acids glycerol nucleotides, nucleosides and nitrogen bases are some of the organic compounds seen in living organisms
- There are 20 types of amino acids and five types of nucleotides. Fat and oils are glycosides in which fatty acids are esterifies to glycerol. Phospholipids contain, in addition a phosphorylated nitrogenous compound.
- Only three type of macro molecules that is proteins, nucleic acids and polysaccharides are found in living system
- Carbohydrates contain the elements, carbon hydrogen and oxygen. They are the first product made by plant in photosynthesis.
- Lipids contain carbon, hydrogen, oxygen, often phosphorus and occasionally nitrogen. Most are non- polar chemicals and therefore insoluble in water. Lipids are used for energy storage, Protection, and insulations. In living there are too many types of lipids: triglycerides and phospholipids.
- Proteins consist of chain of amino acids likened by peptide bonds. There are 20 different amino Acids in living things. All have a carboxylic acids group and amino group but differ in their R group.
- Enzymes are globular proteins with a precise but delicate, 3D shape maintained by ionic and Hydrogen bonds.

1 Mark Questions MCQs

1.Which biomolecule is distributed more widely in a cell?

a. Chloroplast

b. RNA

c. DNA

d. Sarcosomes

2.Name the simplest amino acid

a. Alanine

b. Tyrosine

c. Asparagine

d. Glycine

3. Haemoglobin has-

a. Primary structure

b. Secondary structure

c. Tertiary structure

d. Quaternary structure

4. The fastest enzyme is

a. DNA gyrase

b. Pepsin

c. DNA polymerase

d. Carbonic anhydrase

5. Enzymes enhance the rate of reaction by-

a. Forming a reactant product complex

b. Changing the equilibrium point of reaction

c. Combining with the product as soon as it is formed

d. Lowering the activation energy of the chemical reaction.

6. All the following are nucleosides except-

a. Adenosine

b. Guianosine

c. Cytosine

d. Uridine

7. A nucleotide is formed of-

a. Purine, pyrimidine and phosphate

b. Purine, sugar and phosphate

c. Nitrogen base sugar and phosphate

d. Pyrimidine, sugar and phosphate

8. A segment of DNA has 120 adenine and 120 cytosine bases. The total number of nucleotides present in the segment is

a. 120

b. 240

c. 480

d. None of the above

9. What are the most diverse molecules in a living cell?

a. Lipids

b. Proteins

c. Mineral salts

d. Carbohydrates

10. With reference to enzymes, which of the following statements is true?

a. Apoemzyme= Holoenzyme+ Coenzyme

b. Holoenzyme= Apoenzyme+ Coenzyme

c. Coenzyme= Apoenzyme+ Holoenzyme

d. Holoenzyme= coenzyme-Apoenzyme

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion: The long protein chain folds upon itself like a hollow ball giving rise to the tertiary structure.
   Reason : Tertiarystructure gives a 3-dimensional view of a protein.
2. Assertion: Palmitic acid has 20 carbon atoms including carboxyl carbon.
   Reason : Arachidonic acid has 16 carbon atoms including carboxyl carbon.
3. Assertion : Glycosidic bonds are formed by dehydration.
   Reason : In polysaccharides, individual monosaccharide is linked by glycosidic bond.
4. Assertion: All enzymes are not proteins.

   Reason : RNA molecules that possess catalytic activity are called ribozymes

5. Assertion: Inorganic catalysts work efficiently at high temperature.
   Reason : Enzymes get damaged at high temperature

Case study

Proteins are organic molecules that form muscles, transport O2 (hemoglobin), and act as hormones and enzymes. Most importantly, proteins determine how our bodies look and function. Their building block is the amino acid. Proteins are made of amino acids combined through a dehydration link called a peptide bond. When groups of amino acids are joined together, a protein is formed. There are about 20 different kinds of amino acids. These amino acids consist of five separate parts. The first is a central carbon atom. Second is a carboxyl group (-COOH). Third is an amino group (-NH2). Fourth is a hydrogen. The fifth group is a variable 'R' group. The only difference in the 20 kinds of amino acids is the "R" group. Some "R" groups are very small, others are large, and even others form chains and rings. The sequence and shapes of the "R" groups control the shape and function of the protein.

1. What are 2 of the functions of proteins?

a._____

b._____

2. What is the building block of proteins? _____

3. What is the name of the bond that joins amino acids? _____

4. How many different amino acids are there? _____

5. What part of the amino acid varies from one amino acid to another?_____

2 Mark Questions

1.Explain the composition of triglyceride?

2. Draw the structure of the amino acid, alanine?

3. What are fatty acids? Give two examples.

4. Differentiate between starch and cellulose.

5. Bring out the differences between fats and oils.

6.What are co- enzymes? Give examples. between prosthetic group and co enzymes. Give an example of each.

7. Mention a protein having quaternary structure. Name its polypeptide chain.

8. Which are the two control mechanisms regulate enzyme action?

9. Mention two structural features of prokaryotic DNA.

3 Mark Questions

1.The catalytic cycle of an enzyme action can be described in four steps. What are the steps?

2. i) What is meant by complementary base pairing?

i)What is the distance between two successive bases in a strand of DNA?

iii)How many base pairs are present in one turn on the helix of a DNA strand?

3.How does Ph of the medium influence the enzyme function? Explain along with a curve.

4.Write the general formula for monosaccharide, disaccharide, and amino acids.

5. Differentiate between glycogenesis and glycogenolysis? Where it occurs?

6. How does the heat increase rate of enzyme action?

5 Mark Questions

1.Listed below are some proteins. Write proper functions for each?

	Protein	Functions
	Collagen	
	Trypsin	
	Insulin	
	Antibody	
	Receptor	
	GLUT-4	

2. i) What will be the amino group if the R-group is

a) hydrogen b) methyl group c) hydroxyl methyl group.

ii) Draw the structural formula of any two of them.

3.Describe any five types of proteins based on their functions. Give an example.

4.How do enzymes accelerate the chemical reactions? Enumerate the steps in the catalytic cycle of enzymes.

5.Distinguish between primary, secondary, and tertiary structure of proteins.

6.What is cholesterol? Give its role in the body. How is it harmful?

7.What is glycosidic bond? Explain its formation with the help of an example.

HOTS QUESTIONS

1.Medicines are either man made (i.e., synthetic) or obtained from living organisms like plants, bacteria, animals etc. and hence the latter are called natural products. Sometimes natural

products are chemically altered by man to reduce toxicity or side effects. Write against each of the following whether they were initially obtained as a natural product or as a synthetic chemical.

a. Penicillin

b. Sulfonamide

c. Vitamin C

d. Growth Hormone

2. Select an appropriate chemical bond among ester bond, glycosidic bond, peptide bond and hydrogen bond and write against each of the following.

a. Polysaccharide

b. Protein

c. Fat

d. Water

3. Reaction given below is catalyzed by oxidoreductase between two substrates A and A', complete the reaction. A reduced + A' oxidized _____ + _____

CHAPTER 10

CELL CYCLE AND CELL DIVISION

SYNOPSIS

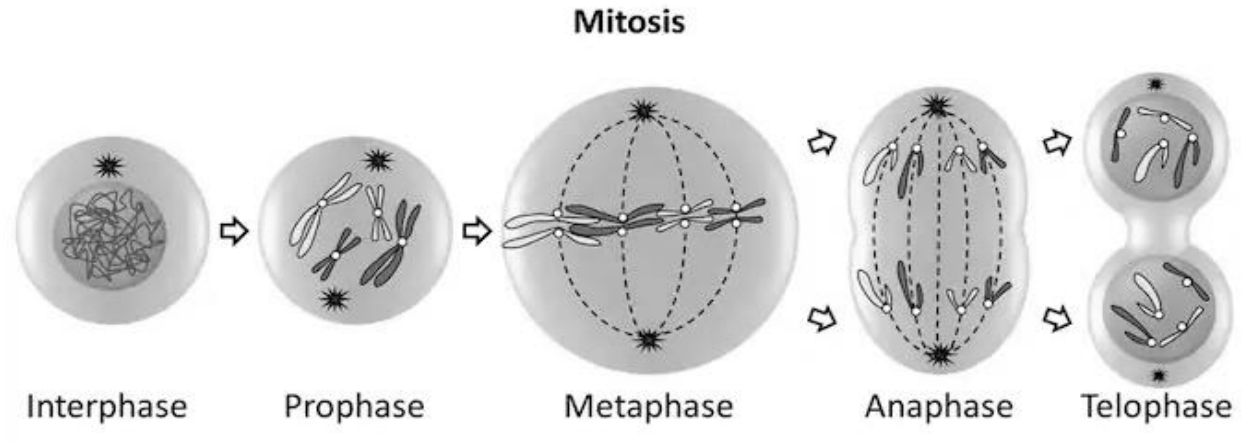
•Mitosis is the process of cell division. In mitosis, the chromosomes are copied and the divided equally the two new daughter cells. So each mitosis division produces two Cells, both diploid and each with exactly the same genes as the parent cell. In both animal and plant mitosis, cells are divided in to half by either a cleavage furrow or a cell plate in order to form two offspring cells.

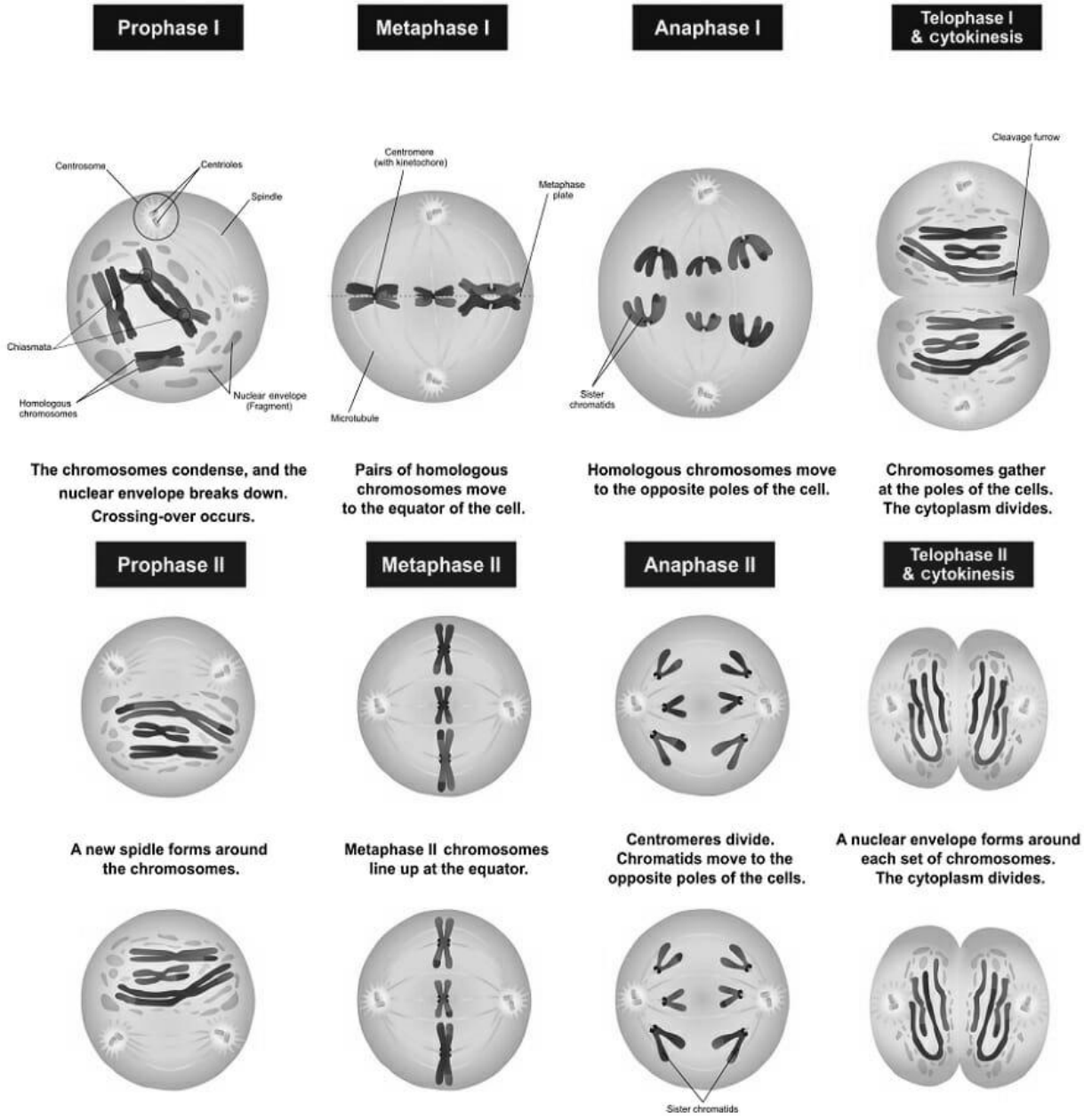
•In both animal and plant mitosis, 4 steps are carried out. Prophase, Metaphase and Telephase.

•Some cells in the body of the multicultural eukaryotic organism are not diploid. Gamete contains only one copy of each gene as they have only one set of chromosomes. These cells are haploid and are produced by a special type of cell division called meiosis.

•Meiosis serves two important purposes: it keeps the number of chromosome from doubling each generation, and it provide genetic diversity in offspring. In this it differs from mitosis, which is process of cell division that occurs in all somatic cells.

•The main difference between meiosis and mitosis are that meiosis occurs only in specialized cell rather than in every tissue; it produces haploid somatic cells; and each daughter cells in genetically differ from the others due to recombination and independent assortment of homologues, rather than genetically identical. The pairing of homologous chromosome and crossing over occurs only in meiosis.





<u>1 Mark questions- MCQs</u>

1. Synthesis of RNA and proteins take place in _____.

a) M phase

b) S phase

c) G1 Phase

d) G2 phase

2. When does synapsis occur during meiosis?

a) Zygotene

b) Leptotene

c) Diplotene

d) Pachytene

3. Crossing over occurs between _____.

a) Two daughter nuclei

b) Two different bivalents

c) Non sister chromatids of bivalents

d) Sister chromatids of bivalents

4. Colchicine arrests which of the following stages of cell division?

a) Anaphase

b) Telophase

c) Interphase

d) Metaphase

5. DNA replicates during _____

a) G1 phase

b) G2 phase

c) S phase

d) Prophase

6. Cell plate is laid during _____

a) Cytokinesis

b) Karyokinesis

c) Interphase

d) Metaphase

7. Spindle fibers are made up of _____

a) Spindles

b) Tubulin

c) Flagella

d) Humulin

8. Chromosomes are arranged along equator during _____

a) Prophase

b) Metaphase

c) Anaphase

d) Telophase

9. Polyploidy can be artificially induced by _____

a) Self-pollination

b) Line breeding

c) Inbreeding

d) Colchicine

10. What is congression?

a) Attachment of microtubule to chromosomes

b) Attachment of two sister chromatids

c) The endpoint of the spindle pole

d) The midpoint of two spindle poles

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

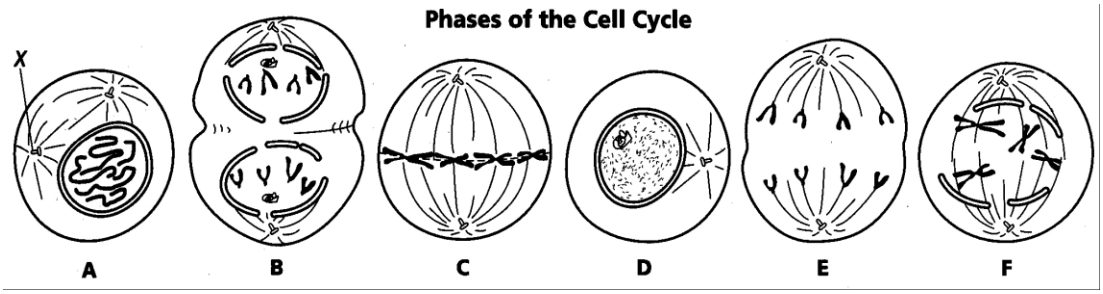
1.Assertion : Meiotic division takes place in reproductive cells.
Reason : Synapsis occurs during zygotene of meiosis.
2. Assertion : Meiosis is known as reductional division.
Reason : During meiosis, the chromosome number get reduce by half of its total number.
3.Assertion: Crossing over leads to recombination of genetic material on the two chromosomes.
Reason : It is the exchange of genetic material between two homologous chromosomes.
4. Assertion: The process of pairing of the chromosomes is called synapsis.
Reason : Synapsis occurs during leptotene stage.
5. Assertion: Variations are critical for the process of evolution.
Reason : Meiosis in creases the genetic variability in the population of organisms from one generation to the next.

Case study

The diagram below shows six cells in various phases of the cell cycle.

Note the cells are not arranged in the order in which mitosis occurs and

of the phases of mitosis occurs twice. Use the diagram to answer questions 1-6.



1) Cells A and D show an early and a late stage of the same phase of mitosis. What phase is it?

2) Which cell is in metaphase?

3) Which cell is in the first phase of mitosis?

4) In cell A, what structure is labeled X?

5) Place the diagrams in order from first to last.

6) Are the cells depicted plant or animal cells? Explain your answer.

7) What is the longest phase of the entire cell cycle?

2 Marks Questions

1.Why meiosis is called reduction division?

2.Differentiate between G1 and G2phases of interphase.

3.Mention any four points on the significance of mitosis.

