LEP: 11TH BIOLOGY
SESSION – 2025-26
INDEX

PREPARED BY:
Ms. Rajveer Kaur
GSSS Kotla Bajwara
Fatehgarh Sahib

CHECKED BY:
Ms. Rebecca Sagar
GMSSSS PAP Campus,
Jalandhar

UNDER THE GUIDANCE OF:
Ms. Jasvinder Kaur
Asst. Director,
Project Sen. Sec. Science,
SCERT

CHAPTER -1; THE LIVING WORLD

The Living World deals with the vast diversity of organisms and the need to study them systematically.
It explains the importance of taxonomy, classification, nomenclature, and identification in biology.
Binomial nomenclature provides a universal and scientific way of naming organisms using genus and species.
Taxonomic categories such as species, genus, family, order, class, phylum, and kingdom help in organizing living organisms.
The chapter highlights the role of taxonomical aids like herbaria, museums, botanical gardens, and zoological parks.
It also introduces taxonomic keys as tools for accurate identification of organisms.
Overall, the chapter emphasizes understanding biodiversity through scientific classification and standardized naming systems.

A.MULTIPLE CHOICE QUESTIONS:

1. The basic unit of classification is

A) Genus B) Species C) Family D) Order

2. Binomial nomenclature was proposed by

A) Aristotle B) Linnaeus C) Whittaker D) Darwin

3. In scientific naming, the first name represents

A) Species B) Variety C) Genus D) Family

4.The correct format of scientific name is

A) Homo Sapiens B) homo sapiens C) *Homo sapiens* D) HOMO sapiens

5.Taxonomy deals with

A) Classification only B) Identification only
C) Nomenclature only D) Identification, nomenclature, and classification

6.Which taxonomic category includes organisms with maximum similarities?

A) Family B) Genus C) Species D) Order

7.Botanical gardens mainly help in

A) Conservation only B) Research only
C) Identification and study D) Preservation of fossils

8.Zoological parks contribute mainly to

A) Taxonomy and conservation B) Fossil study
C) Microscopic analysis D) Chemical preservation

9.The term "systematics" refers to

A) Naming of organisms B) Study of fossils
C) Diversity and evolutionary relationships D) Habitat study

10.Herbarium sheets contain

A) Preserved animals B) Living plants C) Dried, pressed plant specimens D) Fossils

11.Taxonomic keys are based on

A) Chemical characters B) Molecular characters
C) Contrasting characters D) Habitat characters

12.A couplet in a taxonomic key consists of

A) Two similar statements B) Two contrasting statements
C) One statement D) Multiple choices

13. International Code of Botanical Nomenclature is now called

A) ICBN B) ICZN C) ICN D) BIN

14. Which taxonomic aid preserves specimens in formalin?

A) Herbarium B) Botanical garden C) Museum D) Zoological park

15.Classification based on evolutionary relationships is called

A) Artificial B) Natural C) Phylogenetic D) Numerical

16.Species is considered a real unit of classification because

A) It is smallest category B) Members interbreed naturally

C) It contains maximum diversity D) It is man-made

17.The author citation in biological nomenclature indicates

A) Habitat B) Discoverer of species

C) Classifier of species D) Location of species

18.Which of the following is a taxonomical aid?

A) Microscope B) Herbarium C) Centrifuge D) Incubator

19.Identification of organisms involves

A) Assigning scientific names B) Determining correct place in classification

C) Study of fossils D) Habitat analysis

20.Rules of nomenclature ensure

A) Regional naming B) Random naming C) Universal acceptance D) Vernacular naming

B. FILL IN THE BLANKS

21. The scientific naming system uses _____ names for each organism.
22. The taxonomic category above genus is _____.
23. The study of classification is called _____.
24. The smallest taxonomic category is _____.
25. Botanical gardens maintain _____ plant species.

C. TRUE / FALSE

26. Scientific names are written in italics when printed.
27. Taxonomic keys are useful only for animals.
28. Museums preserve both plant and animal specimens.
29. Common names are universally accepted.
30. Species is a group of organisms capable of interbreeding.

D. TWO MARKS QUESTIONS

31. State two reasons why species is considered the basic unit of classification.
32. Mention two differences between taxonomy and systematics.
33. Write two uses of herbarium in biological studies.
34. Mention two rules of binomial nomenclature.
35. State two advantages of using scientific names over common names.

ANSWER KEY:

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 B | 3 C | 4 C | 5 D | 6 C | 7 C | 8 A | 9 C | 10 C | 11 C | 12 B | 13 C | 14 C | 15 C | 16 B | 17 C | 18 B | 19 B | 20 C

B .FILL IN THE BLANKS:

21 Two | 22 Family | 23 Taxonomy | 24 Species | 25 Living

C. STATE WHETHER TRUE / FALSE:

26 True | 27 False | 28 True | 29 False | 30 True

CHAPTER :2 - THE BIOLOGICAL CLASSIFICATION

The chapter Biological Classification explains how living organisms are systematically grouped based on their similarities and differences. Classification helps scientists study, identify, and understand the relationships among organisms. Organisms are classified into hierarchical categories: kingdom, phylum, class, order, family, genus, and species. Modern classification is based on structural features, evolutionary relationships, and genetic information. Five-kingdom classification includes Monera, Protista, Fungi, Plantae, and Animalia. Binomial nomenclature gives each species a unique two-part scientific name consisting of genus and species. Biological classification helps in organizing biodiversity, studying evolutionary relationships, and communicating universally about organisms.

A. MULTIPLE CHOICE QUESTIONS:

1. The five-kingdom classification was proposed by

A) Linnaeus B) Whittaker C) Aristotle D) Haeckel

2. Which kingdom includes organisms with a prokaryotic cell structure?

A) Protista B) Monera C) Fungi D) Plantae

3. Mycoplasma is unique because it

A) Has a cell wall B) Is multicellular C) Lacks a cell wall D) Has chlorophyll

4. Which mode of nutrition is absent in fungi?

A) Saprophytic B) Parasitic C) Autotrophic D) Symbiotic

5. Slime moulds belong to

A) Fungi B) Monera C) Protista D) Plantae

6. Diatoms are characterised by

A) Cellulose cell wall B) Siliceous cell wall C) Protein cell wall D) No cell wall