4.Mention the events happening in Diakinesis.

5.a. What is the role of asters in cell division?

b. Define synaptonemal complex.

6.What are homologous chromosomes?

7.What brings about cleavage of an animal cell after telophase?

8.What are diplontic and haplontic life cycles?

3 Marks Questions

1.Define the following

2.a) Synapse b) Synaptonemal complex c) Bivalent

3.Define cytokinesis? How is it accomplished in plant and animal cells?

4.Why is the so-called resting stage, the interphase, considered the most active stage of cell cycle?

5.Why does a multicellular organism require two types of cell division?

5 Marks Questions

1.Enumerate the events that occur in Anaphase of cell division. Draw a labeled diagram of the cell in anaphase.

2.When does each of the following occur in mitosis?

a) The nuclear membrane disappears.

b) The chromosomes are the thickest.

c) Centromere divides into two.

d) Chromosomes begins to coil.

e) The nuclear membrane reappears.

3. Differentiate between mitosis and meiosis.

4. Draw a labeled sketch showing various stages of meiosis.

5. How does mitotic and meiotic anaphase differ?

CHAPTER 11

TRANSPORT INPLANTS

SYNOPSIS

- One fundamental aspects of life itself is the ability to transport specific substances to particular sites, moving molecules against the direction in which they would diffuse if left alone. After death occurs, atoms, ions and molecules diffuse, moving from regions of higher to lower concentration ,and organization of protoplasm decays; the disorder of the components increases. Diffusions also occurs during life but proceeds more slowly than the controlled and oriented transport processes that tend to increase the order within the plant or animalbody.
- Specific transport occurs at virtually every level of biological organization: Enzymes transport electrons, protons and acetyl groups; membranes transport material across themselves ;cells transport material into and out of themselves as well as circulate it within the protoplasm; whole organism transport water, carbohydrates, minerals and other nutrients from one organs to another between roots, leaves, flowers and fruits.
- Transport process consumes energy, and many are driven by the exergonic breaking of ATP's high energy phosphate-bonding orbital.
- In rooted plants, transport in xylem is essentially unidirectional, from roots to the stems. Organic and mineral nutrients however, undergo multidirectional transport.

Mark Questions MCQs

1. Ascent of sap is

a. Upward movement of water in the plant
b. Downward movement of organic nutrients
c. Upward and downward movement of water in the plant
d. Redistribution of inorganic substances in the plant

2. In xylem, the ascent of sap takes place in

a. Tracheids with associated xylem parenchyma
b. Xylem parenchyma
c. Walls of tracheary elements
d. Lumen of tracheary elements

3. Swelling of wooden frames during rains is caused by-

a. Endo osmosis
b. Imbibition
c. capillary

4. Root hairs absorb water from soil when

a. Osmotic concentration is same in the two

b. Solute concentration is higher in soil solution

c. Solute concentration is higher in root hairs

d. Absorption is active

5. Water potential is equal to

a. Ψ_S + OP

b. Ψ_S = TP

c. Ψ_P + Ψ_W

d. Ψ_P + Ψ_W

6. Purple cabbage leaves do not pass out colour in cold water but do so in hot water because

a. Hot water enters the cell faster

b. Pigment is not soluble in cold water

c. Hot water destroys cell walls

d. Hot water kills plasmalemma and makes it permeable

7. An example of selectively permeable membrane is

a. Plasmalemma

b. Cell wall

c. Mitochondrial membrane

d. Chloroplast membrane

8. Element involved in stomatal regulation its opening and closing is

a. Zinc

b. Magnesium

c. Potassium

d. Iron

9. Wilting in plants occurs when :

a. Phloem is blocked

b. Xylem is removed / blocked

c. Pith is removed

d. A few leaves are removed

10. A bottle filled with previously moistened mustard seeds and water was screw capped tightly and kept in a corner. It blew up suddenly after about half an hour. The phenomenon involved is.

a. Diffusion

b. Imbibition

c. Osmosis

d. DPD

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1.Assertion : During rainy season wooden doors get stuck and do not open and shut properly.
Reason : Due to the process of imbibition, volume of wooden items increases, when they come in contact of water.

2.Assertion : Upward movement of water is called ascent of sap.
Reason : Upward movement of water occurs through xylem and phloem.

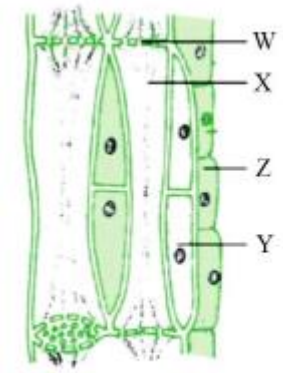
3.Assertion: During water apoplastic movement, water travels through the cells and their cytoplasm.
Reason: The symplastic movement of water takes place exclusively through the intercellular spaces and the walls of the cells

4. Assertion : In the ringing experiment, a narrow continuous band of issues external to the xylem is removed.
Reason : Ringing experiment proves the transport of solutes by phloem.

Assertion : Water and mineral uptake by root hairs from the soil occurs through apoplast until it reaches endodermis. Reason : Casparian strips in endodermis are suberized.

Case study

The food which is prepared by the process of photosynthesis in the leaves of a plant has to be transported to other parts like stem, roots, branches etc. Therefore this food is transported to other parts of the plant through a kind of tubes called phloem. The transport of food from leaves to other parts of a plant is called translocation. The food made by the leaves is in the form of simple sugar. Phloem is present in all the parts of a plant. Phloem is a long tube made of many living cells joined end to end. The living cells of phloem are called sieve tubes



(i) Identify the correct pair of labelled parts with the help of this figure.
(a) W – Sieve plate, Y – Companion cell
(b) X – Sieve plate, Z – Companion cell
(c) Y – Sieve tubes, Z – Sieve plate
(d) X – Companion cell, Y – Phloem parenchyma

The given figure is Lateral Section of phloem in which W represents sieve plate, X represents sieve tubes, Y represents companion cell and Z represents phloem parenchyma.

(ii) Name the labelled part which contains cytoplasm but no nucleus.
(a) Sieve tube
(b) Companion cell

(c) Phloem parenchyma
(d) Sieve plate Sieve tubes (X) are living cells which contain cytoplasm but no nucleus.
(iv) The phloem tissue in plants is responsible for the transport of
(a) amino acids
(b) hormones
(c) sugar
(d) all of these.
(v) Which of the following is not a part of phloem?
(a) Companion cells
(b) Tracheids
(c) Sieve plate
(d) Sieve tube

1-Mark questions

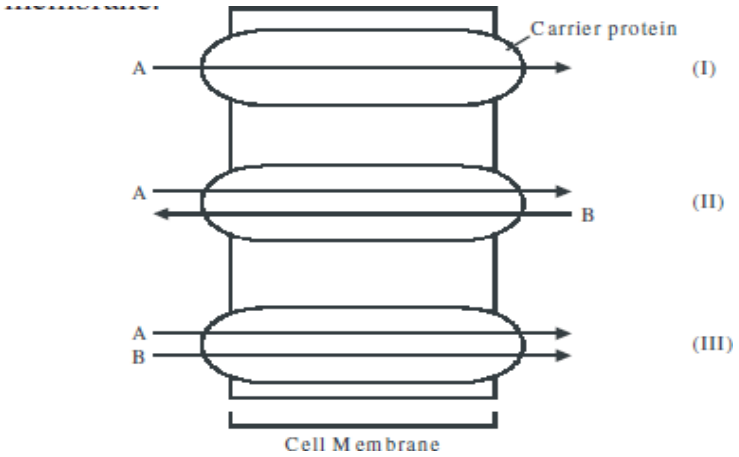
1. Water potential of a cell is affected by both solute and pressure potential. Write the relationship between them?
2. Transpiration is a necessary evil. Can you explain it with water relations in plants?
3. A farmer observed drops of water along the margins of leaves of tomato plants growing in his well-watered field on a winter morning. Give reasons for this occurrence. Why did the water drops appear only along the margins?
4. What is mass or bulk flow in plants? How is it achieved in plants?
5. What is imbibition pressure? What is the usefulness of imbibition pressure to seed germination?
6. Bring out the differences between turgid and flaccid cells

a. What is an isotonic solution?
b. What causes the leaves of the grasses to roll in dry weather?

7. Mention two conditions which lead to guttation.
8. How is transpiration different from Guttation? Give two points.

2-Mark Questions

a. Some carrier proteins present in the plasma membrane allows the movement of molecules in three ways. Explain?
b. How is the mycorrhizal association helpful in absorption of water and minerals in plants?
c. What forces are involved in the absorption of water from the soil by root pressures?
d. Differentiate between stomata and hydathodes.
e. Explain transpiration pull in plants.
f. Observe the given figure and give the answers of the following:
    a) Identify the process occurring in (I) and (II) and (III)
    b) Differentiate between the process II and III
    c) c)How many types of aquaporins form the water channels in the cell membrane?


Carrier protein
A
(I)
A
B
(II)
A
B
(III)
Cell Membrane

5 Mark Questions

1. Explain pressure flow hypothesis of translocation of sugar in plants?
2. With a suitable diagram write down an experiment showing osmosis?
3. a. Define osmosis.
   b. Demonstrate an experiment to show osmosis.
   c. Describe apoplast and symplast pathways.
4. Explain the factors that affect the rate of transpiration.
5. Minerals are present in the soil in sufficient amount. Do plants need to adjust the types of solutes that reach the xylem? Which molecules help to adjust this? How do plants regulate the type and quantity of solutes that reach xylem?

HOT QUESTIONS:

1. Keep some freshly cut flowers in a solution of food colour. Wait for some time for the dye to rise in the flower, when the stem of the flower is held up in light, coloured strands can be seen inside. Can this experiment demonstrate which tissue is conducting water up the stem?
2. When a freshly collected *Spirogyra* filament is kept in a 10% potassium nitrate solution, it is observed that the protoplasm shrinks in size:
   a. What is this phenomenon called?
   b. What will happen if the filament is replaced in distilled water?
3. Sugar crystals do not dissolve easily in ice cold water. Explain.
4. Salt is applied to tennis lawns to kill weeds. How do salting tennis lawns help in killing of weeds without affecting the grass?

CHAPTER 12

MINERAL NUTRITION

SYNOPSIS

- Among the mineral elements by the plants, all are not essential. Out of over 105 elements discovered so far, only about 20 have been found to essential for plant growth and metabolism.
- Analysis of xylem saps shows the presence of inorganic salts. By feeding plants with radioisotopes, it was shown conclusively that inorganic substances move up the plant trough xylem.
- Green plans are prepare most of their foods from simple substance, mostly water and carbon dioxide, through the process of photosynthesis. Such organism, which can prepare their own food through photosynthesis called, autotrophs. Some other organism, including non-green plants, which cannot make their own foods obtain their nutrition from autotrophy, are termed heterotrophy.
- Deficiency of any element in plants may leads to symptoms such as choruses, necrosis, stunted growth etc. Plants absorb minerals element through root by passive or active, absorption. The absorbed elements are then transported from the root to the xylems by apoplectic and simplistic pathways.
- Active mineral absorption requires an expenditure of energy by the absorbing cells. The energy is derived from respiration and is supplied through ATP.

1 Mark Questions MCQs

1. Root nodules of legume plants contain a pinkish pigment leg haemoglobin, It plays which of the following role?

a) It stimulate the growth of rhizobium colonies
b) b)It supplies good amount of oxygen to the cells
c) c)It helps more absorption of nitrogen from thesoil
d)It protect the enzyme Nitrogenase from the fatal effect of oxygen

2. Under the anaerobic conditions denitrifying bacteria such as pseudomonas can convert:

a) Nitrates to ammonia
b) Nitrites to nitrates
c) Nitrates to molecular nitrogen
d) Nitrates to nitrites
e) Molecular nitrogen to nitrates

3. What is concentration of micronutrients in the dry mass of plants per gram ?

(a) 1 to 10 mg
(b) 0.1 mg
(c) 0.1 mg or less than that
(d)10 mg or more than that

4. Which group is included in Macronutrients?

(a)H, Mn, S
(b) S, P, Ca, Mg

(c) Mn, Cu, N

(d) Na, Cl,

5. Which group is included in micronutrients?

(a)Mn, Cu, Mo

(b) Cl, Ni, Co, Mg

(c) C, H, O, N

(d) Cl, S, Ni, Fe

6. Out of the following, what is the function of Potassium ?

(a) ion balance

(b) stabilizes ribosomes

(c) Required for iron absorption

(d) In active site of many redox enzymes

7. Which is the correct sequence of enzymes for protein synthesis during N_2 fixation ?

(a) Nitrogenase □ Transaminase □ Glutamate dehydrogenase

(b) Glutamate dehydrogenase □ Transaminase □ Nitrogenase

(c) Hydrogenase □ Glutamate dehydrogenase □ Transaminase

(d) Transaminase □ Nitrogenase □ Glutamate dehydrogenase

8. Which amino acid acts as a main donor of amino group in transamination ?

a. Glutamic acid

b. Glutamine

c. Glutamate dehydrogenase

d. Glycine

9. Choose the incorrect pair.

a. Pulses – Nos\Nitrogenase - iron & molybdenum containing protein.

b. leghemoglobin - Oxygen carrying protein.

c. FAD - Floride Adenine Dinucleotide.

10. Which is the proper pair of ions and its deficiency symptoms?

a. Nitrogen - Induction of dormancy

b. Potassium - Scorched look to leaves

c. Phosphorous - Chlorosis

d. Zinc - Brown spots of fruit

ASSERTION AND REASONING

Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true and R is not the correct explanation of A.

C. A is true but R is false.

D. A is False but R is true

E. Both A and R are false

1. Assertion: Iron is a microelement.

Reason: Microelements are required in traces only, less than 1mg/gm of dry matter.

2. Assertion: The technique of growing plants in a nutrient solution is known as hydroponics.
Reason: Hydroponics is used for commercial production of vegetables such as tomato, seedless cucumber and lettuce.
3 Assertion: Some essential elements can alter the osmotic potential of a cell.
Reason: Osmotic potential can be regulated by potassium.
4. Assertion: Magnesium is important in photosynthesis and carbohydrate metabolism.
Reason: Mg++ is involved in the synthesis of nucleic acids.
5. Assertion: Certain essential elements are called structural elements of cells.
Reason: These essential elements are the components of certain biomolecules.

CASE STUDY

In facilitated diffusion, special proteins help to move the substances across the membrane, without expenditure of energy. When some proteins allow one kind of molecule to pass across independently, some proteins allow only if two types of molecules pass across simultaneously.

a. What types are given to such movements of two molecules simultaneously?
b. What are aquaporins?
c. Describe their two types.

2 Mark Questions

1.Observe the relationships between the first two terms and fill up the blanks

a. Symbiotic nitrogen fixation: Nitrogenase

a. _____: Glutamate dehydrogenase
b. Magnesium : Chlorosis
c. _____: Necrosis
3. What are chemotrophs?
4. Name two crops that are commonly produced by hydroponics.
5. Name the element that activates

a) Alcohol dehydrogenase b) Nitrogenase.

6. Name two micronutrients that are obtained by plants from water.
7. What are ion channels?
8. Name two bacteria that oxidise ammonia into nitrate.
9. Give two points to prove that elements are transported through xylem? Why are these elements known as mineral elements?
10. Name the enzyme involved in biological nitrogen fixation.
11. Name the substance that imparts pink colour to the root nodule of a leguminous plant and also mention its role.

3Mark questions

1. Under the anaerobic conditions denitrifying bacteria such as pseudomonas can convert
   a) Nitrates to ammonia
   b) Nitrites to nitrates
   c)Nitrates to molecular nitrogen
   d)Nitrates to nitrites
   e) Molecular nitrogen to nitrates
2. Match the following?

A	B

a) Magnesium
b) Sulpher
c)Iodine

a) Found in some amino acids
b) Not important for plants
c)Structural component of chlorophyll d)Manganese
d)Required for enzyme activity

3. Crop plants cannot grow well in nitrogen deficient soil while plants like Drosera and Nepenthes shows vigorous growth.
- Justify the statement?
- Mention any two-deficiency symptom shown by such crop plants?
4. The root system of pea plant is provided with a number of knob-like structures a)What is the use of these structures?
   b)Evaluate the role played by these structures for the above purpose?
   c)Name the derivatives of amino acids?
5. Immediately after manuring, farmers pour water on to their cultivated plants. Find out the reason?
6. Even though iron is absent in chlorophyll, its deficiency causes yellowing of leaf in plants.
- Give the reason.
- State if iron is a micro element or macro element?
7. Name the respective mineral nutrient element of plants that

i) is needed in the synthesis of auxins
ii) forms the core constituent of the ring structure of chlorophyll.
iii) Is a constituent of ferredoxin
iv) forms the component of nitrogenenase and nitrate reductase

8. A farmer adds azotobacter culture to the soil before sowing maize. How does it increase the yield of maize?
9. Why solute can reach up to endodermis through apoplast, but it moves through the endodermis by symplast.
10. Which part of plant body absorbs mineral nutrients?
11. Name the following:

(a) Bacteria which convert ammonia into nitrite.
(b) Bacteria which oxidises nitrite into nitrate.