7. The reserve food material in fungi is

A) Starch B) Glycogen C) Cellulose D) Sucrose

8. Which organism reproduces by conjugation?

A) Amoeba B) Paramecium C) Spirogyra D) Chlamydomonas

9. Cyanobacteria are also known as

A) Red algae B) Brown algae C) Blue-green algae D) Golden algae

10. Which group is known as “golden algae”?

A) Euglenoids B) Dinoflagellates C) Chrysophytes D) Slime moulds

11. The cell wall of fungi is made up of

A) Cellulose B) Chitin C) Pectin D) Lignin

12. Which organism shows both plant-like and animal-like characters?

A) Amoeba B) Euglena C) Paramecium D) Plasmodium

13. Dinoflagellates are mainly

A) Freshwater B) Terrestrial C) Marine D) Parasitic

14. Red tides are caused by

A) Euglenoids B) Chrysophytes C) Dinoflagellates D) Cyanobacteria

15. Which kingdom includes unicellular eukaryotes?

A) Monera B) Protista C) Fungi D) Animalia

16. Which fungi form symbiotic association with algae?

A) Mycorrhiza B) Lichens C) Yeast D) Mushrooms

17. Methanogens are found in

A) Soil B) Marine water C) Rumen of cattle D) Freshwater ponds

18. Which organism lacks membrane-bound organelles?

A) Amoeba B) Euglena C) Bacteria D) Algae

19. Which kingdom shows absorptive mode of nutrition?

A) Plantae B) Fungi C) Protista D) Animalia

20. Which protists possess two flagella of unequal length?

A) Dinoflagellates B) Euglenoids C) Amoeba D) Paramecium

B. FILL IN THE BLANKS

21.The reserve food in cyanobacteria is _____.

22.Fungi reproduce asexually mainly by _____.

23.The silica-rich cell wall of diatoms is called _____.

24.The association between fungi and roots of higher plants is called _____.

25.Organisms placed in Monera are _____ in nature.

C. TRUE / FALSE (5)

26.All bacteria are autotrophic.

27.Euglenoids lack a cell wall.

28.Slime molds are saprophytic in nature.

29.Dinoflagellates possess cellulose plates on their body surface.

30.Lichens are indicators of air pollution

D. TWO MARKS QUESTIONS

31.State two distinguishing features of kingdom Monera.

32.Mention two characteristics of chrysophytes.

33.Write two differences between algae and fungi.

34.State two roles of bacteria in the ecosystem.

35.Mention two reasons why viruses are excluded from biological classification.

E. THREE MARKS QUESTIONS

36.Explain the characteristics of the kingdom Protista.

37.Describe the general features of fungi with examples.

38.Explain different modes of nutrition in Monera.

39.Describe the structure and significance of diatoms.

40.Explain the ecological significance of lichens

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 B | 3 C | 4 C | 5 C | 6 B | 7 B | 8 C | 9 C | 10 C | 11 B | 12 B | 13 C | 14 C | 15 B | 16 B | 17 C | 18 C | 19 B | 20 B

B. FILL IN THE BLANKS:

21 Glycogen | 22 Spores | 23 Frustule | 24 Mycorrhiza | 25 Prokaryotic

C.TRUE/FALSE:

26 False | 27 True | 28 True | 29 True | 30 True

CHAPTER:3- THE PLANT KINGDOM

The chapter Plant Kingdom deals with the classification and characteristics of different groups of plants. Plants are primarily classified based on body organization, presence of vascular tissues, and mode of reproduction. Algae are simple, mostly aquatic plants that perform photosynthesis. Bryophytes are known as amphibians of the plant kingdom because they live on land but require water for reproduction. Pteridophytes are the first vascular plants with well-developed roots, stems, and leaves. Gymnosperms bear naked seeds, while angiosperms are flowering plants with seeds enclosed in fruits. The classification of plants helps in understanding their evolution and diversity.

A. MULTIPLE CHOICE QUESTIONS:

1. Bryophytes are restricted to moist habitats because they lack

A) Xylem and phloem B) Cuticle C) Leaves D) Rhizoids

2. The dominant generation in bryophytes is

A) Sporophyte B) Gametophyte C) Both equal D) None

3. The earliest vascular plants were

A) Pteridophytes B) Bryophytes C) Gymnosperms D) Angiosperms

4. Homospory is found in

A) Selaginella B) Funaria C) Pinus D) Marchantia

5. Heterospory is seen in

A) Marchantia B) Selaginella C) Pteris D) Riccia

6. In pteridophytes, the sporangia are borne on

A) Rhizoids B) Sori C) Archegonia D) Antheridia

7. Gymnosperms are called so because

A) Seeds are enclosed in fruit B) Seeds are naked

C) They are aquatic D) They have flowers

8. The gymnosperm with flagellated sperm is

A) Cycas B) Pinus C) Gnetum D) Cedrus

9. Angiosperms are classified into two classes based on

A) Type of stem B) Number of cotyledons C) Leaf arrangement D) Root type

10. Monocots have

A) Reticulate venation B) Parallel venation C) Dichotomous venation D) None

11. Dicots show

A) Parallel venation B) Reticulate venation C) Dichotomous venation D) Spiral venation

12. Double fertilization occurs in

A) Gymnosperms B) Angiosperms C) Pteridophytes D) Bryophytes

13. Endosperm is

A) Haploid B) Diploid C) Triploid D) Tetraploid

14. Microspores develop into

A) Male gametophytes B) Female gametophytes C) Sporophytes D) Zygotes

15. Megaspores develop into

A) Male gametophytes B) Female gametophytes C) Sporophytes D) Spores

16. Xylem in gymnosperms lacks

A) Tracheids B) Vessels C) Lignin D) Parenchyma

17. Stomata of dicots are usually

A) Anomocytic B) Paracytic C) Diacytic D) Actinocytic

18. Archegonia are absent in

A) Bryophytes B) Pteridophytes C) Gymnosperms D) Angiosperms

19. Endosperm formation in gymnosperms is

A) Triploid B) Haploid C) Diploid D) Polyploid

20. Ephedra belongs to

A) Cycadales B) Gnetales C) Coniferales D) Ginkgoales

B. FILL IN THE BLANKS

21.The dominant generation in pteridophytes is _____.

22.Gymnosperms produce _____ seeds.

23.Monocot embryos have _____ cotyledon(s).

24.Archegonia produce _____ in bryophytes and pteridophytes.

25.Double fertilization results in the formation of _____ and zygote in angiosperms.

C. TRUE / FALSE

26.Bryophytes have true roots, stems, and leaves.

27.Gymnosperms do not have flowers.

28.Angiosperms are the largest group of plants.

29.Pteridophytes are homosporous or heterosporous depending on the species.