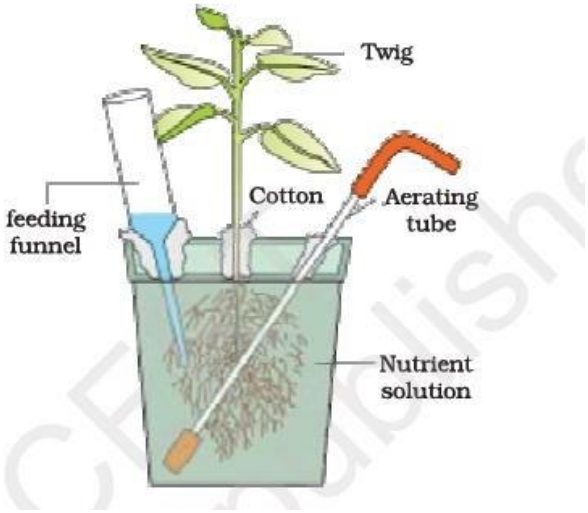
5Mark Questions

1. A farmer has grown a plant in a nutrient medium and found his plants with scorched leaf tips, shorter internodes, loss of apical dominance, bush habit etc.
- What will be your inference?
- What is the name of this culture?
2. Write about the different deficiency syndromes in plants?
3. Explain the following (i) Reductive amination (ii) Transamination
4. Describe the process of progressive reduction of one molecule of nitrogen during nitrogen fixation in leguminous plants.
5. How are essential elements classified on the basis of their function(s) in plants. Give an example for each.
6. Give the physiological role of the following in plants (a) Iron (b) calcium (c) potassium

(a) zinc (e) copper

HOT QUESTIONS:

1. **Carefully observe the following figure**



a. **Name the technique shown in the figure and the scientist who demonstrated this technique for the first time.**
b. **Name at least three plants for which this technique can be employed for their commercial production.**
c. **What is the significance of aerating tube and feeding funnel in this setup?**

CHAPTER 13

PHOTOSYNTHESIS IN HIGHER PLANTS

SYNOPSIS

- Photosynthesis literally means 'synthesis with help of light'. Photosynthesis is the only process on earth by which solar energy is trapped by autotrophic organism and converted into food for the rest of the organisms
- About 170 millions tones of dry matters are produced by this process annually, 90% of in the oceans.
- Only 0.2% of the light energy incidents on earth is utilized by photosynthetic organism, yet this amount of trapped energy meet the food requirement of all other heterotrophs.
- Fossil fuels such as a coal, petroleum and natural gas are also product of photosynthetic organisms' that lived millions of years ago.
- The atmospheres contains only about 0.03% carbondioxide by volume. But this small percentage represents about 2200 billion tones of it this amount of carbon dioxide is adequate supported photosynthesis for a few hundred years even if no further amount is added .The oceans of earth contain over 50 times the amount of atmospheric carbon dioxide in the form of dissolved gas of carbonates. From these two sources about 70 billion tons of carbon are fixed annually by photosynthesis.
- Chloroplast is the main centre of this process, which contain membranous sac called hyracoid having stacked arrangement called grand. Photosynthetic pigments and enzymes are present in integral lamellae and hyracoid membrane. The pigment differs in their sensitivity or wavelength of light, type of cell in which they are present and their association with a specific photosensitive system (PS).
- Chlorophyll, (of various types) is the principle photosensitive pigment.PS1 contains chlorophyll a (700nm). PS II has chlorophyll a that absorbs 680nm. The accessory pigments are carotenoides and phycobionts.
- Chlorophyll, particularly chlorophyll a , which act as a reaction centre, takes part in the photochemical reaction .Light energy is initially absorbed by various chlorophyll molecules and accessory pigments and funneled to the reaction centres.Together , these pigment from two type of photo system called , photosystem I and photosystem II. In photosystem I, chlorophyll a molecules, which absorb light maximum at 700nm, act as the reaction centre and is referred to as P 700. Chlorophyll a that has maximum absorption of 680 nm, is the reaction centre in photosystem II and and is referred to as P 680 .The flow of events during light reactions involves both photosystem I and II.
- Electrons released due to splitting of water initiate the electro transport chain. This leads to the formation of ATP and NADPH2,energy required for converting CO2 to carbohydrates.
- The chemical energy also called, assimilatory power stored in the form of ATP and NADPH2,is utilized for CO2assimilation of carbohydrate from CO2 take place in the stroma of chloroplasts.
- The enzyme Rubiscocatalyses the initial carbons reaction, in which Co2 combines with ribulose bisphosphate(RuBP), a 5-carbon compound. The product of this reaction is a 3 catrboncompound.3-phosphoglycerate.Hence, this pathway of carbon reactions is calledC3path way on the Calvin cycle..

- There is another path of the CO2 fixation called C4 pathway, which is different than the C3 pathway.The first product of the C4 pathway is a4-carban compound, oxaloaceticacid Occurrence of C4 pathway in certain plants (called C4plants) in nature is an outcome of a necessity. This necessity was to get rid of an apparently wasteful process of photorespiration. During photorespiration, there is a loss of fixed carbon (25 per cent) and no energy rich compound is produce.

1 Mark questions MCQs

1. Photorespiration occurs in

a) Four cell organelles
b) Two cell organelles
c) One cell organelle
d) Three cell organelle

2. Kranz anatomy is found in the leaves of

a) Wheat
b) Mustard
c) Potato
d) Sugarcane

3. Reduction of NADP occurs in

a) Oxidative photophosphorylation
b) Cyclic photophosphorylation
c) Non cyclic photophosphorylation
d) None

4. C3 and C4 plants differ with respect to

a) Number of ATP molecules consumed
b) First product
c) Substrate which accepts carbon dioxide
d) All

5. Electrons from the excited chlorophyll molecules of PS-II are first accepted by

a) Pheophytin
b) Ferredoxin
c) Cytochrome f
d) Cytochrome b

6. Maximum photosynthesis occurs in

a) Blue light
b) Red light

c) White light
d) Green light

7. The minerals involved in spitting reaction during photosynthesis is

a) Potassium and manganese
b) Magnesium and chlorine
c) Potassium and chlorine
d) Manganese and chlorine

8. The first product of C4 pathway is

a) PGA
b) DHAP
c) Oxaloacetate
d) Phosphoenolpyruvate

9. The two-pigment system theory of photosynthesis was proposed by

a) Aron
b) Blackman
c) Hill
d) Emerson

10. Non cyclic photophosphorylation results in the production of

a) NADH
b) NADPH
c) ATP
d) ATP and NADPH

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion: Chloroplasts mostly occur in mesophyll cells along their walls inside the leaves.
Reason: The membrane system of chloroplast is responsible for trapping the light energy and also for the synthesis of ATP and NADPH.
2. Assertion: Cyclic photophosphorylation synthesizes ATP.
Reason: ATP synthesis in cyclic photophosphorylation is not associated with NADPH formation.
3. Assertion: The stromal thylakoids are rich in both PSI and PSII.
Reason: The granal membranes are rich in ATP synthetase.
4. Assertion: Cyclic photophosphorylation synthesizes ATP.
Reason : ATP synthesise in cyclic photophosphorylation is not associated with NADPH formation.

5. Assertion : Oxidative phosphorylation requires oxygen.
Reason : Oxidative photophosphorylation occurs in mitochondria.

CASE STUDY

Two of the three products of light reaction, ATP and NADPH are used to drive the reactions in the biosynthetic/dark phase. It has been verified by the fact that immediately after light becomes unavailable, the biosynthetic phase continues for some time and then stops; if light becomes available again, the process continues.

a. What is the third product of light reaction?
b. Name the first stable product of photosynthesis.
c. What are the two phases in photosynthesis?
d. In photosynthesis, the light independent reactions take place at:
I. PSI
II. PS II
III. Stromal matrix
IV. Thylakoid lumen

2 Marks Questions

1. Two groups (A and B) of bean plants of similar size and same leaf area were placed to identical conditions. Group A was exposed to light of wavelength of 500-550nm.Compare the photosynthetic rate of the two groups giving reason.
2. Photorespiration pose a threat to plants, yet it occurs in angiosperm. Why?
3. Name the internal plant factors that determine the rate of photosynthesis.
4. Mention two conditions under which PSI only is functioning.
5.
a. What is meant by Kranz anatomy?
b. Write the significance of C4 cycle.

6. What is the most important function of PSII?
7. Why chlorophyll occurs in different forms?
8. Why do C4 plants are more expensive than C3 plants?

3 Marks Questions

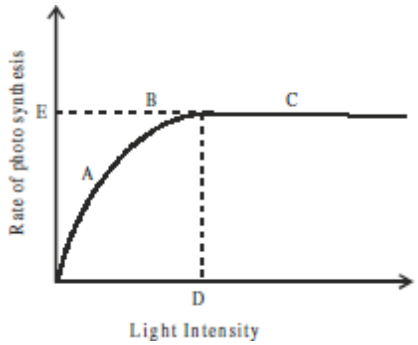
1. What is the law of limiting factors? How would the rate of photosynthesis be affected if the soil water becomes limiting? Explain.
2. Why are plants that consume more than the usual 18ATP to produce one molecule of glucose, favoured in the tropical regions?
3. Describe the effect of temperature on photosynthesis.
4. Differentiate between absorption and action spectrum.
5. The figure shows the effect of light on the rate of photosynthesis. Based on the graph, answer

the following questions :

(i) At which point(s) A, B or C in the curve, light is a limiting factor?

(ii) What could be the limiting factor(s) in region A?

(iii)What do region C and D represent on the curve?



5 Marks Questions

1. Describe the chemiosmotic hypothesis of ATP formation in the chloroplasts.

a. Describe three phases of Calvin cycle. Explain the significance of each of them.

b. Describe non- cyclic photophosphorylation in plants.

c. Explain the process of biosynthetic phase of photosynthesis occurring in the Chloroplast.

2. Describe Hatch and Slack pathway.

3. Give a schematic diagram of cyclic photophosphorylation and explain its importance.

4. Describe C4 pathway in a paddy plant. How is this pathway an aptive advantage to the plant?

CHAPTER 14

RESPIRATION IN PLANTS

SYNOPSIS

- Respiration is an energy releasing enzymatically controlled catabolic process which involves a stepwise oxidative breakdown of organic substance inside living cells. It takes place in all types in all living cells, even the photosynthetic ones that trap solar energy and store the same in organic compounds. The compounds that are oxidized during this process are known as respiratory substrates.
- The whole of energy contained in respiratory substance is not released all at once. It released slowly in a stepwise series of reactions controlled by enzymes. During the process of respiration, oxygen is utilized, and carbon dioxide water and energy are releases as products.
- Depending upon the availability of oxygen, respiration is classified into two major type: (1) aerobic respiration and (2) anaerobic respiration. In an aerobic respiration molecular oxygen is not needed.
- Glycolysis is process in which one molecule of glucose is converted to two molecules of pyruvic acid through a series of reactions involving several intermediate substances. Glycolysis is known as the Embden-Meyerhof-Pranas (EMP) pathway. All the glcolytic reaction take place inn the cytoplasm. The conversion of glucose to pyruvic acid though glycolysis is common to both anaerobic and aerobic respirations
- In the absence of oxygen, plants continue to produce carbon dioxide at least for some time and this pr oves that plants can respire anaerobically. It is curious that some microorganisms exist totally in anaerobic conditions. The term anaerobic respiration is usually applied with reference to higher plants (submerged roots of paddy plants) and the term fermentation is used for the anaerobic breakdown of sugars, proteins and other substance by bacteria and yeast. The end products of fermentation are carbon dioxide and other organic substance such as ethyl alcohol and lactic acid.
- In alcoholic fermentation the removal of carbon dioxide (decarboxylation) from pyruvic acid results in the formation of acetaldehyde, which in turn is reduced to ethyl alcohol by NADH formed earlier (during glycolysis) In lactic acid fermentation, pyruvic acid is directly reduced by means of NADH to lactic acid. Only 2 ATP molecules are produced during an aerobic glycolysis.
- On entering the mitochondrion pyretic acid is oxidized to acetyl CoA enters the TCA cycle is where it is oxidized further, yielding carbon dioxide and reduced coenzymes (NADH and FAZH2). The reduced coenzymes are regenerated in the electron-transport chain. The electron transport enzymes of the inner mitochondrial membrane transport the electron in an ordered sequence of molecular oxygen ultimately producing water.
- At the same time these enzymes transfer protons from the matrix to the outside of the membrane, giving rise to a proton gradient. The energy released by the flow is utilized top synthesize ATP by the ATP syntheses present in the f0-fi complex. The process is termed oxidative phosphorylation. The energy trapped in the high-energy bonds of ATP is utilized to drive the energy-requiring process.
- ATP is synthesised from ADP (adenosine diphosphate) and inorganic phosphate (pi). The reaction is called phosphorylation. It is endothermic or energy requiring.
- Compensation point is the value of pint in light intensity and atmospheric CO2

concentration when the rate of photosynthesis is just equivalent of the rate of respiration in the photosynthetic organs so that there is no net gaseous exchange.

- Pentose Phosphate Pathway is also know by other names like Hexose monophosphate shut (HMP) .The pathway is an alternate mechanism of glucose oxidation or respiration, which was first studied, by WARBRG et al (1938). It occurs inside the cytoplasm.

1Mark Questions MCQs

1. Oxidative phosphorylation is:-

a) Addition of phosphate group to ATP.

b) Formation of ATP by energy released from electrons removed during substrate oxidation.

c) Formation of ATP by transfer of phosphate group from a substrate to ADP

d) Oxidation of phosphate group in ATP

2. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins ?

a) Pyruvic acid

b) Acetyl CoA

c) Glucose-6-phosphate

d) Fructose 1,6-bisphosphate

3. R.Q. of anaerobic respiration is

a) Zero

b) Infinite

c) 1

d) > 1

4. Anaerobic respiration takes place in

a) Ribosome

b) Nucleus

c) Vacuole

d) Cytoplasm

5. What is true of Krebs Cycle?

a) ATP/GTP is formed

b) Two decarboxylations

c) Acetyl CoA combines with OAA

d) All the above

6. Oxidative phosphorylation is found in

a) Chloroplasts

b) Leucoplasts

c) Peroxisomes

d) Miochondria

7. How many ATP molecules can be produced through oxidative phosphorylation of $2NADH_2$ and $3FADH_2$

a) 15

b) 24

c) 6

d) 12

8. Pyruvic acid formed during glycolysis is oxidized to CO_2 and H_2O

a) Calvin cycle

b) Hill reaction

c) Krebs cycle

d) Nitrogen cycle

9. Which of the following exhibits the highest rate of respiration?

a. Growing shoot apex

b. Germinating seed

c. Root tip

d. Leaf bud

10. Electron Transport System (ETS) is located in mitochondrial

a. Outer membrane

b. Inter membrane space

c. Inner membrane

d. Matrix

ASSERTION AND REASONING

In the following questions, a statement of assertion is followed by a statement of reason.
Mark the correct choice as:

(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If both Assertion and Reason are false.

1. Assertion: Glycolysis is the first step of respiration in which glucose completely breaks into CO_2 and H_2O.
Reason: In this process, there is a net gain of twenty-four molecules of ATP.
2. Assertion: Glycolysis occurs in cytoplasm.
Reason: Enzymes for glycolysis are found in cytoplasm.
3. Assertion: The process of glycolysis is also known as EMP pathway.
Reason: There is very little transport of gases from one plant part to another.
4. Assertion: The incomplete oxidation of glucose into lactic acid or ethanol is fermentation.
Reason: In only prokaryotes, it takes place under anaerobic condition.
5. Assertion: Under aerobic conditions, pyruvate gives rise to lactate.
Reason: Under anaerobic conditions, pyruvate gives rise to acetyl CoA.

CASE STUDY

We know that aerobic respiration involves mitochondria, into which pyruvic acid is transported for further oxidation; it is completely oxidized into CO2 and water along with the formation of ATP.

1.Mention the sites in the mitochondria, where these events occur.
2. What happens to pyruvic acid before it enters Kreb's cycle?
3. Why is Kreb's cycle also called Citric acid cycle?

2 <u>Marks Questions</u>

1.Cell respiration takes place in Yeast and Dahlia
a) Which is the common phase?

b)Dahlia needs more energy. Which way will Dahlia get it?

2.Cellular respiration occurs both in prokaryotes and eukaryotes.

a) Where does it occur in prokaryotes?

b) In which cell organelle does it occur in eukaryotes?

3.A seed released 102 molecules of CO2 by utilizing 145 molecules of O2 during Germination.

a)Calculate the RQ value?
b)Name the respiratory substrate?

4.Which enzymes of citric acid cycle occur in the inner mitochondrial membrane?

5.What would be the RQ value of yeast if it were to respire glucose anaerobically?

6.Name the end products of glycolysis.

7.What do you mean by CO2 compensation point?

8.Define amphibolic pathway.

3-Marks Questions

1. Net gain of ATP during aerobic respiration is 36 from one molecule of glucose. Explain?

2.Incomplete oxidation of food materials in the absence of O2 is anaerobic.

a) Give an example of a microorganism which carries out anaerobic respiration?
b) Where does anaerobic respiration take place in humans?
c)What is the net gain of ATP during this process?

3.What is the significance of citric acid cycle?

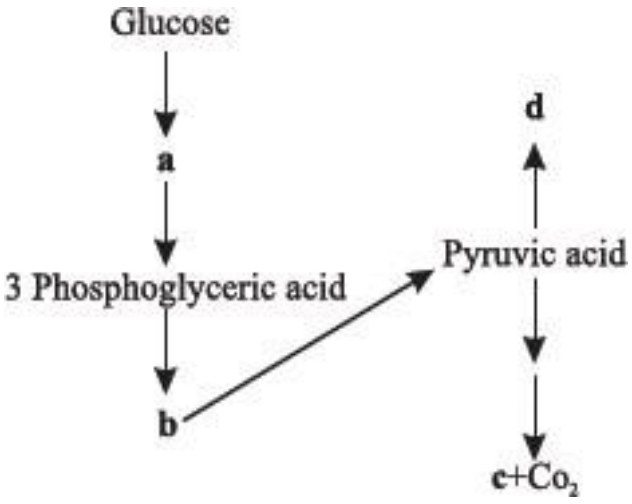
4.Give the schematic representation of an overall view of TCA cycle.

5 Marks Questions

1. Explain the mechanism of electron transport system operative in mitochondria highlighting the role of oxygen.
2. What is phosphorylation? Explain oxidative phosphorylation in plants.
3. What is glycolysis? Where does glycolysis takes place in a cell? Give schematic representation of glycolysis.

HOTS QUESTIONS:

1. If a person is feeling dizzy, glucose or fruit juice is given immediately but not a cheese sandwich, which might have more energy. Explain.
2. What is meant by the statement "aerobic respiration is more efficient."?
3. In the following flow chart, replace the symbols a,b,c and d with appropriate terms. Briefly explain the process and give any two application of it.



CHAPTER 15

PLANT GROWTH AND DEVELOPMENT

SYNOPSIS

- Growth, one of the most fundamental and conspicuous characteristic of living organisms, is the sum total of various processes that combine to cause an irreversible increase in mass weight of volume. In multicellular plant, growth is generally accomplished by the assimilation and fixation of inorganic substance from the surrounding environment. In plant it is generally confined to apical regions and in meristematic tissue.
- Almost all the plant experience a period of suspended growth and even a period of rest, which is referred to as dormancy.
- The dormancy in seeds many be due to impermeable and mechanically resistant seed coat, physiologically immature and rudimentary embryo, or even due to the presence of inhibitors. Dormancy can be broken or its period can be reduced by mechanical of chemical scarification of seed cat stratification of seed, and by changing the environment conditions.
- Cell division and cell enlargement followed by cell differentiation, result in growth. The rat of growth is slow in the beginning rapid thereafter, and then becomes stationary. The rate of growth of a plant or its organs can be measured with the help of an instrument, called auxanometer.
- Among the internal factors certain naturally occurring chemical substance, called growth regulators or phytohormones, are important. They include auxins, gibberellins, cytokinins, ethylene and abscisic acid.
- Auxins cause cell elongation, cell division in vascular cambium, root initiation and callus formation Auxins are also involved in apical dominance and abscission. Synthetic auxins are used as herbicides, rooting hormones and for prevention of pre-harvest fruit drop.
- Gibberellins cause the elongation of stems of genetically dwarf plants. The major sits of gibberellins production are embryos roots and young leaves. Gibberellins cause bolting of rosette plants and induce production of hydrolyzing enzymes in germinating seeds.
- Cytokine play a key role in the cell division, and specially help in delaying senescence and reducing apical dominance.
- Ethylene and abscise acid generally have a negative role and are responsible for immature falling of leaves, rapid fading of flowers, inhibiting germination etc. Some times, their negative role becomes beneficial for us, as inducing fruit ripening, breaking dormancy in potato, inhibiting the growth of duckweeds and stimulating the closure of stomata.
- Plant growth result from promotion and inhibition, mediated by the interaction of phytohormones.
- Plant development begins when the embryo in a dormant seed recommences its growth as various types of influences overcome the factors that impose dormancy. Availabity of water and oxygen and a suitable temperature are important requirements. As dormant seeds imbibe water, their metabolic activities are initiated and reserve food materials are mobilized. In many seeds, germination is controlled by light. Red light stimulate germination are far red light retards. In such seed germination is under control of the pigment phytochrome, which exist, in two interconvertible forms Pr and Pfr. Light requirements for germination can be substituted by gibberellins or cytokines. Abscisic

acids induces dormancy and gibberellins break it.

- Flowering in plants has a close relationship with the period's exposure to light. Some flowering plants are neutral toward the duration of light. Low temperature, in particular, has profound effect on growth and flowering of plants. This effect is referred to as vernalisation.
- Abscission is shedding of leaves, flowers or fruits by plants.

1 Mark questions- MCQs

1. Production of leaves and flowers is due to

a) lateral meristems
b) intercalary meristems
c) apical meristems
d) cortex

2. Seed dormancy is due to _____.

a) Ethylene
b) Abscisic acid
c) Starch
d) Lipase

3. Which one of the following pairs is not correctly matched?

a) IAA – Cell wall elongation
b) Abscisic acid – Stomatal closure
c) Gibberellic acid – Leaf fall
d) Cytokonin – Cell division

4. Coiling of garden pea tendrils around any support is an example of:

a) Thermotaxis
b) Thigmotaxis
c) Thigmonasty
d) Thigmotropism

5. Phytochrome is involved in:

a) Phototropism

b) Photorespiration

c) Photopeiodism

d) Geotropism

ASSERTION AND REASON

In the following questions, a statement of assertion is followed by a statement of reason.
Mark the correct choice as:
(a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.
(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
(c) If Assertion is true but Reason is false.
(d) If both Assertion and Reason are false.
1. **Assertion:** As a whole plant growth is indefinite.
Reason: Plants retain the capacity of continuous growth throughout their life.
2. **Assertion:** For the synthesis of protoplasm nutrients are required by plants which act as source of energy.
Reason: Water provides the medium for enzymatic activities needed for growth.
3. **Assertion:** Both at the root apex and the shoot apex, the constantly dividing cells show the meristematic phase of growth.
Reason: The cells of this region are rich in protoplasm and lacks nuclei.
4. **Assertion:** Sigmoid growth curve consists of four parts.
Reason: Lag phase is also known as grand phase of growth.
5. **Assertion:** The sum of growth and differentiation is development.
Reason: Development in plants is under the control of extrinsic factors only.

CASE STUDY

Plant growth involves three phenomena – differentiation, dedifferentiation and redifferentiation. The cells undergo differentiation to attain a form/ structure, to suit the function they perform.

a. What is dedifferentiation? Name two tissues formed by this process phenomenon.
b. What is redifferentiation?
c. Even differentiation can be considered as open, in plants as their growth. Justify

3 Marks Questions

1.Coconut milk and apple fruit extract are used in certain Plant Tissue culture experiment.

Why? Give reasons?

2.What is the difference between absolute growth rate and relative growth rate?

3.Write the full form of NAA and IBA

4.What regulates the apical dominance in plants?

5.What is the significance of vernalization plants?

4 Marks Questions

1.Explain sigmoid growth curve

2.A short day plant and a long day plant growing in your garden flower on the same day of the year.

3.How is it possible?

4.What is the scientific principle behind it?

5.What is senescence? Name the two types of senescence??

6.Describe an experiment that would demonstrate that growth stimulating hormone is produced at the tip of coleoptile.

5 <u>Marks Questions</u>

1.What is seed dormancy? What are the causes of seed dormancy?

2.List five main groups of natural plant growth regulators. Write a note on discovery, physiological functions and agricultural/horticultural applications of any one of them.

CHAPTER 16

DIGESTION AND ABSORPTION

SYNOPSIS

- Animals flourish on heterotrophic nutrition, which may be holozoic, saprozoic, parasitic and symbiotic. Enzymes, called **hydrolases**, digest food.
- **Holozoic nutrition** involves ingestion, digestion, absorption and egestion (feeding) of food.
- **Digestion** may be extra cellular or intracellular. Animals have evolved the alimentary canal with associated glands for extra cellular digestions.
- The human digestive systems have five functions: ingestion, peristalsis,digestion, absorption and egestion.
- The human alimentary canal is composed of 4 different layers of tissue: inner **mucosa. Sub mucosa, muscle layer and outer serosa.**
- Mechanical digestion involves mastication by the teeth and churning by the muscular stomach wall.
- Chemical digestion involves enzymes called **hydrolases,** which hydrolyse food substrates
- The stomach secretes gastric juice containing hydrochloric acid, pepsin, rennin and mucus.
- **Bile** is released into the duodenum from the gall bladder. It emulsifies fats and neutralizes the acids chime entering the duodenum from the stomach.
- **Pancreatic juice** containing a number of enzymes enters the duodenum from the pancreas. Digested food molecules are absorbed in the ileum by diffusion, facilitated diffusion or by active transport.
- The ileum is well adapted for absorption because it has a large surface area: it is very longest and it has a folder inner lining with villi and epithelial cells with microvilli.
- The undigested food is given out as faeces.

1 mark questions MCQs

1. Select what is not true of intestinal villi among the following
   a. They possess micro villi
   b. They increase the surface area
   c. They are supplied with capillaries and the lacteal vessels
   d. They only participate in digestion of fats
2. Hepato-pancreatic duct opens into the duodenum and carries
   a. Bile
   b. Pancreatic juice
   c. Both bile and pancreatic juice
   d. Saliva
3. One of the following is not a common disorder associated with digestive system
   a. Tetanus
   b. Diarrhoea
   c. Jaundice
   d. Dysentery

4. A gland not associated with the alimentary canal is
   a. Pancreas
   b. Adrenal
   c. Liver
   d. Salivary glands

5. What is the approximate length of pharynx in human?
   a. 25 cm
   b. 12.5 cm
   c. 11.5 cm
   d. 15.5 cm

6. The layers of wall of digestive duct from inner to outer are…….
   a. Muscular layer, Submucosa, Serosa, Mucosa
   b. Serosa, Submucosa, Mucosa, Muscular layer
   c. Mucosa, Submucosa, Muscular layer, Serosa
   d. Mucosa, Muscular layer, Submucosa, Serosa

7. What are Goblet cells?
   a. Mucus secreting cells
   b. Absorbing cells
   c. Enzyme secreting cells
   d. Phagocytic cells

8. Make the correct pairs

Column - I	**Column - II**	
(P) Lipase	(i) Starch	(A) (P-iv) (Q -ii) (R- i) (S - iii)
(Q) Pepsin	(ii) Cassein	(B) (P-iii) (Q -iv) (R- ii) (S - i)
(R) Renin	(iii) Protein	(C) (P-iv) (Q -iii) (R- ii) (S - i)
(S) Ptylin	(iv) Lipid	(D) (P-iii) (Q -ii) (R- iv) (S - i)

9. Fatty acids and glycerol are first absorbed by
   a. Lymph vessels
   b. Villi
   c. Blood capillaries
   d. Hepatic portal vein

10. Enzyme which does not directly act upon food substrate is
   a. Trypsin
   b. Lipase
   c. Enterokinase
   d. Amylopsin

(A) and Reason (R).

Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true and R is not the correct explanation of A.

C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion: Human beings have two sets of teeth during their life.
Reason: Human beings have thecodont dentition.
2. Assertion: Oesophagus pierces the diaphragm and enters the abdominal cavity.
Reason: Peristaltic movement starts from oesophagus.
3. Assertion: Chewing is one of the important process of digestion in animals.
Reason: It helps in enzyme action.
4. Assertion: Presence of HCl in stomach is necessary for the process of digestion.
Reason: HCl kills and inhibits the growth of bacteria in the stomach.
5. Assertion: Cardiac sphincter prevents regurgitation.
Reason: It prevents re-entry of food from small intestine to stomach.

Case study

Preeti has just read that protein digestion in the stomach is initiated by hydrochloric acid; the enzymes start digesting the proteins. But she cannot pin – point the function of HCl.

a. What is the role of HCl in protein digestion?
b. How is the milk protein digested in the stomach of human infants?
c. What is chyme?
d. The enzyme that is not present in succus entericus is _____.

I. Nucleases
II. Nucleosidase
III. Lipase
IV. Maltase

2 mark questions:

1. It is absolutely not necessary to produce amylase in an active form in our body, but it is not so, in the case of trypsin. Give reason.
2. How does human adult digest milk proteins and milksugar?
3. What would happen if the esophagus does not make a sharp angle before entering the stomach?
4. Draw(diagrammatic) and label the section of gut?

3 mark questions:

1. Trace the main steps in the digestion of proteins as the food passes through the alimentary canal in human beings.
2. Describe the structure of the typical tooth
3. Name three accessory digestive organs in humans.
4. Mention calorific values of carbohydrate, proteins and fats.
5. Draw the position of the stomach, Liver, and the pancreas with proper labeling.
6. What is the food substances transported through facilitated transport?
7. Draw and label the structure of villi.
8. Draw the sketch of anatomical regions of human stomach and label any four parts in it.

5 mark questions

1. You have eaten boiled rice at lunch time. Make a list of enzymes it will be acted upon and changes it undergoes before been absorbed in the small intestine.
2. a) Name the enzymes used in the digestion of

(i) Maltose
(ii) Diglyceride
(iii) Peptones
(iv) Lactose
(v) Nucleic acid

b) Mention the products formed as a result of digestion of above items.

3. Describe the hormonal control of digestive juices in human.

CHAPTER 17

BREATHING AND EXCHANGING EXCHANGE OF GASES SYNOPSIS

- Animals need to inhale oxygen for the breakdown of food produce energy. This process results in to the release of carbon dioxide. Carbon dioxide is armful for animals. Hence it is required to be exhaled. This entire process called respiration. Respiration involving oxygen is called aerobic respiration.
- Organisimic respiration is the process of gas exchange between a complex animal and its environment; cellular respiration is the process by which cells generate ATP through a series of reaction.
- The exchange of internal carbon dioxide with external oxygen is a fundamental requirement of all animals.
- In mammals lungs are the respiratory organs (pulmonary respiration).
- Humans have an organized respiratory system, with lung as the respiratory organs. Air enters into the lung through nasal cavity, pharynx, trachea and bronchi. Lung contains air sacs or alveoli, which are highly vascular for the function of gaseous exchange.
- Breathing involves two stages: inspiration during which atmospheric air is drawn in and expiration during which the alveolar air is given out. The movement of air into and out of the lungs is carried out by creating a pressure gradient between the lungs and the atmosphere.
- Tidal volume (TV): Volume of the air inspired or expired during a normal inspiration. It is approx. 500ml., i.e., a healthy man can inspire or expire approx. 6000-8000 ml of air per minute.
- Inspiratory reserve volume (IRV): Additional volume of air a person can inspire by a forcible inspiration. This averages 2500-3000 ml.
- Expiratory reserve volume (ERV): Additional volume of air a person can expire by forcible expiration. It averages 1000-1100 ml.
- Residual volume (RV): Volume of air remaining in the lungs even after a forcible expiration. This averages 1100-1200 ml. By adding up a few respiratory volumes above, one can derive various pulmonary capacities, which can be used in clinical diagnosis.
- Inspiratory capacity (IC): Total volume of air a person can inspire after a normal expiration. This involves tidal volume and inspiratory reserve volume (TI + IRV).
- Expiratory capacity (EC): Total volume of air a person can expire after a normal inspiration. This includes tidal volume and expiratory reserve volume (TV + ERV).
- Functional residue capacity (FRC): Volume of air that remains in the lungs after a normal expiration. This includes ERV + RV.
- Vital capacity (VC): The maximum volume of air a person can breathe in after a forced expiration. This includes ERV, TV and IRV or the maximum volume of air a person can breathe out after a forced inspiration.

- Total lung capacity: Total volume of air accommodated in the lungs at the end of a forced inspiration. This includes RV, ERV, TV and IRV or vital capacity + residual volume.

1 Mark Questions- MCQs

1. Which of the following factor affects the binding of O2 with the haemoglobin?
   a) Molecular structure of O_2
   b) Molecular structure of CO_2
   c) Molecular structure of haemoglobin
   d) Partial pressure of O_2

2. Which of the following helps lungs stay inflated?
   a) The ribcage
   b) The intercostal muscles
   c) The diaphragm
   d) The vacuum within the chest

3. Vital capacity of lungs of an average human is:
   a) 3000 - 4500 ml
   b) 1500 – 1800 ml
   c) 2000 – 2500 ml
   d) 500 – 1000 ml

4. Skin is an accessory organ of respiration in:
   a) frog
   b) rabbit
   c) human
   d) lizard

5. Under which condition more number of CO_2 binds to haemoglobin?
   a) When pCO_2 is high and pO_2 is low in the tissues.
   b) When pCO_2 is low and pO_2 is high in the tissues.
   c) When pCO_2 is high and pO_2 is low in the alveoli.

d) When pCO_2 is low and pO_2 is high in the alveoli

6. Which of the following is the volume of air inspired or expied during a normal respiration?

   a) Inspiratory Reserve Volume (IRV)

   b) Expiratory Reserve Volume (ERV)

   c) Tidal Volume (TV)

   d) Residual Volume (RV)

7. Mountain sickness at high altitude is due to:

   a) excess CO_2 in blood.

   b) decreased CO_2 in air.

   c) decreased partial pressure of oxygen.

   d) decreased efficiency of haemoglobin.

8. Normal breathing is called:

   a) Apnoea

   b) Dyspnoea

   c) Eupnoea

   d) Hyperpnoea

9. In crustacea respiration occurs through:

   a) Trachea

   b) Gills

   c) Book Lungs

   d) Book gills

10. Maximum amount (70% - 75%) of CO_2 transport occur as :

    a) dissolved in plasma

    b) Carbaminohaemoglobin complex

    c) Bicarbonate

    d) none of the above

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.

B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion: Inspiration occurs due to muscular relaxation.
Reason: During inspiration, the diaphragm and external intercostal muscle contract simultaneously.