30.Cycas seeds are enclosed in an ovary.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 A | 2 B | 3 A | 4 C | 5 B | 6 B | 7 B | 8 A | 9 B | 10 B | 11 B | 12 B | 13 C | 14 A | 15 B | 16 B | 17 A | 18 D | 19 B | 20 B

B. FILL IN THE BLANKS:

21 Sporophyte | 22 Naked | 23 One | 24 Eggs | 25 Endosperm

C. TRUE/FALSE:

26 False | 27 True | 28 True | 29 True | 30 False

CHAPTER: 4 -THE ANIMAL KINGDOM

The chapter Animal Kingdom explains the classification and characteristics of animals based on their body organization and evolutionary relationships. Animals are grouped according to features such as symmetry, body cavity, segmentation, and presence of notochord. Non-chordates lack a notochord, while chordates possess a notochord at some stage of development. The animal kingdom includes diverse phyla such as Porifera, Cnidaria, Platyhelminthes, Annelida, Arthropoda, Mollusca, and Echinodermata. Chordates are further divided into protochordates and vertebrates. Vertebrates show advanced features like a backbone, well-developed nervous system, and complex organs. Classification of animals helps in understanding their structure, evolution, and diversity.

A. MULTIPLE CHOICE QUESTIONS:

1. The simplest animals with cellular level of organization are

A) Porifera B) Coelenterata C) Platyhelminthes D) Nematoda

2. Coelom provides

A) Body cavity lined by mesoderm B) Exoskeleton C) Circulatory system D) Digestive cavity

3. The first triploblastic phylum is
A) Porifera B) Coelenterata C) Platyhelminthes D) Cnidaria
4. Protostomes develop
A) Mouth from blastopore B) Anus from blastopore C) Both D) Neither
5. Deuterostomes develop
A) Mouth from blastopore B) Anus from blastopore C) Both D) Neither
6. Coelom in annelids is
A) Schizocoelous B) Enterocoelous C) Absent D) Pseudocoelom
7. The circulatory system of molluscs is usually
A) Open B) Closed C) Absent D) Both open and closed
8. In arthropods, exoskeleton is made up of
A) Cellulose B) Chitin C) Keratin D) Calcium carbonate
9. Chordates are characterised by
A) Notochord B) Dorsal hollow nerve cord C) Pharyngeal gill slits D) All of these
10. Vertebrates are distinguished by
A) Endoskeleton B) Exoskeleton
C) Open circulatory system D) Segmentation absent
11. Radial symmetry is found in
A) Porifera B) Coelenterata C) Platyhelminthes D) Annelida
12. Bilateral symmetry is associated with
A) Coelenterata B) Platyhelminthes C) Ctenophora D) Porifera
13. Tagmosis is a characteristic feature of
A) Annelida B) Arthropoda C) Mollusca D) Echinodermata
14. Which phylum has water vascular system?
A) Arthropoda B) Echinodermata C) Chordata D) Mollusca
15. Hemocoel is found in
A) Annelida B) Arthropoda C) Mollusca D) Echinodermata
16. Flame cells are excretory organs of
A) Nematoda B) Platyhelminthes C) Annelida D) Mollusca
17. The heart of fish is
A) Two-chambered B) Three-chambered C) Four-chambered D) Absent
18. Amphibians are characterised by
A) Cutaneous respiration B) Metamorphosis C) Three-chambered heart D) All of these
19. Birds are adapted for flight due to
A) Hollow bones B) Feathers C) High metabolic rate D) All of these
20. Monotremes are unique because they
A) Lay eggs B) Give live birth C) Lack hair D) Have placenta

B. FILL IN THE BLANKS

21.Porifera shows _____ symmetry.
22.Notochord is a characteristic of _____.
23.Coelom develops from mesoderm in triploblastic animals by _____ or _____ process.
24.Flame cells in flatworms help in _____.
25.Endoskeleton is characteristic of _____.

C. TRUE / FALSE

26.All coelomates have a closed circulatory system.
27.Echinoderms show bilateral symmetry in larval stage.
28.Arthropods are diploblastic and coelomate.
29.Amphibians are the first vertebrates with lungs.
30.Monotremes are oviparous mammals.

ANSWER KEY

A.MULTIPLE CHOICE QUESTIONS:

1 A | 2 A | 3 C | 4 A | 5 B | 6 A | 7 A | 8 B | 9 D | 10 A | 11 B | 12 B | 13 B | 14 B | 15 B | 16 B | 17 A | 18 D | 19 D | 20 A

B. FILL IN THE BLANKS:

21 Asymmetrical | 22 Chordates | 23 Schizocoely, Enterocoely | 24 Excretion | 25 Vertebrates

C.TRUE/FALSE:

26 False | 27 True | 28 False | 29 True | 30 True

CHAPTER:5- MORPHOLOGY OF FLOWERING PLANTS

The chapter Morphology of Flowering Plants deals with the external structure and form of different parts of flowering plants. It explains the morphology of roots, stems, leaves, flowers, fruits, and seeds. Roots help in anchorage, absorption of water and minerals, and sometimes storage of food. Stems support the plant and help in the transport of water, minerals, and food. Leaves are the main organs of photosynthesis and transpiration. Flowers are the reproductive structures responsible for sexual reproduction in plants. Understanding plant morphology helps in identification, classification, and study of plant functions.

A. MULTIPLE CHOICE QUESTIONS:

1. The region of a stem between two nodes is called

A) Node B) Internode C) Apex D) Petiole

2. Phyllotaxy refers to

A) Leaf shape B) Leaf arrangement on stem C) Leaf venation D) Leaf size

3. The arrangement of vascular bundles in a dicot stem is

A) Scattered B) Ring-shaped C) Concentric D) Collateral

4. In monocot stem, vascular bundles are

A) Scattered B) Ring-shaped C) Collateral D) Concentric

5. Leaf venation in dicots is usually

A) Parallel B) Reticulate C) Dichotomous D) Spiral

6. Leaf venation in monocots is

A) Parallel B) Reticulate C) Dichotomous D) Net-like

7. Taproot system is characteristic of

A) Monocots B) Dicots C) Both D) None

8. Fibrous root system is found in

A) Maize B) Gram C) Sunflower D) Pea

9. The modification of stem for food storage is

A) Tendril B) Rhizome C) Thorn D) Stolon

10. The modification of root for climbing is

A) Prop root B) Stilt root C) Pneumatophore D) Haustoria

11. Tendrils of pea are modified

A) Stem B) Leaf C) Petiole D) Root

12. Pinnately compound leaf is found in

A) Mango B) Dalbergia C) Guava D) China rose

13. Petiole is absent in

A) Banana B) Papaya C) Grass D) Mustard

14. Leaf margin of guava is

A) Entire B) Serrate C) Lobed D) Undulate

15. Spines of cactus are modified

A) Leaves B) Stems C) Roots D) Petiole

16. Prop roots are found in

A) Maize B) Banyan C) Sugarcane D) Grass

17. Pneumatophores are characteristic of

A) Mangroves B) Desert plants C) Vine plants D) Aquatic plants

18. Stolon is modified

A) Stem B) Leaf C) Root D) Node

19. Tendrils in cucurbits are modified

A) Stem B) Leaf C) Petiole D) Root

20. Haustoria are modified

A) Stems B) Roots C) Leaves D) Node

B. FILL IN THE BLANKS

21.The region of a leaf between base and apex is called _____.
22.Collateral vascular bundles have xylem towards _____ and phloem towards _____.
23.Roots growing vertically upwards in aquatic plants are called _____.
24.Climbing roots are called _____.
25.Leaf with a single blade is called _____ leaf.