2. Assertion: Alveoli are the primary sites for exchange of gases.
Reason: All factors in our body are favourable for diffusion of O2 from alveoli to tissues and that of Co2 from tissues to alveoli.

3. Assertion: The lungs are situated in thoracic chamber which is anatomically an air – tight chamber.
Reason: Such an arrangement is essential to avoid any change in pulmonary volume.

4. Assertion: Aerobic respiration involves the exchange of respiratory gases twice.
Reason: Exchange occurs from lung to heart and then heart to lung.

5. Assertion: If there is no air in trachea, it will not collapse.
Reason: Trachea is having the cartilagenous ring.

CASE STUDY

In human beings, the lungs are situated in the thoracic chamber which is formed dorsally by the vertebral column, ventrally by the sternum, laterally by the ribs, and on the lower side by the dome-shaped diaphragm. The anatomical setup of the lungs in the thorax is such that any change in the volume of the thoracic cavity will be reflected in the lung (pulmonary) cavity. Such an arrangement is essential for breathing. Breathing involves two stages – inspiration and expiration. During inspiration, the atmospheric air is drawn in and during expiration, the alveolar air is released out.

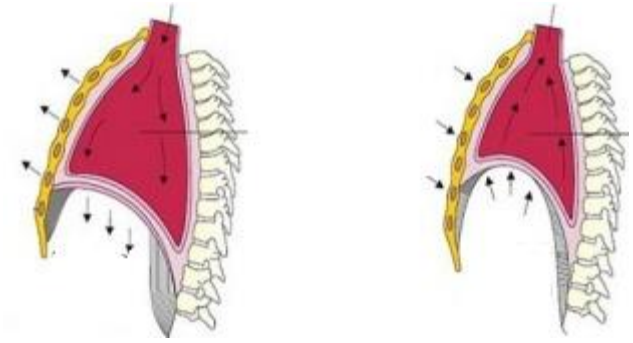
1.On average, a healthy human breathes _____ times/minute.
a.12 – 16
b.18 -20
c.70 – 72
d.80 – 84

2. Air is sucked into the lungs by_____ .
Ribs lift up
Diaphragm flattens
Ribs flatten
Both ribs lift up and diaphragm flattens

3.What term is used for the volume of air inspired or expired during normal respiration?
Tidal volume
Inspiratory Reserve Volume
Residual Volume
Vital Capacity

4.The residual volume of air is _____.
6000 to 8000 mL
2500 mL to 3000 mL
1000 mL to 1100 mL
1100to 1200 mL

5.The following statements are drawn as conclusions for the image shown.



I. The movement of air into and out of the lungs is carried out by creating a pressure gradient.
II. Expiration can occur if the pressure within the lungs (intra-pulmonary pressure) is less than the atmospheric pressure.
III. The diaphragm and a specialised set of muscles help in generation of pressure gradients.
IV. Expiration is initiated by the contraction of diaphragm which increases the volume of thoracic chamber in the antero-posterior axis.

Choose from below the correct alternative.

a. Only I is true
b. I and IV are true
c. III and II are true
d. I and III are true

2 Marks Questions

1. What are the adaptations seen in alveoli for breathing?
2. What is the role of carbonic anhydrase enzyme in the transport of gases during respiration?
3. Respiratory organs of king crab are called book gills. Why?
4. What are occupational respiratory disorders? What are their harmful effects? What precautions should a person take to prevent such disorders?
5. Explain the role of neural system in regulation of respiration is human.

3 marks Questions

1. How does exchange of respiratory gases take place in the alveoli? Explain.
2. How is haemoglobin useful in transporting respiratory gases?
3. Explain the process of expiration under normal conditions.
4. Give the values of PO2 and Pco2 respectively of each of the following :

(i) Alveolar air
(ii) Arterial blood
(iii) Venous blood

5. Draw a labelled diagram of a section of an alveolus with a pulmonary capillary

6. What is the role of diaphragm and intercostals muscles in the breathing?
7. What is respiratory quotient? Write the name of substrates in which RQ become less than one and above one?

5 Marks Questions

1. How do PO2, PCO2, H+ and temperature affect oxygen combining capacity with RBC?
2. Explain the major transport mechanisms for the co2?
3. How are the following caused?

(i) Wheezing

(ii) Emphysema

4. What happens to the people in high altitude? How is it overcome?

Passive smoking is much harmful than habitual smoking. Justify the

statement.

5. (a) Arrange the following terms based on their volumes in an ascending order

i. Tidal Volume (TV)

ii. Residual Volume (RV)

iii. Inspiratory Reserve Volume (IRV)

iv. Expiratory Capacity (EC)

(b) Complete the missing terms

i. Inspiratory Capacity (IC) =_____+IRV

ii. _____= TV + ERV

iii. Functional Residual Capacity (FRC) = ERV + __

7. (a) Name the organs of respiration in the following organisms:

i. Flatworm -

ii.Bird -

iii. Frog-

iv. Cockroach -

(b) Name the important parts involved in creating a pressure gradient between lungs and the atmosphere during normal respiration.

6. What happens to the people in high altitude? How is it overcome?

Passive smoking is much harmful than habitual smoking. Justify the statement.

7. (a) Arrange the following terms based on their volumes in an ascending order

v. Tidal Volume (TV)

vi. Residual Volume (RV)

vii. Inspiratory Reserve Volume (IRV)

viii. Expiratory Capacity (EC)

(b) Complete the missing terms

iv. Inspiratory Capacity (IC) =_____+IRV

v. _____= TV + ERV

vi. Functional Residual Capacity (FRC) = ERV + __

7. (a) Name the organs of respiration in the following organisms:

v. Flatworm -
vi. Bird -
vii. Frog-
viii. Cockroach -

(b) Name the important parts involved in creating a pressure gradient between lungs and the atmosphere during normal respiration.

CHAPTER 18

BODY FLUIDS AND CIRCULATION

SYNOPSIS

- All parts of body require nourishment and oxygen, and metabolic wastes needs to be removed from the body .These and some often functions are carried out by an extra cellular fluid, which flows throughout the body. This flow is known as circulations and the organs concerned constitute the circulatory system
- More advanced animals carry blood as the circulating fluid and a circulatory system with the heart and blood vessels to conduct the blood .In many invertebrates such as prawns and insects, the blood pumped by the heart comes out from blood vessels and flow through open space and channels in the tissues before returning to the heart .This called the open circulatory system.
- Vertebrates possess a closed circulatory system in which blood remains confined.
- Blood pumped by the heart passes through progressively smaller arteries to small and thence to capillaries; blood is returned from capillaries through veinules and progressively larger veins to heart. It never leaves the vessels normally .The valves located in the heart and blood vessels maintain the blood flow in single direction in the circulatory system.
- Plasma is a straw colored viscous fluid constituting nearly 55 percent of the blood. 90-92 percent of plasma is water and proteins contribute 6-8 percent of it. Fibronogin, globulins and albumins are the major proteins.
- Erythrocytes or red blood cells (RBC) are most abundant of all the cells in blood. A healthy adult man has, on an average, 5 million to 5.5 millions of RBCs.
- Erythrocytes, leucocytes and platelets are collectively called formed elements and they constitute nearly 45 per cent of the blood.
- Leucocytes are also known as white blood cells (WBC) as they are colorless due to the lack of hemoglobin. They are nucleated and are relatively lesser in number which averages 6000-8000 mm–3 of blood.
- As you know, blood of human beings differ in certain aspects though it appears to be similar. Various types of grouping of blood has been done. Two such groupings – the ABO and Rh – are widely used all over the world.
- ABO grouping is based on the presence or absence of two surface antigens(chemicals that can induce immune response) on the RBCs namely A and B. Similarly, the plasma of different individuals contain two natural antibodies (proteins produced in response to antigens). The distribution of antigens and antibodies in the four groups of blood, A, B, AB and O.
- Another antigen, the Rh antigen similar to one present in Rhesus monkeys (hence Rh), is also observed on the surface of RBCs of majority (nearly 80 per cent) of humans. Such individuals are

called Rh positive (Rh+ve) and those in whom this antigen is absent are called Rh negative (Rh-ve). **1**

mark Questions- MCQs

1. Largest number of white blood corpuscles are-
   a- Eosinophils
   b- Basophils
   c- Neutrophils
   d- Monocytes
2. Heart beat is
   a- Induced by hormones
   b- Voluntary process
   c- Dependent upon stimulation by nerve complex
   d- Auto inducing
3. Increase in number of leucocytes beyond normal indicates-
   a- Anemia
   b- Infection
   c- Increased defense against pathogens
   d- Non formation of RBCs
4. The sequence of cardiac cycle is-
   a- Atrial systole- ventricular systole- joint diastole
   b- Atrial diastole- atrial systole- ventricular diastole
   c- Atrial systole- ventricular diastole- ventricular systole
   d- Ventricular diastole- ventricular systole-atrial systole
5. For reaching left side of the heart, blood must pass through-
   a- Liver
   b- Kidneys
   c- Lungs
   d- Brain
6. In blood-
   a- WBCs are more than RBCs
   b- RBCs are more than WBCs
   c- RBCs are less than platelets
   d- Platelets are less than WBCs
7. The wave representing the ventricular diastole is-
   a- P

b- Q

c- R

d- T

8. Which factor is delaying in blood clotting-
   a- Vitamin K
   b- Hirudin
   c- Heparin
   d- All of the above
9. Mammalian heart is-
   a- Myogenic
   b- Neurogenic
   c- Digenic
   d- None of the above
10. Thrombokinase is produced in-
   a- RBCs
   b- WBCs
   c- Blood vessels
   d- Bold platelets

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false
1. Assertion: In lymphatic system, lymph is known as tissue fluid.
Reason: It comprises of plasma proteins, RBCs and WBCs.
2. Assertion: Type O blood group individuals are called 'universal donor'.
Reason: RBCs of O blood group consists both A and B surface antigens.
3. Assertion: Blood coagulates in uninjured blood vessels.
Reason: Uninjured blood vessels release an anticoagulant heparin.
4. Assertion: Left atrium possesses the thickest muscles.
Reason: Left atrium receives blood from the lungs.
5. Assertion: In the human heart, there is no mixing of oxygenated and deoxygenated blood.
Reason: Presence of valves in the heart allows the movement of blood in one direction only.

CASE STUDY

Leena and Rita are final year B.Sc students. Suddenly, their classmates Arun's mother needed blood transfusion; she is B positive. Leena and Rita made all efforts to find suitable blood donors from their college.
a. Which are the blood groups that are suitable for transfusion for Arun's mother?
b. Name the blood group known as universal donor.
c. Name the blood group referred to as universal acceptor.

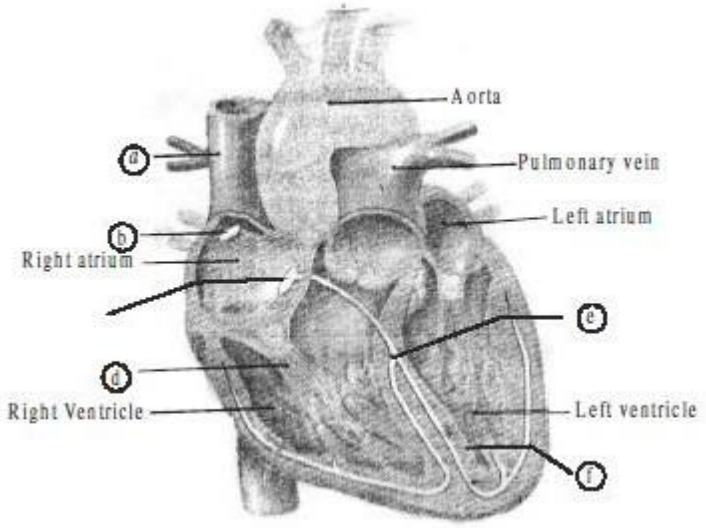
d.In an accident there is great loss of blood and there is no time to analyse the blood group. Which blood can be safely transferred?
I. O II. AB III. A IV. B

2 mark questions

1. Due to the developmental abnormality, the mass of left ventricle of an infant's heart is as thin as that of right ventricle. What would be its specific effect on circulation blood?
2. Which of the chambers of the human heart has thickest muscular walls? Why?
3. Explain why the blood flows at a slow speed in animals having open circulatory system. Give one example of such animals.
4. Explain the chemical events of blood clotting.
5. Define a cardiac output. What is its value?
6. Why does blood flow with jerk in arteries and not in veins?

3 mark questions

1. What is systemic circulation? Describe its importance. why are the walls of the ventricle more muscular than the walls of the atria?
2. Why is left ventricular wall thicker than the right ventricular wall in human heart? Describe the role of bicuspid valve in maintaining unidirectional low of blood in the heart?
3. Name the components of the formed elements in the blood and mention one major function of each of them?
4. Draw a standard ECG and explain the different segments in it.
5. Differentiate between Angina and Heart failure.
6. Label the following diagram



5 mark questions

1. Where and from which cells do platelets originate? What is their life span? How do they act when blood vessels get injured?
2. Describe step by step what happens in the different phase of cardiac cycle in humans.
3. Explain the regulation of cardiac activity
4. Explain the evolutionary change in the pattern of heart among the vertebrates.
5. What are granulocytes? Name the different types of granulocytes in a normal human and explain their functions.
6. Explain Rh grouping and the effects

Chapter 19

EXCRETORY PRODUCTS AND THEIR ELIMINATION

SYNOPSIS

- Excretion is the elimination of waste products from waste product from the body. Lungs excrete carbon dioxide and some water in the expired air. But non volatile solutes and water are primarily excreted in the urine. The urinary system consists of those organs of the excretory system which form, store and void urine.
- A major function of the excretory system is the excretion of nitrogenous waste product. These are mainly produced by the catabolism of proteins. Animals are ammonoletic, uric telic accordingly as they excrete ammonia, urea or uric acid as the principal nitrogenous waste product.
- Ammonotelic animals such as bony fishes excrete mainly ammonia because they get enough water to dissolve the highly toxic ammonia and excrete it speedily.
- Ureotelic animals such as mammals and sharks cannot readily get as much water is required for speedily excreting ammonia; so, they change ammonia to urea and excrete urea in the urine.
- Uricotelic animals such as birds and land reptiles have very limited access water. So, they change ammonia to insoluble uric acid, which may be swept out in the urine with minimum amount of water.
- Simple tubular systems like protonephridia, metanephridia, malpighian tubules, green glands, and the complex tabular like the vertebrate kidneys help in elimination of nitrogen containing waste.
- Human urinary system consist of two kidneys, which from the urine, two ureters which conduct the urine from kidneys to the urinary bladder, a urinary bladder for storage of urine and a urethra through which the urine is voided by bladder contractions.The kidneys contains many minutes tabular nephrons, which are located partly in the renal cortex and partly in the renal medulla. They form urine and drain it ultimately in to the pelvis of the kidneys, from where the ureter arises.
- Urethral sphincter guards the urethra. When enough urine accumulates in the bladder to raise its pressure sufficiently, the bladder wall contracts and urethral spincters relax due to reflex. This brings about micturition. The act may also be initiated or delayed voluntarily.
- Accessory excretory organs include the skin, lungs and liver. Skin excretes mainly water and sodium chloride in the sweat, and small amount of lipids and sterols in the sebum. Lungs excrete carbon dioxide and some water vapour.Liver excretes bile pigments and cholesterol in the bile.
- Each nephron start from a blind expanded end called the Bowman's capsule, closely applied to a tuft of capillaries called the glomerulus.The Bowman's capsule is followed by a highly tortuous proximal convoluted

tubule, a U shaped Henle's loop, a tortuous distal convoluted tubule and connecting tubule.

- The urine is mainly formed by the filtration of a protein – free filtrate from the blood of glomerular capillaries into the Bowman's capsule. The force for forming this glomerular filtrate is provided by the difference between the blood pressure in the glomerulus's and the sum of the osmotic pressure of the plasma proteins and the capsular filtrate pressure .Some substances of glomerular such as glucose, amino acids, and Na+ are reabsorbed actively and either largely or totally a combination of glomerular, tubular secretion forms the urine in nephrons.
- Haemodialysis, and in extreme cases transplantation of kidney from a histocompatible donor can save and/or prolong the life renal insufficiencies and malfunctions of various k

1 Mark Questions-MCQs

1. _____ facilitates reabsorption of water by the nephron.

a) Loop of the nephron

b) Medulla

c) Cortex

d) Pelvis

2. Ability of the kidneys for the production of concentrated urine is dependent on _____.

a) Active transport

b) Passive transport

c) Countercurrent mechanism

d) Diffusion

3. Accumulation of urea and other waste substances in the blood is called

a) Hemodialysis

b) Cystitis

c) Uremia

d) Urethritis

4. Correct sequence of urine formation is

a) Filtration, reabsorption, secretion

b) Secretion, reabsorption, filtration

c) Reabsorption, secretion, filtration

d) Reabsorption, filtration secretion

5. Glomerular filtrate passes from glomerular capsule into the _____

a) Loop of the nephron

b) Proximal convoluted tubule

c) Glomerular capsule

d) Convoluted tubule

6. If a man takes large amount of protein, he is likely to excrete more amount of

a) Glucose

b) Urea and uric acid

c) Water

d) Salts

7. In the kidneys, osmotic pressure controls _____.

a) Glucose absorption

b) Sodium absorption

c) Water absorption

d) none of these

8. Which one of the following statements is correct with respect to kidney function regulation?

a) During summer when body loses lot of water by evaporation, the release of ADH is suppressed

b) When someone drinks lot of water, ADH release is suppressed

c) Exposure to cold temperature stimulates ADH release

d) An increase in glomerular blood flow stimulates formation of Angiotensin II

9. Glomerular capsule and Convoluted tubules always lie within the _____.

a) Renal pelvis

b) Renal medulla

c) Renal cortex

d) None of these

10. Creatinine the waste product closely regulated by the brain and kidneys is the end product of the metabolism of-

a) Ammonia

b) Muscle

c) Nucleotide

d) Anaerobic

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.