C. TRUE / FALSE

26.Taproot system is found in monocots.
27.Nodes are the points of leaf attachment on stem.
28.Pneumatophores help in gaseous exchange.
29.Stolon is a modified root for vegetative propagation.
30.Tendrils in pea are modified leaves.

D. TWO-MARKS QUESTIONS

31.Differentiate between taproot and fibrous root system.
32.Give two examples of stem modifications for support.
33.Mention two differences between monocot and dicot leaf venation.
34.State two functions of adventitious roots.
35.Give two examples of leaves modified for protection.

E. THREE-MARKS QUESTIONS

36.Explain three modifications of stem for storage, climbing, and vegetative propagation.
37.Describe three types of root modifications with examples.
38.Explain the different types of leaf arrangement on the stem (phyllotaxy).
39.Describe three modifications of leaves for protection, climbing, and storage.
40.Explain three differences between monocot and dicot stems.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 B | 3 B | 4 A | 5 B | 6 A | 7 B | 8 A | 9 B | 10 D | 11 B | 12 B | 13 C | 14 B | 15 A | 16 B | 17 A | 18 A | 19 B | 20 B

B. FILL IN THE BLANKS:

21 Lamina | 22 Inner	Outer | 23 Pneumatophores | 24 Adventitious roots | 25 Simple

C. TRUE/FALSE:

26 False | 27 True | 28 True | 29 False | 30 True

CHAPTER: 6 - ANATOMY OF PLANTS

The chapter Anatomy of Plants explains the internal structure of different plant parts. It focuses on the study of tissues and tissue systems present in roots, stems, and leaves. Plant tissues are classified into meristematic and permanent tissues based on their ability to divide. The chapter describes simple tissues like parenchyma, collenchyma, and sclerenchyma. Complex tissues such as xylem and phloem are responsible for the transport of water, minerals, and food. The internal organization of dicot and monocot roots, stems, and leaves is also explained. Knowledge of plant anatomy helps in understanding plant functions and adaptations.

A. MULTIPLE CHOICE QUESTIONS:

1. The primary function of xylem is

A) Transport of water B) Transport of food C) Photosynthesis D) Storage

2. The main water-conducting element in xylem is

A) Tracheid B) Vessel C) Phloem fiber D) Sieve tube

3. Phloem is responsible for

A) Water conduction B) Food conduction C) Mechanical support D) Transpiration

4. Sieve tubes are a component of

A) Xylem B) Phloem C) Cambium D) Parenchyma

5. The vascular cambium is

A) Interfascicular and intrafascicular B) Only interfascicular
C) Only intrafascicular D) Absent in dicots

6. In monocot stems, vascular bundles are

A) Conjoint, collateral, and closed B) Open and radial
C) Conjoint, collateral, and open D) Collateral, radial, and open

7. Cork cells are

A) Living and thin-walled B) Dead and suberised
C) Living and lignified D) Dead and non-suberised

8. Lenticels are mainly found in

A) Phloem B) Xylem C) Cork D) Pith

9. The secondary xylem in dicots forms

A) Annual rings B) Interfascicular cambium C) Sieve tubes D) Medullary rays

10. Collateral vascular bundles have

A) Phloem inside, xylem outside B) Xylem inside, phloem outside
C) Xylem and phloem side by side D) Only xylem

11. Starch sheath is found in

A) Monocot stem B) Dicot stem C) Monocot root D) Dicot root

12. Protoxylem lacuna is characteristic of

A) Monocot stem B) Dicot stem C) Monocot root D) Dicot root

13. Endodermis in roots has
A) Suberised walls B) Casparian strips C) Lignified walls D) Thin walls
14. Pith is usually absent in
A) Dicot stem B) Monocot stem C) Dicot root D) Monocot root
15. Pericycle gives rise to
A) Lateral roots B) Secondary xylem C) Cambium D) Phloem fibers
16. Phloem fibres are
A) Conducting B) Storage C) Mechanical support D) Photosynthetic
17. Annual rings in trees indicate
A) Age of the plant B) Secondary phloem C) Root growth D) Cambium activity
18. Medullary rays are found in
A) Between xylem and phloem B) Xylem only C) Phloem only D) Pith only
19. In monocot root, vascular bundles are
A) Radial and exarch B) Collateral C) Concentric D) Closed
20. Periderm replaces
A) Primary xylem B) Epidermis C) Pith D) Cambium

B. FILL IN THE BLANKS
21.The first cambium to develop in stems is called _____ cambium.
22.Casparian strips are present in the walls of _____.
23.The thick-walled dead cells forming outer protective layer of stem is _____.
24.Secondary growth is common in _____ plants.
25.Lignin deposition provides _____ to xylem vessels.

C. TRUE / FALSE
26.Monocot stems show secondary growth.
27.Cork cells are living at maturity.
28.Annual rings are formed due to seasonal variation in cambial activity.
29.Phloem fibers provide mechanical support.
30.Pith is absent in monocot stems.

D. TWO-MARK QUESTIONS
31.Differentiate between primary xylem and secondary xylem.
32.Write two differences between monocot and dicot stem anatomy.
33.State two functions of the pericycle in roots.
34.Mention two structural differences between monocot and dicot roots.
35.Give two functions of medullary rays in dicot stems.

ANSWER KEY

A.MULTIPLE CHOICE QUESTIONS:
1 A | 2 B | 3 B | 4 B | 5 A | 6 A | 7 B | 8 C | 9 A | 10 B | 11 A | 12 A | 13 B | 14 D | 15 A | 16 C | 17 D | 18 A | 19 A | 20 B

B. FILL IN THE BLANKS:
21 Fascicular | 22 Endodermis | 23 Cork | 24 Dicot | 25 Mechanical strength

C. TRUE/FALSE:
26 False | 27 False | 28 True | 29 True | 30 False

CHAPTER : 7- THE STRUCTURAL ORGANISATION IN ANIMALS

The chapter Structural Organisation in Animals explains how cells, tissues, organs, and organ systems are arranged in animals. It describes different types of animal tissues such as epithelial, connective, muscular, and nervous tissues. Each tissue type performs specific functions essential for survival. The chapter also explains the structure and functions of organs and organ systems in animals. Detailed study of earthworm, cockroach, and frog is included to understand body organization. These examples show adaptation of animals to different habitats and lifestyles. Understanding structural organization helps in learning how animals function efficiently.