C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1.Assertion: In the descending limb of Henle, the urine is hypertonic while in ascending limb, it is hypotonic.
Reason: Descending limb is impermeable to Na+ while ascending limb is impermeable to H20.
2. Assertion: Birds drink very little water and insects never consume.
Reason: They are uricotelic.
3. Assertion: The antidiuretic hormone increases the water permeability of distal convoluted tubule.
Reason: In absence of ADH, water re-absorption is considerably reduced.
4. Assertion: Ammonia should be removed from the body as rapidly as it is formed.
Reason: In water, ammonia is insoluble.
5. Assertion: Comparative to uric acid, urea is a more toxic excretory substance.
Reason: Birds and insects are uricotelic animals.

CASE STUDY

Radha has been reading the structure of a nephron and the role played by the different parts of it in urine formation and osmoregulation; but there are certain mistakes, and her elder brother helps her with a correct and detailed explanation.
a. What are the two major parts of a nephron?
b. What is a Malpighian corpuscle?
c. Where is urine filtered from? Why is it called ultrafiltration?

2 marks questions

1. Match the following

A	B
a. Flame cells	1. Cockroach
b. Nephridia	2. Planaria
c. Malphigian tubules	3. Earth worm
d. Green glands	4. Prawns

2. Explain micturition?
3. Write about excretory process in animals other than humans?
4. Draw and label the structure of malphigian body (renal corpuscle)?
5. A pigeon and a cat were fed on protein diet. In what different forms would they excrete nitrogenous wastes?
6. Mammals are ureotelic. What does this statement mean? State one advantage of ureotelism.
7. What is the importance of DCT in urine formation?

8. Which is the most harmful metabolite in your body? How is it excreted?

9. Mark the odd ones is each of the following -
   (a) Renal pelvis medullary pyramind, renal cortex, ureter.
   (b) Afferent arteriole, Henle's loop vasa recta efferent arteriole.
   (c) Glomerular filtration antiduretic hormone, hypertonic urine, collecting duct.
   (d) Proximal convoluted tubule, distal convoluted tubule,

Henle's loop **3 marks questions**

1. Excretion is the removal of wastes. Explain three different types of elimination of nitrogenous wastes in animals?
2. Draw diagrammatically and label the parts of nephron?
3. Explain briefly the regulation of kidney function?
4. Give a brief account of counter current mechanism?
5. What are Ammoniotelic, ureotelic and Uricotelic animals.? Give on example of each type of these.

5 marks questions

1. Explain the structure of human excretory system?
2. Explain the process of urine formation?
3. Explain the function of renal tubules?
4. Write about the disorders of excretory system?
5. Distinguish between (i) Uricotelism and Ureotelism (ii) Sebum and sweat (iii)Proximal and distal convoluted tubules (iv) Ascending and descending limbs of Henle's loop (v) Cortical and Medullary nephrons.

CHAPTER 20

LOCOMOTION AND MOVEMENT

SYNOPSIS

- Movement and locomotion are indispensable for all the vital activities among animals. This phenomenon is observed in all the animal form, ranging from the cellular protozoans to the multicultural and complex animals like humans.
- The three basic type of movements are**; amoeboid, ciliary** and **muscular movements.**
- Movements of body parts help to maintain body posture, to collect information, to carry out digestion of food and to perform the activities of internal organs. Most animal have developed contractile muscle fibers for carrying out movements and locomotion in association with the skeletal muscles. It many animals, muscle contraction moves bones of the skeleton like levers to produce body movements.
- In higher animals, the skeletal system participates in movement and locomotion in association of with the skeletal muscles. It also forms a supporting frame work for the body ,protects its softer internal organs, stores calcium and phosphorus, and houses the red bone marrow where the blood cells are formed
- In human, muscles are of three types-**skeletal, smooth** and **cardiac muscles.** Skeletal muscles are made up of myofibrils, which consist of sarcomeres. The myofibrils show light and dark bands represented by thin and thick filaments respectively, the thin are mainly made up of actin proteins and the thick filaments of myosin proteins. The heads of thick filaments form cross-bridge with actin during contraction of the muscles.
- Human skeleton consist of **bones and cartilages**. It provides mechanical support to the body and protects the soft vital organs. Skull, vertebral column, ribs and sternum form the skeleton .Limbs are attached to the axial skeleton with the help of girdles. The bones at joints and muscles act as lever to bring about movements.
- Bones articulate with each other at joints. Muscular contractions move the bones at joints. At fixed or fibrous joints, the articulating bones are firmly held together by the white fibrous tissue so that the bones are not allowed to move at such joints. At slightly movable or cartilaginous joints, the opposing surfaces of the articulating bones are joined by white fibro cartilage, allowing limited movements at the joint. At freely movable or synovial joints, a slippery synovial fluid occurs in the space between the articulating surfaces of bones; its lubricating action permits considerable movements at such joints. The synovial joints are classified into **ball-and-socket joints, hinge joints, pinot joints, gliding joints and ellipsoid joints** according to the movements they permit.
- Arthritis and osteoporosis are the widespread diseases related to bones affecting mainly the elderly person.

1 Mark Questions- MCQs

1. Red muscle is rich in
   a. Golgi bodies
   b. Mitochondria
   c. Lysomomes
   d. Ribosomes.
2. Joint between atlas and axis is
   a. Pivot
   b. Hinge
   c. Angular
   d. Saddle
3. The longest bone amongst the following is (B.V - 2003)
   a. Radius
   b. ulna
   c. Humerus
   d. Femur
4. Make correct pairs from the column -1 and column - II.

Column -I	Column - II
Types of synoviyal joint	Bones involved
(P) Ball and socket	(i) Carpal and metacarpal of thumb
(Q) Hinge	(ii) Atlas and axis
(R) Pivot	(iii) Frontal and parietal
(S) Saddle	(iv) Knee
	(v) Humerus and pectoral girdle

   a. (P-ii) (Q-iv) (R-ii)(S-v)
   b. (P-ii) (Q -iii) (R- i) (S - v)
   c. (P-iii)(Q-v) (R-iv)(S-ii)
   d. (P-v) (Q -iv) (R- ii) (S - i)
5. Joint between metacarpals and phalanges is (B.V - 2003)
   a. Ball and socket
   b. Pivot
   c. Saddle
   d. Hinge
6. ATPase needed for muscle contraction is present over
   a. Actin
   b. Troponin
   c. Myosin
   d. Actin

7. Gliding joint occur between

a. Prezygapophysis and postzygapophysis
b. Acetabulum and femur
c. Pelvis girdle and femur
d. All the above.

8. Synovial fluid is present in

a. Spinal cavity
b. Cranial cavity
c. Freely movable joints
d. Fixed joints

9. Synovial fluid is secreted by

a. Blood
b. Cartilage
c. Bone
d. Synovial membrane

10. During & vigorous exercise, glucose is converted into

a. Glycogen
b. pyruvic acid
c. Starch
d. Lactic acid

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1 Assertion: There are similarities between the locomotion of unicellular organisms and multicellular animals.
Reason: Ciliary, flagellar and amoeboid movements occur in unicellular organisms.

2. Assertion: Muscle fibre is a synctium.
Reason: Muscle fibre has a large number of parallelly arranged myofilaments in the sarcoplasm.

3. Assertion: The portion of the myofibril between two successive 'Z' lines is considered as the functional unit of contraction called sarcomere.
Reason: During contraction, 'I' bands get reduced whereas 'A' bands retain the length, thereby causing shortening of the sarcomere.

4. Assertion: Fatigue is the inability of muscle to relax.
Reason: It is due to lactic acid accumulation by repeated contractions.

5. Assertion: Mechanism of muscle contraction is explained by sliding – filament theory.
Reason: Contraction of muscle fibre takes place by the sliding of thick filaments over the thin filaments.

Case study

Sachin and Ramana have come caross red muscle fibres and white muscle fibres in their lesson; they have already studied about striated, smooth and cardiac muscle and are not sure of which of the three types of muscles will have these red and white fibres. But Sachin's mother, a doctor by profession helps them with the necessary information.

- What kind of muscle do the red and white fibres belong to?
- Why are they called red muscle fibres?
- Why can red muscle fibres work for long without getting fatigued but white muscle fibres get fatigued faster?
- _____ is a striated and involuntary muscle.

a. cardiac muscle
b. skeletal muscle
c. smooth muscle
d. chest muscle

2mark Questions

1. Write about the different types and number of bones in the forelimb?
2. What is meant by vertebro chondral ribs?
3. What is ribcage?
4. What is patella? Where is it found? What is its function?
5. What is tetany? How is it caused?
6. Why can a red muscle fibre work for a prolonged period, while a white muscle fibre suffers from fatigue soon?
7. Differentiate between bone and cartilage.
8. Expand the terms –
   a)HMM b)LMM
10. Draw a labeled diagram showing the electron structure of a myofibril.
11. State the role of calcium ions and ATP in muscle contraction.

3 mark questions

1. Explain the three different types of joints?
2. Write the differences between pectoral and pelvic girdle?
3. Explain about vertebral column?
4. Explain the structure of contractile protein?
5. Explain how locomotion takes place in Paramecium and Hydra?
6. What are joints? Give any two joints and where they are located?
7. Name the category of bones forming the ribcage. How are these articulated to each other to form the cage.

5 Mark questions

1. Explain the structure of different types of muscles?

2. Describe the structure of skull? And write the number of each bones?
3. What are the different movements exhibited by cells of human body?
4. Write about the disorders of muscular and skeletal system?
5. Explain the sliding filament theory.

HOT questions:

1An elderly woman slipped in the bathroom and had severe pain in her lower back. After X-ray examination doctors told her it is due to a slipped disc. What does that mean? How does it affect our health?

2. Rahul exercises regularly by visiting a gymnasium. Of late he is gaining weight. What could be the reason? Elaborate.

3. Radha was running on a treadmill at a great speed for 15minutes continuously. She stopped the treadmill and abruptly came out.For the next few minutes, she was breathing heavily/fast.
Answer the following questions.
a.What happened to her muscles when she did strenuously exercise?

a. How did her breathing rate change?

CHAPTER 21

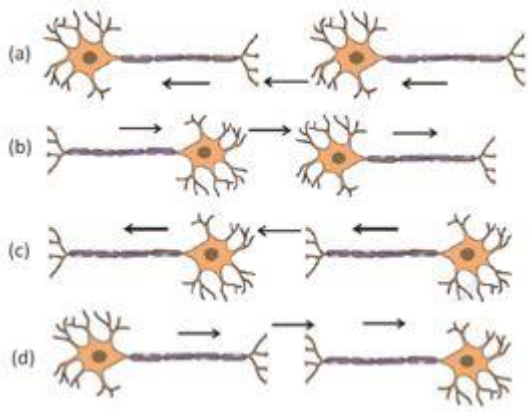
NEURAL CONTROL AND COORDINATION

SYNOPSIS

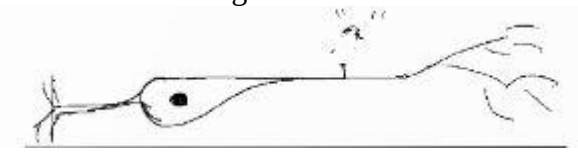
- In human, the nervous system, along with endocrine system, regulate the other system of the body and coordinate body function.
- The nervous system consists of the central nervous system composing of the brain and spinal cord, and the peripherals nerves coursing outside the central nervous system.
- The **central nervous system** contains nerves centers centers for all sensation and activities. Membranes, called meninges, cover the brain and the spinal cord. The cavities of the cerebral ventricles inside in the brain and the cavity between meninges contain the cerebrospinal fluid.
- The brain consists of the forebrain, the midbrain and the hindbrain.
- The **cerebrum** of the forebrain consists of two cerebral hemisphere and show many convolutions, called **gyri.** The cerebral cortex or the outer layer of the cerebrum is made of gray matter in which nerve cells are located. Different areas of cerebral cortex function as the highest centres for sensation and activities; e.g. the soma esthetic of general sensory area, motor area, visual area, auditory area and premotor area. **Hypothalamus** consists of scattered masses of gray matter in the white matter at the base of brain. It contains nerve centres for temperature regulation, hunger, thirst and emotional reactions and the autonomic nervous system. It secretes neurohormones controlling the secretion the anterior pituitary hormones. It synthesizes the posterior pituitary hormones and also controls their release from the posterior pituitary in to the blood.
- The **hindbrain** consists of **cerebellum** and **brain stem**. Cerebellum contains centers for maintenance of muscle tones, posture and equilibrium and also for modulating movements initiated by the cerebral cortex. The brain stem consists of **medulla oblongata and pons varoli**, and contains many centers for vegetative activities such as respiration, circulation and salivation.
- The **spinal cord** has the gray matter at its center and the white matter around it. Groups of nerve cells constitute spinal nuclei in the gray matter. Bundles of nerves fibres ascend or descend along the white matter forming the nerves tracts. The ascending tracts conduct nerve impulses coming from the peripherals tissues to the brain. The descending tracts conduct impulses down from the brain to be relayed ultimately to muscles and glands.
- **Peripheral nerves** are made of many fibres**. Afferent and efferent** fibers conduct impulses respectively from and to the peripheral tissue. Efferent and afferent fibers are also motor and sensory fibres because they cause muscles movement.
- Spinal nerves are mixed nerves and innervate peripheral tissues. In human being, thirty-one pairs of these nerves originate from the spinal cord.
- **Cranial nerves** originated from different regions of the brain and perform diverse functions. Twelve pairs of these nerves are present in the nervous system of man.
- Transmission across a synapse usually requires neurotransmitters because there is a small space, the synaptic cleft, which separates one neuron from another. The neurotransmitters released at the end of axons may be either excitatory or inhibitor

1 mark questions- MCQs

1. What is the correct flow of direction of impulses?



2. What does the diagram indicate and where is it found?

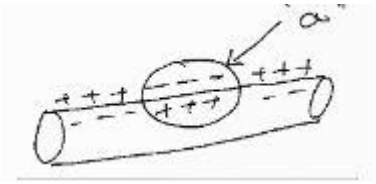


   a- Unipolar neuron in spinal cord
   b- Bipolar neuron in human eye
   c- Unipolar neuron in embryonic phase
   d- Unipolar neuron in human eye

3. Which of the following is adherent to brain?
   a- Arachnoid
   b- Pia mater
   c- Dura mater
   d- None of the above
4. Which of the following option indicated the correct order of bones in the internal ear?
   a- Incus- Malleus-Stapes
   b- Malleus- Incus- Stapes
   c- Stapes- Malleus- Incus
   d- Malleus- Incus-Stapes
5. Which of te following are the parts of autonomic nervous system-
   a- Limbic system and hippocampus
   b- Sympathetic and parasympathetic
   c- Sympathetic and limbic system
   d- Brain and spinal cord
6. Several statements are given here in reference to cone cells. Which of the following option indicates all correct statements for cone cells.
   i. Cone cells are sensitive than rod cells
   ii. They are responsible for color vision
   iii. Erythrolobe is the photo pigment which is sensitive to red light
   iv. They are absent in fovea of retina
   a- iii, ii and i
   b- ii, iii and iv
   c- iii and iv

d- i, ii and iv

7. a and b are the regions of limbic system
   a- a- thalamus; b- hypothalamus
   b- a-amygdala; b-thalamus
   c- a- hippocampus; b- hypothalamus
   d- a- amygdala; b- hippocampus
8. What does 'a' indicate in the given diagram?



   a- Repolarization
   b- Depolarization
   c- Resting potential
   d- Activation of Na+ pump
9. Which of the following is the toughest?
   a- Pia mater
   b- Dura mater
   c- Arachnoid
   d- All are delicate
10. Limbic system along with_____ regulates the sexual behaviour.
   a- Hypothalamus
   b- Thalamus
   c- Cerebral cortex
   d- Cerebrum

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion: Nerve conduction is the one-way conduction.
Reason: Nerve impulse is transmitted from dendrite terminals to axon terminals.
2. Assertion: The chemical stored in synaptic vesicles are termed neurotransmitters.
Reason: Synaptic vesicles release these chemicals in the synaptic cleft.
3. Assertion: Transmission of nerve impulse across a synapse is accomplished by neurotransmitters.
Reason : Transmission across a synapse usually requires neurotransmitters because there is a small space, i.e., synaptic cleft, that separates one neuron from another.
4. Assertion: The axonal membrane of the neuron is more permeable to sodium ion (Na+) and nearly impermeabe to potassium (K+).
Reason: In a resting state, neuron conducts impulses.
5. Assertion: Multipolar neurons have two or more axons and one dendrite.
Reason: Multipolar neurons are found usually in the embryonic stage.