A. MULTIPLE CHOICE QUESTIONS:

1. The epithelial tissue specialised for rapid diffusion is

A) Cuboidal B) Squamous C) Columnar D) Glandular

2. The intercalated discs are a unique feature of

A) Skeletal muscle B) Smooth muscle C) Cardiac muscle D) Nervous tissue

3. Which connective tissue has maximum matrix?

A) Areolar B) Adipose C) Blood D) Bone

4. The protein responsible for elasticity in connective tissue is

A) Collagen B) Elastin C) Actin D) Myosin

5. Haversian system is absent in

A) Long bones B) Flat bones C) Compact bone D) Spongy bone

6. Chondrocytes are found in

A) Bone B) Blood C) Cartilage D) Tendon

7. Which tissue lines the inner surface of blood vessels?

A) Squamous epithelium B) Cuboidal epithelium
C) Columnar epithelium D) Stratified epithelium

8. Which muscle lacks striations and shows involuntary movement?

A) Skeletal B) Cardiac C) Smooth D) Striated

9.Myelin sheath is formed by

A) Astrocytes B) Schwann cells C) Microglia D) Neurons

10.The functional unit of muscle contraction is

A) Myofibril B) Sarcolemma C) Sarcomere D) Actin filament

11.Which connective tissue connects muscle to bone?

A) Ligament B) Tendon C) Cartilage D) Areolar

12.Matrix of bone is hardened due to deposition of

A) Calcium carbonate B) Calcium phosphate
C) Sodium chloride D) Potassium salts

13.The voluntary muscles are also called

A) Smooth muscles B) Cardiac muscles
C) Skeletal muscles D) Visceral muscles

14.Neuroglial cells are mainly responsible for

A) Impulse conduction B) Protection and support
C) Muscle contraction D) Hormone secretion

15.The epithelial tissue with cilia is mainly involved in

A) Absorption B) Protection C) Movement of substances D) Secretion

16.Which blood cell lacks nucleus in mammals?

A) RBC B) WBC C) Platelet D) Lymphocyte

17.Osteocytes are located in

A) Lacuna B) Canaliculi C) Haversian canal D) Matrix

18. Which tissue shows rhythmic contraction?

A) Skeletal muscle B) Smooth muscle

C) Cardiac muscle D) Areolar tissue

19. Blood platelets are involved in

A) Oxygen transport B) Immunity

C) Blood clotting D) Nutrition

20.Areolar tissue mainly functions in

A) Storage of fat B) Transport of gases

C) Binding and packing D) Movement

B. FILL IN THE BLANKS

1.The fluid connective tissue that transports nutrients is _____.

2.The plasma membrane of muscle fibre is called _____.

3.Cartilage lacks _____ supply.

4.The junction between two neurons is called _____.

5.The central canal of the Haversian system is called _____ canal.

C. TRUE / FALSE

1.Smooth muscles are multinucleate.

2.Tendons are less elastic than ligaments.

3.Blood is a connective tissue with a liquid matrix.

4.Neurons have the ability to divide throughout life.

5.Squamous epithelium is present in the alveoli of lungs.

ANSWER KEY

A. MULTIPE CHOICE QUESTION:

1 B | 2 C | 3 C | 4 B | 5 D | 6 C | 7 A | 8 C | 9 B | 10 C |
11 B | 12 B | 13 C | 14 B | 15 C | 16 A | 17 A | 18 C | 19 C | 20 C

B. FILL IN THE BLANKS:

21 Blood | 22 Sarcolemma | 23 Blood vessel | 24 Synapse | 25 Haversian

C.TRUE / FALSE:

26 False | 27 True | 28 True | 29 False | 30 True

CHAPTER:8- CELL - THE UNIT OF LIFE

The cell is the basic structural and functional unit of life, and all living organisms are made up of one or more cells. Cells were first discovered by Robert Hooke, while Antonie van Leeuwenhoek observed living cells for the first time. According to the cell theory, all organisms are composed of cells and new cells arise from pre-existing cells. Cells are of two main types: prokaryotic cells, which lack a true nucleus, and eukaryotic cells, which possess a well-defined nucleus and membrane-bound organelles. Each cell contains various organelles like the nucleus, mitochondria, endoplasmic reticulum, Golgi apparatus, and lysosomes, each performing specific functions. The plasma membrane regulates the movement of substances into and out of the cell, maintaining internal balance. Thus, the coordinated activities of cells and their organelles enable growth, metabolism, and reproduction in living organisms.

A. MULTIPLE CHOICE QUESTIONS:

1.The fluid mosaic model of plasma membrane was proposed by

A) Watson and Crick B) Singer and Nicolson
C) Robertson D) Danielli and Davson

2.Which component gives selective permeability to the plasma membrane?

A) Proteins B) Carbohydrates C) Phospholipid bilayer D) Glycoproteins

3.Cristae are present in

A) Chloroplast B) Ribosome C) Mitochondria D) Lysosome

4.Which cell organelle is known as the "powerhouse of the cell"?

A) Ribosome B) Golgi apparatus C) Lysosome D) Mitochondria

5.The main site of protein synthesis in a cell is

A) Golgi complex B) Rough ER C) Smooth ER D) Lysosome

6.Which cell organelle is absent in prokaryotes?

A) Ribosome B) Plasma membrane C) Nucleoid D) Mitochondria

7.The functional unit of chromosome is

A) Centromere B) Chromatin C) Gene D) Telomere

8**.Which organelle is involved in lipid synthesis?**

A) Rough ER B) Smooth ER C) Golgi apparatus D) Ribosome

9.Lysosomes contain enzymes that are

A) Oxidative B) Digestive C) Synthetic D) Respiratory

10. lamella in plant cells is rich in

A) Cellulose B) Lignin C) Pectin D) Chitin

11.Which plastid is involved in photosynthesis?

A) Amyloplast B) Elaioplast C) Chromoplast D) Chloroplast

12.Grana are stacks of

A) Cristae B) Thylakoids C) Lamellae D) Vesicles

13.Centrosome is mainly involved in

A) Protein synthesis B) Respiration C) Cell division D) Transport

14.Which of the following is a single membrane-bound organelle?

A) Mitochondria B) Chloroplast C) Lysosome D) Nucleus

15.Vacuole in plant cells is bounded by

A) Plasma membrane B) Tonoplast C) Cell wall D) Middle lamella

16.The nuclear envelope is continuous with

A) Golgi complex B) Rough ER
C) Smooth ER D) Plasma membrane

17.Which organelle modifies and packages proteins?

A) Ribosome B) Lysosome C) Golgi apparatus D) Mitochondria

18.Peroxisomes are involved in

A) Protein synthesis B) Lipid synthesis C) Detoxification D) Photosynthesis

19.Which cell structure is present only in plant cells?

A) Mitochondria B) Chloroplast C) Ribosome D) Golgi body

20.Chromatin is chemically composed of

A) DNA only B) RNA only C) DNA and proteins D) Proteins only

B. FILL IN THE BLANKS

21. Ribosomes are composed of _____ and _____.
22.The inner membrane of mitochondria is folded into _____.
23.Dictyosomes are found in _____ cells.

24. The fluid content inside the nucleus is called _____.
25.Plasmodesmata help in _____ between plant cells.

C. TRUE / FALSE

26. Prokaryotic cells lack membrane-bound organelles.
27. A smooth endoplasmic reticulum has ribosomes attached to it.
28. Golgi apparatus is involved in glycosylation of proteins.
29. Lysosomes are absent in plant cells.
30. The cell wall provides rigidity and protection to plant cells.

D. THREE MARKS QUESTIONS:

Passage 1: Discovery and Cell Theory

The discovery of cells marked a turning point in biological sciences. Robert Hooke first observed cells in a thin slice of cork and described them as box-like structures. Later, Anton van Leeuwenhoek observed living cells. The cell theory, proposed by Schleiden and Schwann, stated that all plants and animals are made of cells and that the cell is the basic unit of life. Rudolf Virchow later added that all cells arise from pre-existing cells, making the theory complete.

Questions:

1.Why were Hooke's observations limited to dead cells?
2.How did van Leeuwenhoek's contribution differ from Hooke's findings?
3.State the significance of Virchow's contribution to cell theory.
4.Why is the cell considered the structural and functional unit of life?

Passage 2: Prokaryotic and Eukaryotic Cells

Cells are broadly classified into prokaryotic and eukaryotic types. Prokaryotic cells lack a membrane-bound nucleus and organelles, while eukaryotic cells possess a true nucleus and membrane-bound organelles. Bacteria represent prokaryotic cells, whereas plant and animal cells are eukaryotic. Despite their simplicity, prokaryotic cells perform all essential life processes.

Questions:

1.Mention two structural differences between prokaryotic and eukaryotic cells.
2.Why are prokaryotic cells considered primitive but efficient?
3.Name one organelle absent in prokaryotes and explain its function.
4.How does the absence of nuclear membrane affect genetic material in prokaryotes?

Passage 3: Cell Membrane and Transport

The plasma membrane is a selectively permeable membrane that encloses the cell. It is composed mainly of lipids and proteins arranged in a fluid mosaic model. The membrane regulates the movement of substances into and out of the cell through processes such as diffusion, facilitated diffusion, and active transport. This regulation is essential for maintaining cellular homeostasis.

Questions:

1.What is meant by selective permeability of plasma membrane?
2.Why is the fluid mosaic model considered dynamic in nature?
3.Differentiate between diffusion and active transport.
4.How does membrane structure help in maintaining homeostasis?

Passage 4: Endoplasmic Reticulum and Golgi Apparatus

The endoplasmic reticulum (ER) is a network of membranous tubules involved in intracellular transport. Rough ER is associated with ribosomes and protein synthesis, while smooth ER is involved in lipid

synthesis and detoxification. The Golgi apparatus modifies, packages, and transports proteins and lipids received from ER to their final destinations.

Questions:

1.How does rough ER differ structurally and functionally from smooth ER?
2.Why is Golgi apparatus called the “post office” of the cell?
3.Explain the role of smooth ER in detoxification.
4.How are ER and Golgi functionally coordinated?

Passage 5: Mitochondria and Energy Production

Mitochondria are double-membraned organelles known as the powerhouses of the cell. The inner membrane is folded into cristae, increasing surface area for ATP synthesis. Mitochondria contain their own DNA and ribosomes, supporting the endosymbiotic theory. Energy released during cellular respiration is stored in the form of ATP.

Questions:

1.Why are mitochondria called semi-autonomous organelles?
2.How do cristae increase efficiency of ATP production?
3.State one evidence supporting endosymbiotic theory.
4.Why are mitochondria more abundant in muscle cells?

31.Explain the fluid mosaic model of plasma membrane.
32.Describe the structural organisation of mitochondria.
33.Write the functions of endoplasmic reticulum.
34. Explain the role of Golgi apparatus in protein transport.
35. Describe the chemical composition and functions of chromatin.

E. FIVEMARKS QUESTIONS

36.Describe the structure and functions of the nucleus in detail.
37.Explain the structure, types, and functions of plastids.
38. Describe the ultrastructure of mitochondria with a labelled description.
39.Explain the different types of endoplasmic reticulum and their roles.
40. Describe the structure and functions of the plasma membrane.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 C | 3 C | 4 D | 5 B | 6 D | 7 C | 8 B | 9 B | 10 C | 11 D | 12 B | 13 C | 14 C | 15 B | 16 B | 17 C | 18 C | 19 B | 20 C

B. FILL IN THE BLANKS:

21 rRNA, Proteins | 22 Cristae | 23 Plant | 24 Nucleoplasm | 25 Cell	to	cell transport

C. TRUE / FALSE:

26 True | 27 False | 28 True | 29 False | 30 True

CHAPTER: 9- BIOMOLECULES

Biomolecules are organic compounds present in living organisms that are essential for life processes. The major classes of biomolecules include carbohydrates, proteins, lipids, and nucleic acids. Carbohydrates serve as the primary source of energy and also provide structural support in plants. Proteins are made of amino acids and perform diverse functions such as catalysis, transport, movement, and defense. Lipids are hydrophobic molecules that store energy and form important components of cell membranes. Nucleic acids, namely DNA and RNA, store and transmit genetic information and control cellular activities. Enzymes, which are mostly proteins, speed up biochemical reactions and are vital for metabolism.

A. MULTIPLE CHOICE QUESTIONS:

1. The most abundant organic compound in living cells is

A) Protein B) Lipid C) Carbohydrate D) Nucleic acid

2. Glycosidic bond is formed between

A) Two amino acids B) Two monosaccharides
C) Two nucleotides D) Fatty acid and glycerol

3. Which of the following is a reducing sugar?

A) Sucrose B) Lactose C) Starch D) Cellulose

4. The monomer of proteins is

A) Fatty acid B) Nucleotide C) Amino acid D) Monosaccharide

5. Peptide bond is formed between

A) Two carboxyl groups B) Amino and carboxyl group
C) Two amino groups D) R-groups

6. Which level of protein structure is stabilized by hydrogen bonds?

A) Primary B) Secondary C) Tertiary D) Quaternary

7. The structure of DNA was proposed by

A) Chargaff B) Wilkins C) Watson and Crick D) Meselson

8. Nitrogenous bases in DNA include

A) Adenine, Uracil B) Cytosine, Uracil C) Adenine, Thymine D) Guanine, Uracil

9. The bond between nitrogenous base and sugar is

A) Ester bond B) Hydrogen bond C) Glycosidic bond D) Phosphodiester bond

10. Lipids are insoluble in water because they are

A) Polar B) Amphoteric C) Hydrophobic D) Charged

11. Which polysaccharide is present in plant cell walls?

A) Glycogen B) Starch C) Cellulose D) Chitin

12. The primary structure of protein refers to

A) Alpha helix B) Sequence of amino acids
C) Folding of polypeptide D) Association of subunits