CASE STUDY

The brain is the central information processing organ of our body and acts as the 'command and control system'. It controls the voluntary movements, balance of the body, functioning of vital involuntary organs, thermoregulation, hunger and thirst, circadian rhythms of our body, activities of several endocrine glands and human behaviour. It is also the site for processing vision, hearing, speech, memory, intelligence, emotions and thoughts. The human brain is well protected by the skull. Inside the skull, the brain is covered by cranial meninges consisting of an outer layer called dura mater, a very thin middle layer called arachnoid and an inner layer (which is in contact with the brain tissue) called pia mater. The brain can be divided into three major parts: forebrain, midbrain, and hindbrain.

1.) Left cerebral hemispheres and right cerebral hemispheres are connected by a _____

a) Cerebral cortex
b) Neurosecretory cells
c) Tract of nerve fibres
d) Limbic lobe

2.) Myelin sheath is also known as _____

a) Cerebral cortex
b) White matter
c) Corpus callosum
d) Limbic lobe

3.) Define hypothalamic hormones.

4.) Define Dura mater

2-mark questions

1. The human neural system is divided into two parts. Explain?
2. State the differences between action potential and resting potential?
3. How does ear convert sound waves into neural impulses?
4. Differentiate between rods and cones?
5. Illustrate the structure of a neuron?
6. What is meant by ear ossicles?
7. What is the difference between aquous and vitreous humor?
8. Distinguish between electrical synapses and chemical synapses.

3 mark questions

1. Explain the polarization of the membrane of a nerve fiber?
2. Distinguish between reflex action and reflex arc?
3. What are the functions of brain?
4. Write down the process of mechanism of vision?
5. Write down the process of hearing?
6. Draw a diagram of V.S of human eye and label the following:
   Iris, retina, Cornea, Blind spot, Ciliary body and vitreous chamber.

5 mark questions

1. The brain can be divided into three parts. Explain?
2. Long raw and explain the structure of eye?

3. Explain the structure of ear?

4. Explain the process of generation and conduction of nerve impulses?

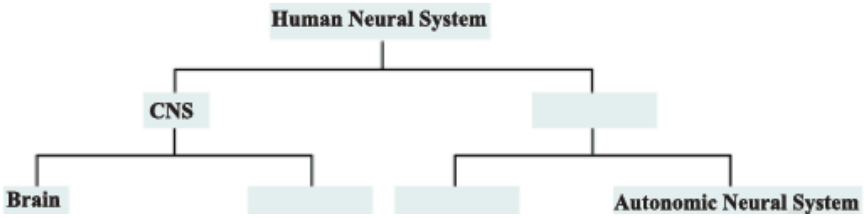
5. Give a brief account of

   (a) Mechanism of synaptic transmission?
   (b) How do you perceive the color of an object?
   (c) Blind spot and Yellow spot?
   (d) Myelinated and non-Myelinated axons?

6. Explain central nervous system?

7 The major parts of the human neural system are depicted below.

Fill in the empty boxes with appropriate words.



CHAPTER 22

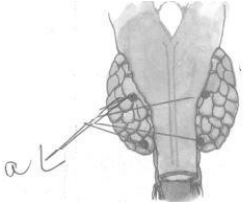
CHEMICAL CO ORDINATIONS AND INTERACTION

SYNOPSIS

- Special tissues are called endocrine glands produce hormones. They pass into the blood and act away from their site of produce hormones. They pass in to the blood and act away from their production. Hormones affect **target cells** and **target organs** in the body.
- In humans, more than a dozen tissue and organs produce hormones. Some including the **pituitary glands, the thyroid glands, the parathyroid glands and the adrenal glands** are endocrine specialists: their major function is to secrete one or more hormones. Others, such as the pancreas, ovaries and testes,secrete hormones in addition to their other functions together , these **glands** make up the human **endocrine system.**
- The brain maintains long-term control over physiological processes by synthesizing releasing hormones in the hypothalamus. Some neurosecretory cells in the hypothalamus synthesize two hormones (vasopressin and oxytocin),which are released into the blood from their axon terminals in the posterior pituitary, a distinct gland itself. The anterior lobe of the pituitary, another distinct gland, is connected to the hypothalamus by portal vein.
- Thyroid glands secrete thyroxin (T4) and tri-idothyronin (T3).These hormones of thyroid glands enhance metabolic rate, promote body growth and tissue differentiation. Iodine deficiency goiter is also accompanied by reduced thyroxin secretion.
- Parathyroid secrete parathormone or parathyroid hormone(PTH), which increase the blood calcium levels by increasing mobilization of bone calcium and renal absorption of calcium from the urine.
- Adrenal cortex secretes three groups of steroid hormones. They are **Mineralocorticoids, Glucocorticoids and Sex corticoids**
- The medulla of adrenal gland secretes adrenaline and nor adrenaline, which prepare the body for the high activity.
- The islet cells of the pancreas secrete insulin, which stimulate uptake and uses of glucose .They also secrete glucagons. Which has the opposite effect .Diabetes results from immunological distraction of the islet cells, reduced insulin secretion, or less of sensitivity to insulin.
- Interstitial (Leydig) cells of testes secrete testosterone.
- **Thymosins secreted by thymus stimulate** maturation of immune system cells. Melatonin controls skin colour in some animals. And appears to control annual reproductive cycles

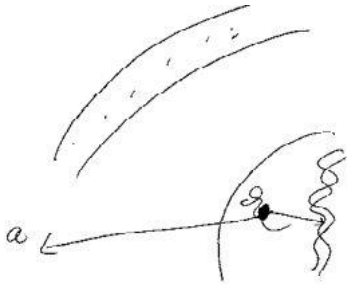
1 mark questions-MCQs

1. Which of the following is not effect of GH?
   a- Dwarfism
   b- Cretinism
   c- Development of all tissues
   d- Gigantism
2. Which of the following are effects of vasopressin?
   a- Increased glucose level
   b- High BMR
   c- Accumulation of fat under the skin
   d- Reabsorption of water and electrolytes
3. Which of the following pair of hormones maintain the Ca++ levels in the body?
   a- PTH and TCT
   b- PTH and aldosterone
   c- TCT and ADH
   d- T3 and T4
4. Which hormone is secreted by Zona fasciculate?
   a- ADH
   b- Mineralocorticoids
   c- Glucocorticoids
   d- Hydrocorticoids
5. Which gland atrophies after puberty?
   a- Thyroid
   b- Parathyroid
   c- Thymus
   d- Adrenal
6. What is related to a in the diagram?



   a- TCT
   b- TSH
   c- PTH

d- LH

7. What is the full form of ANF?
   a- Atrial Natriuretic Factor
   b- Atrial Natural factor
   c- Anti Natriuretic Factor
   d- Anti Nutrient Factor
8. Find the odd in terms of source-
   a- ANF
   b- Vasopressin
   c- Adrenaline
   d- Aldosterone
9. Which part of the following secrtetes LHRH
   a- Pars nervosa
   b- Hypothalamus
   c- Pars intermedia
   d- Pars distalis
10. Which of the following hormones follows the mechanism shown in the diagram?
11. 

   a- Progesterone
   b- Insulin
   c- Glucagon
   d- Adrenaline

Assertion (A) and Reason (R).

Answer these questions selecting the appropriate option given below:
A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true and R is not the correct explanation of A.
C. A is true but R is false.
D. A is False but R is true
E. Both A and R are false

1. Assertion: Failure of secretion of somatotropin from an early age causes dwarfism in the patient.
Reason : Somatotropin hormone stimulates the body growth and elongation of long bones.
2. Assertion: Neurohypophysis is under the direct regulation of the hypothalamus.
Reason: Neurohypophysis stores and releases two hormones called oxytocin and vasopressin which are actually synthesized by the hypothalamus.

3. **Assertion:** Failure of secretion of hormone vasopressin causes diabetes mellitus in the patient.
Reason: Vasopressin increases the volume of urine by increasing the reabsorption of water from the urine.
4. A**ssertion:** PTH is a hypercalcemic hormone.
Reason: It stimulates the process of bone resorption.
5. Assertion: Immune response of old persons become weak.
Reason: Thymus degenerates in old individuals.

Case study

Pancreas is a composite gland which acts as both exocrine and endocrine gland. The endocrine pancreas consists of 'Islets of Langerhans'. The two main types of cells in the Islet of Langerhans are called α-cells and β-cells. The α-cells secrete a hormone called glucagon, while the β-cells secrete insulin. Glucagon is a peptide hormone and plays an important role in maintaining normal blood glucose levels. Glucagon acts mainly on the liver cells (hepatocytes) and stimulates glycogenolysis resulting in an increased blood sugar (hyperglycemia). In addition, this hormone stimulates the process of gluconeogenesis which also contributes to hyperglycemia. Glucagon reduces cellular glucose uptake and utilization. Thus, glucagon is a hyperglycemic hormone. Insulin is a peptide hormone, which plays a major role in the regulation of glucose homeostasis. Insulin acts mainly on hepatocytes and adipocytes (cells of adipose tissue) and enhances cellular glucose uptake and utilization. As a result, there is a rapid movement of glucose from blood to hepatocytes and adipocytes resulting in decreased blood glucose levels (hypoglycemia). Insulin also stimulates conversion of glucose to glycogen (glycogenesis) in the target cells. The glucose homeostasis in blood is thus maintained jointly by the two – insulin and glucagon's. Prolonged hyperglycemia leads to a complex disorder called diabetes mellitus which is associated with loss of glucose through urine and formation of harmful compounds known as ketone bodies. Diabetic patients are successfully treated with insulin therapy.

1.) _____ Hormone produces anti-inflammatory reactions and suppresses the immune response.
a) cortisol
b) Glucocorticoids
c) Insulin
d) both a & b

2.) Hormone secreted by the α-cells of Islet of Langerhans
a) Cortisol
b) Glucocorticoids
c) Glucagon
d) Insulin

3.) Enlist the name of hormones secreted by α-cells and β-cells.
4.) Name the hormone which is involved in the regulation of glucose homeostasis.
5.) What is the main difference between hyperglycemia and hypoglycemia?

2 mark questions

1. What happens to the wall of distal convoluted tubule(DCT) of a nephron, when vasopressin is released by pituitary into blood stream?
2. Expand ANF? Where is it secreted from? What is its function?
3. What causes cretinism? Mention any two outward visible symptoms?
4. What happens to the glycogen concentration in the liver cells, when the

concentration of adrenaline in the blood stream increases?

5. A person is suffering from calcium deficiency in spite of taking a calcium rich diet. Explain how this condition occurs?
6. Why adrenal medulla is termed as the gland of emergency?
7. Androgens regulate the development, maturation and other important functions in human male. List them.

3 mark questions

1. Name a gland in humans acting as both endocrine and exocrine?
   (a)Mention the three endocrine secretions from this gland?
   (b)Write two principal action of each secretion?
2. A patient was complaining of frequent urination, excess thirst, hunger and tiredness. The fasting glucose level was found higher than 130mg/dl
   (a)Name the disease?
   (b)Give the root cause of this disease?
   (c)What are the control measures?
3. Due to some physiological reasons the blood glucose level of an otherwise normal person has shot up above normal. How will this condition return to normal through hormonal action?
4. What are the effects of hyper thyroidism?
5. Pituitary gland is considered as the master gland. Explain?
   Describe the significance of thyroid gland in human body?
6. Define hormone and classify them on basis of their chemical nature.

5 marks questions

1. Write briefly about the mechanism of hormonal action?
2. Explain the function of pancreas?
3. What is the function of testis and ovary with respect to hormones?
4. Explain the structure and function of thyroid gland?
5. Diagrammatically indicate the location of various endocrine gland in our body?
6. Explain briefly the various types of disorders resulting from malfunctioning of thyroid gland.
7. Explain the mechanism of hormone action which helps in various physiological and development effect? Also, define the role of second messenger in this process.

HOTS questions

1.A patient complains of constant thirst, excessive passing of urine and low blood pressure. When the doctor checked the patients' blood glucose and blood insulin level, the level were normal or slightly low. The doctor diagnosed the condition as diabetes insipidus. But he decided to measure one more hormone in patients' blood. Which hormone does the doctor intend to measure?

2. You have learnt that a characteristic feature of endocrine system is the presence of feedback loops. By this what is meant if hormone A stimulates gland 'X' to secrete hormone B, the production of 'A' could be modified when the level of B changes in our blood. An example is the relation between hormones LH and estrogen (E2)
3. An old woman exhibits the following features. High levels of LH in blood but low levels of E2 in the blood. Another woman exhibits high level of LH in blood and also high level of E2 in the blood. Where is the defect in both these women? Provide suitable diagram to support this answer.
4. A milkman is very upset. One morning as his cow refuses to milk. The milkman's wife gets the calf from the shed. On fondling by the calf, the cow gave enough milk. Describe the role of endocrine gland and pathway associated with this response?

مـــدرسـة دلهـي الخـاصـة ذ.م.م.

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DPS SHARJAH

PERIODIC TEST I (Sample paper)(2022-23)

Subject: Biology **Grade: XI**	**Max. Marks:35** **Time:**

Name:	**Section:**	**Roll No:**

General Instructions:

- ***All questions are compulsory***
- **The Question Paper contains three sections.**
- **Section A has 5 MCQ questions of 1 mark each; Section B has 5 questions of 2marks each. Section C has 5 questions of 3marks each. Section D has 1 question of 5marks.**
- ***All answers to be written in the answer sheet provided.***

	SECTION -A:				**1 mark each**
	Multiple Choice Questions:				
1.	Select the correct statement from the following regarding cell membrane				
	a.	Lipids are arranged in a bilayer with polar heads towards the inner part	**b.**	Fluid mosaic model of cell membrane was proposed by Singer and Nicolson	
	c.	Na+ and K+ move across the cell membrane by passive transport	**d.**	Proteins make up 60-70% of the cell membrane	
2.	What is true about ribosomes				
	a.	These are found only in eukaryotic cells	**b.**	These are self-splicing introns of some RNAs	
	c.	The prokaryotic ribosomes are 80S, where “S” stands for sedimentation coefficient	**d.**	These are composed of ribonucleic acid and proteins	
3.	2. Important site for the formation of glycoproteins and glycolipids is				
	a.	Ribosomes	**b.**	Vacuoles	
	c.	Golgi apparatus	**d.**	Plastids	
4.	The main arena of various types activities of a cell is				
	a.	Nucleus	**b.**	Plasma membrane	
	c.	Mitochondria	**d.**	Cytoplasm	

5.	Why is a capsule advantageous to a bacterium?				
	a.	It allows the bacterium to attach to the surface	**b.**	To protect bacterium from desiccation	
	c.	It provides means of locomotion	**d.**	It allows bacterium to hide from host's immune system	
	SECTION -B				**(2*5=10)**
6.	What is cell theory? Who modified the hypothesis of Schleiden& Schwann?				
7.	Differentiate between gram positive and gram-negative bacteria.				
8.	An improved model of structure of cell membrane known as fluid mosaic model was proposed in 1972. a) Name the scientist who proposed fluid mosaic model b) Name and explain the two types of proteins in cell membrane				
9.	What is the importance of fluid nature of membranes regarding cell function?				
10.	What type of enzymes do lysosomes contain? What is their function?				
	SECTION -C				**(3*5=15)**
11.	Differentiate between prokaryotic and eukaryotic cells.				
12.	a. What are the types of Glycocalyx in different bacteria? b. Name two surface extensions in bacterial cells, that are not concerned with motility.				
13.	a. Why are mitochondria /chloroplast not considered with the endomembrane system? b. Why is the concentration of certain ions higher in the vacuole than in the cytoplasm of plant cells?				
14.	a. Differentiate between primary and secondary cell wall. b. What is middle lamella? What is it made of?				
15.	Explain the structure of chloroplast with the help of a diagram.				
	SECTION D				**(1*5=5)**
16.	How do neutral solutes move across the plasma membrane? Can the polar molecules also move across it in the same way. If not, then how are these transported across the membrane?				

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DPS SHARJAH

HALF YEARLY – SAMPLE PAPER (2022-23)

Subject: Biology **Grade: XI**	**Max. Marks:70** **Time: 3hrs**

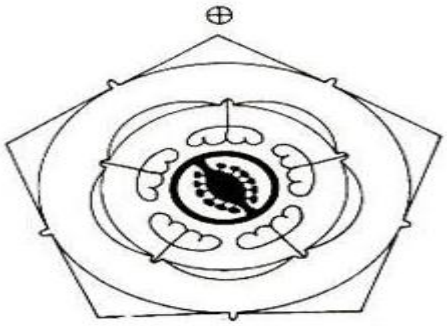
Name:	**Section:**	**Roll No:**

General Instructions:

1. The Question Paper contains five sections.
2. Section A - Q. No: 1 to 5 are multiple questions carrying 1 mark each.
3. Section B - Q. No: 6 to 10 are very short answer questions carrying 1 mark each.
4. Section C - Q. No: 11 to 20 are short answer questions carrying 2 marks each.
5. Section D - Q. No: 20 to 30 are short answer questions carrying 3 marks each.
6. Section C - Q. No: 31 to 31 are case study questions carrying 5 marks each.