13. RNA differs from DNA by the presence of

A) Thymine B) Deoxyribose C) Ribose D) Double helix

14. Which enzyme catalyses peptide bond formation?

A) Pepsin B) Ligase C) Ribosome D) Trypsin

15. The weakest bond stabilising protein structure is

A) Disulphide bond B) Ionic bond C) Hydrogen bond D) Peptide bond

16. Glycogen is mainly stored in

A) Kidney and lungs B) Brain and heart C) Liver and muscles D) Skin and bones

17. A nucleotide is composed of

A) Sugar and base B) Sugar and phosphate

C) Base and phosphate D) Sugar, base and phosphate

18. Which lipid acts as a structural component of cell membrane?

A) Triglyceride B) Steroid C) Phospholipid D) Wax

19. The helical structure of DNA is stabilised by

A) Peptide bonds B) Hydrogen bonds C) Ionic bonds D) Disulphide bonds

20. Enzymes are mostly

A) Lipids B) Carbohydrates C) Proteins D) Nucleic acids

B. FILL IN THE BLANKS

21. The simplest form of carbohydrate is _____.

22.The bond linking amino acids in a protein is called _____ bond.

23.DNA is a polymer of _____.

24.Lipids yield _____ kcal of energy per gram.

25.The sugar present in RNA is _____.

C. TRUE / FALSE

26. Sucrose is a reducing sugar.

27.Proteins are polymers of amino acids.

28.RNA is double-stranded like DNA.

29.Cellulose is digestible by humans.

30. Enzymes speed up biochemical reactions.

D. TWO MARKS QUESTIONS

31.Differentiate between monosaccharides and polysaccharides.

32.Explain the significance of hydrogen bonds in biomolecules.

33.Write two differences between DNA and RNA.

34.State two biological functions of proteins.

35.Why are lipids considered energy-rich compounds?

ANSWERS KEY:

A. MULTIPLE CHOICE QUESTIONS:

1 C | 2 B | 3 B | 4 C | 5 B | 6 B | 7 C | 8 C | 9 C | 10 C |
11 C | 12 B | 13 C | 14 C | 15 C | 16 C | 17 D | 18 C | 19 B | 20 C

B. FILL IN THE BLANKS:

21 Monosaccharide | 22 Peptide | 23 Nucleotides | 24 9 | 25 Ribose

C. TRUE / FALSE:

26 False | 27 True | 28 False | 29 False | 30 True

CHAPTER:10-CELL CYCLE AND CELL DIVISION

The cell cycle is a series of events by which a cell grows, replicates its DNA, and divides into two daughter cells. It consists of two main phases: interphase and the mitotic phase. Interphase includes G_1, S, and G_2 phases, during which the cell grows and DNA replication occurs. The mitotic phase involves mitosis, which ensures equal distribution of chromosomes, followed by cytokinesis that divides the cytoplasm. Mitosis is divided into prophase, metaphase, anaphase, and telophase, each with distinct cellular changes. Regulation of the cell cycle is controlled by checkpoints and cyclins to ensure accuracy and prevent uncontrolled division. Proper control of the cell cycle is essential for growth, development, and tissue repair in organisms.

A. MULTIPLE CHOICE QUESTIONS:

1. The longest phase of the cell cycle is

A) G_1 phase B) S phase C) G_2 phase D) M phase

2. DNA replication occurs during

A) G_1 phase B) S phase C) G_2 phase D) Prophase

3. Which phase is characterised by rapid cell growth and protein synthesis?

A) G_1 phase B) S phase C) G_2 phase D) Metaphase

4. Condensation of chromatin into visible chromosomes occurs during

A) Interphase B) Prophase C) Metaphase D) Anaphase

5. The stage at which chromosomes align at the equatorial plate is

A) Prophase B) Metaphase C) Anaphase D) Telophase

6. Separation of sister chromatids takes place in

A) Metaphase B) Prophase I C) Anaphase D) Telophase

7. Spindle fibres are formed from

A) Ribosomes B) Microtubules C) Microfilaments D) Centrioles only

8.Which phase marks the end of karyokinesis?

A) Prophase B) Metaphase C) Anaphase D) Telophase

9. Cytokinesis in animal cells occurs by

A) Cell plate formation B) Cleavage furrow C) Fragmentation D) Budding

10. Cytokinesis in plant cells occurs by

A) Cleavage furrow B) Phagocytosis C) Cell plate formation D) Pinocytosis

11. Reduction in chromosome number occurs during

A) Mitosis B) Meiosis I C) Meiosis II D) Amitosis

12. Crossing over takes place during

A) Pachytene B) Zygotene C) Diplotene D) Diakinesis

13. Synapsis of homologous chromosomes occurs in

A) Prophase I B) Metaphase I C) Anaphase I D) Telophase I

14. The number of chromosomes in a human somatic cell is

A) 23 B) 46 C) 92 D) 44

15. The stage at which chiasmata become visible is

A) Leptotene B) Zygotene C) Pachytene D) Diplotene

16. Meiosis II is similar to

A) Amitosis B) Binary fission C) Mitosis D) Cytokinesis

17. Which phase ensures equal distribution of chromosomes?

A) G_1 phase B) Metaphase C) Anaphase D) Telophase

18. Failure of spindle formation affects

A) DNA replication B) Chromosome movement C) Protein synthesis D) Cytokinesis

19. The resting stage of cell cycle is

A) G_1 phase B) S phase C) G_0 phase D) G_2 phase

20. Haploid cells are produced as a result of

A) Mitosis B) Meiosis C) Amitosis D) Endomitosis

B. FILL IN THE BLANKS

21. The synthesis of histone proteins occurs during _____ phase.
22. The region joining sister chromatids is called _____.
23. The division of cytoplasm is known as _____.
24. Bivalent formation occurs during _____ stage of meiosis.
25. Chiasmata represent sites of _____.

C. TRUE / FALSE

26. Interphase is a metabolically inactive phase.
27. Mitosis maintains genetic stability in somatic cells.
28. Meiosis occurs only in diploid cells.
29. Crossing over increases genetic variation.
30. Cytokinesis always follows karyokinesis immediately.