	SECTION - A				**(1x5=5)**
	Multiple Choice Questions:				
2.	In five kingdom classification, the kingdom that includes the blue green algae, nitrogen fixing bacteria and methanogenic archaebacteria, is				
	a.	Plantae	b.	Fungi	
	c.	Protista	d.	Monera	
2.	Epipetalous is condition of				
	a.	Placentation	b.	Stamens	
	c.	Position of ovary	d.	Aestivation of petal	
3.	A slide of TS dicot stem shows				
	a.	Scattered vascular bundles	b.	Vascular bundles arranged in a ring	
	c.	Radial vascular bundles	d.	Closed vascular bundles	
4.	Excretion in frog is				

	a.	Ammonotelic	b.	Ureotelic	
	c.	Ureotelic	d.	None of the above	
5.	Fluid mosaic model of cell membrane state that it has lipid bilayer with				
	a	Proteins on both the surfaces	b	Proteins on the outer surface only	
	c	Proteins embedded in it only	d	Some proteins embedded and some on the surfaces	
	SECTION -B				**(1x5=5)**
6.	Cyanobacteria and heterotrophic bacteria are very different from each other but fall under eubacteria of kingdom Monera. Is this type of grouping justified?				
7.	Flower is a modified shoot. Justify the statement.				
8.	Differentiate between open and closed vascular bundle.				
9.	Why are frogs not visible during the winters and summers?				
10.	What structural characteristics do cilia, flagella and centrioles have in common?				
	SECTION -C				**(2x10=15)**
11.	a. What is the principle underlying the use of cyanobacteria in agricultural fields for crop improvement? b. Name the group of Monerans, which lack cell wall.				
12.	What is two kingdom classification? Who proposed it? Why was the two-kingdom found to be insufficient? (any two points)				
13.	What is pericarp? Name its three different regions in a fleshy fruit.				
14.	Differentiate between racemose and cymose inflorescence.				
15.	How are exarch and endarch conditions different anatomically?				
16.	What are bulliform cells? What is their function?				
17.	How are frogs beneficial to man? **OR** Describe the external features of frog.				
18.	Name and describe the two types of glycocalyx found in bacterial cells.				
19.	ER divides the intracellular space of the cell into two distinct compartments. Explain.				
20.	What are kinetochores? What is their function?				
	SECTION D				**(3x10=30)**

21.	Draw a well labelled diagram of bacteriophage.	
22.	Describe the three common steps in the sexual reproduction of fungi. OR Why are Deuteromycetes commonly known as imperfect fungi? Mention the characteristics of mycelium of such fungi.	
23.	What is aestivation? Describe its various types found in plants.	
24.	Describe the internal structure of the leaf of a monocotyledonous plant.	
25.	Write the anatomical difference between monocot root and dicot root. **OR** Write the anatomical difference between monocot stem and dicot stem.	
26.	Draw a labelled diagram of frog showing complete digestive system.	
27.	Describe how respiration takes place in frogs.	
28.	Draw a well labelled diagram of chloroplast.	
29.	Comment on the cartwheel structure of a centriole.	
30.	Distinguish between anaphase of mitosis from anaphase I of meiosis.	
	SECTION – E	**(5x2=10)**
31.	Study the diagram given below: 	
a.	Write the floral formula for the diagram given above.	
b.	Why are flowers of mustard referred to as hypogynous?	
c.	Which of the following is not a correct floral character of the members of family Solanaceae?	
	i Flower: Zygomorphic — ii Calyx: valvate aestivation	
	iii Stamens: Epipetalous — iv Fruit: berry or capsule	
d	In Unilocular ovary with a single ovule, the placentation is	
	i Marginal — ii Basal	

	iii	Free central	iv	Axile	
32	Like mitosis, **meiosis** is a form of eukaryotic cell division. However, these two processes distribute genetic material among the resulting daughter cells in very different ways. Mitosis creates two identical daughter cells that each contain the same number of chromosomes as their parent cell. In contrast, meiosis gives rise to four unique daughter cells, each of which has half the number of chromosomes as the parent cell. Meiosis is important because it ensures that all organisms produced via sexual reproduction contain the correct number of chromosomes. Meiosis also produces genetic variation by way of the process of recombination. Later, this variation is increased even further when two gametes unite during fertilization, thereby, creating offspring with unique combinations of DNA. This constant mixing of parental DNA in sexual reproduction helps fuel the incredible diversity of life on Earth.				
a	The chromosomes appear as long thin threads in				
	i	Leptotene	ii	Zygotene	
	iii	Pachytene	iv	Diplotene	
b	Synapsis is the pairing of				
	i	Homologous chromosomes	ii	Non homologous chromosomes	
	iii	Analogous chromosomes	iv	Paralogous chromosomes	
c.	What are dyads?				
d.	What are chiasmata? What is their significance?				

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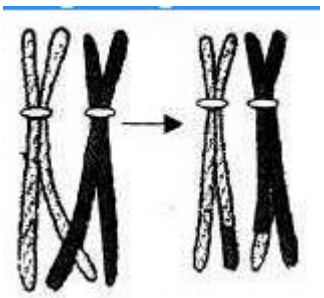
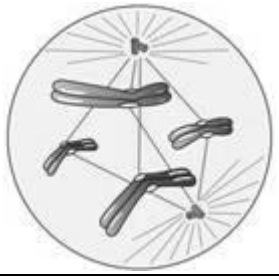
DPS SHARJAH

SAMPLE PAPER PERIODIC TEST II (2022-23)

Subject: BIOLOGY	**Max. Marks:35**
Grade: XI	**Time: 1.5 Hrs**

Name:	**Section:**	**Roll No:**

	SECTION A	6
3.	All eukaryotic unicellular organisms belong to a) Bacteria b) Protista c) Fungi d) Monera	
2.	Naked cytoplasm, multinucleated and saprophytic are the characteristics of a) Fungi2) b) Monera c) Slime molds d) Protista	
3.	With respect to fungal sexual cycle, choose the correct sequence of events a) Meiosis, Plasmogamy and Karyogamy b) Karyogamy, Plasmogamy and Meiosis c) Meiosis, Karyogamy and Plasmogamy d) Plasmogamy, Karyogamy and Meiosis	
4.	Members of Phycomycetes are found in i. Aquatic habitats ii. On decaying wood iii. Moist and damp places iv. As obligate parasites on plants a) i and iv b) ii and iii c)All of these d)None of these	

5.	The given figure is the representation of a certain event at a particular stage of a type of cell division.  Which is this stage? a.Prophase I during meiosis b.Prophase II during meiosis c.Prophase of mitosis d.Both prophase and metaphase of mitosis	
	Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as: (a) If both Assertion and Reason are true and Reason is the correct explanation of Assertion. (b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion. (c) If Assertion is true but Reason is false. (d) If both Assertion and Reason are false.	
6.	**Assertion:** Interphase is resting stage. **Reason** : The interphase cell is metabolically inactive.	
7.	**Assertion:** Methanogens can show symbiotic association with eukaryotic organisms **Reason:** They are used for the production of biogas	
	SECTION B	
8.	State two economically important uses of: (a) heterotrophic bacteria (b) archaebacteria	
9.	**Distinguish between metaphase of mitosis & metaphase I of meiosis?** **OR** Label the diagram and also determine the stage at which this structure is visible. 	
10.	**Give the terms for the following:** **a) The period between 2 successive mitotic divisions** **b) The division in which chromosome number is halved.** **c) Phase in cell cycle where DNA is synthesized.** **d) Division of nuclear material.**	
	SECTION C	

11.	**Write six differences between mitosis & meiosis?**	
12.	**What are the different groups of fungi?** **OR** Apart from chlorophyll, algae have several other pigments in their chloroplast. What pigments are found in blue-green, red and brown algae that are responsible for their characteristic colors?	
13.	**What are homologous chromosomes? What happens to homologous chromosomes during meiosis?**	
	SECTION D	
14.	Read the passage below and answer any four questions that follow Mitosis is the type of division in which chromosomes replicate and become equally distributed both quantitatively and qualitatively into two daughter nuclei. Thus, it is also called equational division since the chromosome number of the parent is conserved in the daughter cell. On the basis of nuclear division-phase is divided into four stages: Prophase, Metaphase, Anaphase and Telophase. Mitosis starts with nuclear division followed by daughter chromosome separation and ends with division of cytoplasm. It is necessary for growth and development of a multicellular organism. i) Which among the following is the longest and shortest phase in mitosis? (a) Telophase and Prophase (b) Metaphase and Anaphase (c) Prophase and Anaphase (d) Anaphase and Prophase ii) X phase is characterised by condensation of chromosomal material to form compact mitotic chromosomes X is (a) prophase (b) anaphase (c) metaphase (d) telophase. iii) Which of the following is the best stage to study the morphology of chromosomes? (a) Prophase (b) Metaphase (c) Anaphase (d) Telophase iv)How many mitotic divisions are required for a cell to make 512 cells? (a) 8 (b) 6 (c) 7 (d) 9 v) Read the given statements and select which ones are true (T) and which ones are false (F). I. Germ cells are formed by mitosis. II. Mitosis is capable to regenerate whole organism. III. Mitosis involves multiplication of both unicellular and multicellular organisms. IV. Mitosis increases the nucleocytoplasmic ratio.	

	I II III IV (a) F F T F (b) T T T F (c) T F F F (d) F T T F	
15.	Read the following and answer any four questions that follow Viruses are non-cellular organisms that are characterised by an inert crystalline structure surrounding the genetic material. These are obligate parasites and do not have a biosynthetic machinery. Therefore, they use host machinery to replicate themselves. Viruses are ultramicroscopic nucleoprotein entities having variable size and shape. The basic structure of virus is composed of envelope, capsid and nucleoid. Based on the type of genetic mateial, viruses are classified as Deoxyvirus and Ribovirus. i). All the listed viruses contain DNA, except (a) cauliflower mosaic virus (b) polio virus (c) rabies virus (d) retrovirus ii) Capsid of viruses (a) surrounds the genetic material (b) is proteinaceous (c) composed of several capsomeres (d) All of the above iii) A polyhedral-shaped virus is (a) Alfalfa mosaic virus (b) Poliomyelitis virus (c) TMV (d) All of the above iv). Viroids differ from viruses in (a) having protein coat (b) lacking protein coat (c) having DNA (d) having both DNA and RNA v). **Assertion** - Coliphages and cyanophages are bacterial viruses. **Reason** - Envelope of viruses is composed of RNA. (a) Both A and R are true and R is the correct explanation of A (b) Both A and R are true, but R is not the correct explanation of A (c) A is true, but R is false (d) Both A and R are false	
	SECTION E	5
16.	**Explain the various methods of asexual & sexual reproduction in fungi.** **OR**	

	Algae are known to reproduce asexually by a variety of spores under different environmental conditions. Name these spores and the conditions under which they are produced.	

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DPS SHARJAH

FINAL (2022-23)– SAMPLE QP

Subject: Biology **Grade: XI**	**Max. Marks:70** **Time: 3 hrs**

Name:	**Section:**	**Roll No:**

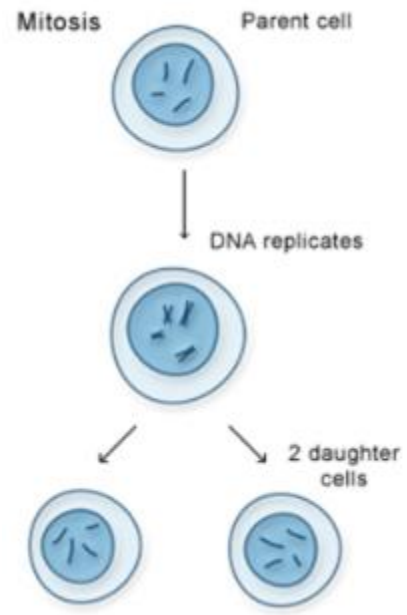
General Instructions:

- ***All questions are compulsory.***
- **The Question Paper contains three sections.**
- **Section A has 5 MCQ questions of 1 mark each; Section B has 5 questions of 2marks each. Section C has 5 questions of 3marks each. Section D has 1 question of 5marks.**
- ***All answers to be written in the answer sheet provided.***

	SECTION -A:				**1 mark each**
	Multiple Choice Questions:				
4.	Fasciola and Taenia are the members of phylum Platyhelminthes bearing which of the following characters?				
	a.	They have organ level of organization	**b.**	Flame cells help in osmoregulation and excretion.	
	c.	They have dorso – ventrally flattened body	**d.**	All of the above	
2.	Individual components of perianth are called				
	a.	Sepals	**b.**	Petals	
	c.	Tepals	**d.**	Bracts	
3.	You are given an old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?				
	a.	Protoxylem	**b.**	Cortical cells	
	c.	Secondary xylem	**d.**	Secondary phloem	
4.	Excretion in frog is				
	a.	Ammonotelic	b.	Ureotelic	
	c.	Ureotelic	d.	None of the above	
5.	Which of these methods are utilized by frogs for protection?				

	a	Speed	**b**	Spikes
	c	Mimicry	**d**	Playing dead
6.	Chromatophores take part in			
	a.	Growth	b.	Movement
	c.	Respiration	d.	Photosynthesis
7.	Number of mitosis divisions required to produce 128 cells from a single cell is			
	a.	7	b.	14
	c.	16	d.	32
8.	Photorespiration is favoured by			
	a.	Low light intensity	b.	Low O2 and high CO2
	c.	Low temperature	d.	High O2 and low CO2
9.	In mitochondria, protons accumulate in the			
	a.	Inter membrane space	b.	Matrix
	c.	Outer membrane	d.	Inner membrane
10.	Which one of the following is phagocytic?			
	a.	Monocyte	b.	RBC
	c.	Eosinophil	d.	Basophil
11.	_____ is responsible for the recovery of water and sodium chloride from the urine.			
	a.	Bowman's capsule	b.	Ureter
	b.	Loop of Henle	d.	None of the above
12.	A person has taken a large amount of meal which contains high proteins. His urine will eliminate more amount of:			
	a.	Urea	b.	Creatinine
	c.	Glucose	d.	Glycogen
	Question No. 13 and 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: A. Both A and R are true and R is the correct explanation of A. B. Both A and R are true and R is not the correct explanation of A. C. A is true but R is false. D. A is False but R is true			
13.	Assertion: The floral formula of Family Solanaceae is  Reasoning: This floral formula of Solanaceae tells that flower is bisexual, sepals five, petals five, stamens five and gynoecium tricarpellary, trilocular with many ovules.			
14.	Assertion: In a dicot stem, vascular bundles are conjoint, collateral and closed. Reason: Vascular bundles and conjoint, collateral and open in monocot stem.			
15.	Assertion: Lysosomes are called suicide bags of the stem. Reason: Lysosomes bring about autolysis (autophagy) in the cell.			

16.	Assertion: When the urine moves through the descending limb, it become hypertonic and as it passes through the ascending limb of Henle's loop it becomes hypotonic. Reason: The descending limb is permeable to sodium ions, while the ascending limb is impermeable to sodium ions.	
	SECTION -B	**(2*5=10)**
17	Mention the functions of the following in frog: a. Ureters b. Malpighian tubules c. Tympanum d. Sinus venosus a. Ureters - b. Malpighian tubules - c. Tympanum – receive sound signals d. Sinus venosus – receives blood through vena cava	
18.	Describe the half leaf experiment on photosynthesis.	
19.	Define RQ. What is its value for carbohydrate?	
20.	What is the effect of pCO_2 on oxygen transport?	
21.	Describe the role of liver, lungs and skin in excretion.	
	SECTION -C	**(3*5=15)**
22.	a. Why is a bat, a flying animal, placed under Mammalia and not under Aves? b. Differentiate between animals of Chondrichythes and Osteichythyes.	
23.	Draw a well-labelled diagram of V.S. of maize seed.	
24.	Write the anatomical difference between monocot and dicot leaf.	
25.	What is mesosome? Mention the functions it performs.	
26.	a. What are cofactors? Explain any two types of cofactors? b. Differentiate between nucleotide and nucleoside.	
27or	Give the schematic representation of an overall view of Krebs cycle. OR Give the schematic representation of Glycolysis.	**Resp**
28	Define vital capacity. What is its significance?	
	SECTION D	**(1*4=4)**
29	While observing a slide of mitotic cell division of onion root tips, a student noticed the following structures and wanted to know about these stages of cell divisions.	

		
a	Name the structure that is involved in the formation of spindle fibres during cell division.	
b	In many cells all the chromosomes lie in the middle of the cells forming a plate. Name the stage of cell division. Metaphase	
c	Name the next stage of cell division. Anaphase	
d	Arrange the following events of meiosis in correct sequence: i. Crossing over ii. Synapsis iii. Terminalization of chiasmata iv. Disappearance of nucleolus	

	a	ii, i, iii, iv	b	i, ii, iii, iv	
	c	ii, iii, iv, i	d	ii, i, iv, iii	

30	On a educational trip Uttaranchal, Ketki and her friends observed that many people were having swollen necks.	**(1*4=4)**
a	Which probable disease are these people suffering from?	
b	How is it caused?	
c	What effect does this condition have on pregnancy?	

d	Mary is about to face an interview. But during the first five minutes before the interview she experiences sweating, increased rate of heart beat, respiration, etc. which hormone is responsible for her restlessness.				
	a.	Estrogen and progesterone	b.	Oxytocin and vasopressin	
	c.	Adrenaline and noradrenaline	d.	Insulin and glucagon	
	SECTION D				
31	Briefly describe the structures and types of proteins. OR Discuss the factors that affect enzyme activity.				**(1*5=5)**
32	Differentiate between: a. Cyclic and noncyclic photophosphorylation. b. Anatomy of leaf in C3 and C4. OR Explain Calvin cycle with the help of a labelled diagram.				**(1*5=5)**
33	Explain heart sounds. Describe the evolutionary change in the pattern of heart among the vertebrates. **OR** What is the difference between lymph and blood? What is meant by double circulation? What is its significance?				**(1*5=5)**