D.FIVE MARK QUESTIONS

31. Describe the different phases of the cell cycle with their significance.
32. Explain the stages of mitosis with suitable details.
33. Describe Prophase I of meiosis, highlighting its substages.
34. Explain the significance of meiosis in sexually reproducing organisms.
35. Describe the differences between mitosis and meiosis.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 A | 2 B | 3 A | 4 B | 5 B | 6 C | 7 B | 8 D | 9 B | 10 C |
11 B | 12 A | 13 A | 14 B | 15 D | 16 C | 17 C | 18 B | 19 C | 20 B

B. FILL IN THE BLANKS:

21 S | 22 Centromere | 23 Cytokinesis | 24 Pachytene | 25 Crossing over

C.TRUE / FALSE:

26 False | 27 True | 28 True | 29 True | 30 False

CHAPTER:11- PHOTOSYNTHESIS IN HIGHER PLANTS

Photosynthesis is the process by which green plants synthesize food using sunlight, carbon dioxide, and water. It occurs in chloroplasts, where chlorophyll traps light energy. The process consists of two main stages: light reactions and dark reactions (Calvin cycle). During light reactions, water is split to release oxygen and produce ATP and NADPH. The Calvin cycle uses ATP and NADPH to fix carbon dioxide into carbohydrates. Photosynthesis follows specific pathways such as the C_3, C_4, and CAM pathways to adapt to different environmental conditions. This process is vital as it provides food, oxygen, and energy for all living organisms on Earth.

A. MULTIPLE CHOICE QUESTIONS

1. The primary pigment involved in photosynthesis is

A) Chlorophyll b B) Chlorophyll a C) Carotene D) Xanthophyll

2. Photosynthetically active radiation (PAR) lies between

A) 200–400 nm B) 300–500 nm C) 400–700 nm D) 700–900 nm

3. The site of light reaction in chloroplast is

A) Stroma B) Thylakoid membrane C) Outer membrane D) Inner membrane

4. Oxygen evolved during photosynthesis comes from

A) CO_2 B) Glucose C) Water D) Chlorophyll

5. The splitting of water during photosynthesis is called

A) Hydrolysis B) Photolysis C) Oxidation D) Reduction

6. PS II has its reaction centre chlorophyll called

A) P680 B) P700 C) P720 D) P600

7. Cyclic photophosphorylation produces

A) ATP only B) NADPH only
C) ATP and NADPH D) ATP, NADPH and O_2

8. The Calvin cycle occurs in

A) Thylakoid lumen B) Grana C) Stroma D) Cytoplasm

9. RuBisCO is involved in

A) Photolysis of water B) Carboxylation of RuBP
C) Reduction of NADP D) Transport of electrons

10. The first stable product of C_3 cycle is

A) Oxaloacetic acid B) Pyruvic acid
C) 3-phosphoglyceric acid D) Malic acid

11. C_4 plants avoid photorespiration due to

A) Larger stomata B) Presence of bundle sheath cells
C) High oxygen concentration D) Absence of RuBisCO

12. The enzyme PEP carboxylase is active in

A) Bundle sheath cells B) Guard cells C) Mesophyll cells D) Phloem cells

13. Photorespiration occurs when RuBisCO acts as

A) Carboxylase B) Oxygenase C) Dehydrogenase D) Isomerase

14. The C_4 acid transported to bundle sheath cells is

A) Pyruvate B) PGA C) Malate D) RuBP

15. CAM plants fix CO_2 during night to reduce

A) Respiration B) Photorespiration C) Transpiration loss D) Energy loss

16. The wavelength most effective for photosynthesis is

A) Green B) Yellow C) Red and Blue D) Infrared

17. ATP synthesis during photosynthesis is driven by

A) Electron flow only B) Proton gradient C) Oxygen release D) CO_2 fixation

18. Which of the following is not a pigment?

A) Chlorophyll a B) Chlorophyll b C) Phycobilin D) Carotene

19. The regeneration phase of Calvin cycle uses

A) ATP only B) NADPH only

C) ATP and NADPH D) Neither ATP nor NADPH

20. Photorespiration results in

A) ATP synthesis B) CO_2 fixation C) Loss of fixed carbon D) Increased glucose production

B. FILL IN THE BLANKS

21.The light-harvesting complex contains _____ pigments.

22.RuBisCO is the most abundant _____ in the biosphere.

23.The splitting of water occurs at _____ of PS II.

24.C_4 plants show a special type of anatomy called _____ anatomy.

25. In CAM plants, stomata open during the _____.

C. TRUE / FALSE

26. Chlorophyll b absorbs light mainly in the green region.

27.Cyclic photophosphorylation does not produce oxygen.

28.Photorespiration occurs only in chloroplasts.

29.Bundle sheath cells lack grana in C_4 plants.

30.Photosynthesis is an anabolic process.

D. TWO MARKS QUESTIONS

31.Why is chlorophyll a called the primary pigment?

32.State two differences between cyclic and non-cyclic photophosphorylation.

33.Why does photorespiration reduce photosynthetic efficiency?

34.Mention two advantages of C_4 pathway over C_3 pathway.

35.Write two functions of carotenoids in photosynthesis.

E. THREE MARKS QUESTIONS

36.Explain the role of light in photosynthesis.

37.Describe the structure of chloroplast related to photosynthesis.

38.Explain the significance of Calvin cycle.

39.Describe the role of ATP and NADPH in carbon fixation.

40.Explain how temperature affects photosynthesis.

F. FIVE MARKS QUESTIONS

41.Describe the light reactions of photosynthesis in detail.

42.Explain the Calvin cycle with its three phases.

43.Describe photorespiration and its biological significance.

44.Explain the C_4 pathway with suitable examples.

45.Compare C_3, C_4 and CAM pathways of photosynthesis.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B	2 C	3 B	4 C	5 B	6 A	7 A	8 C	9 B	10 C
11 B	12 C	13 B	14 C	15 C	16 C	17 B	18 C	19 A	20 C

B. FILL IN THE BLANKS:

21 Accessory	22 Enzyme	23 Oxygen	evolving complex	24 Kranz	25 Night

C. TRUE / FALSE:

26 False	27 True	28 False	29 True	30 True

CHAPTER: 12- RESPIRATION IN PLANTS

Respiration in plants is the process by which energy is released from food for growth and maintenance. It involves the breakdown of glucose to produce ATP, which is the energy currency of the cell. Plant respiration occurs through three main stages: glycolysis, Krebs cycle, and electron transport system. Glycolysis takes place in the cytoplasm, while the Krebs cycle and electron transport system occur in mitochondria. Plants can carry out both aerobic respiration in the presence of oxygen and anaerobic respiration when oxygen is limited. The exchange of respiratory gases occurs mainly through stomata and lenticels. Respiration is essential for plants as it supplies energy required for all metabolic activities.

A. MULTPLE CHOICE QUESTIONS:

1.The final acceptor of electrons in aerobic respiration is

A) NAD^+ B) FAD C) Oxygen D) Cytochrome

2.Glycolysis occurs in the

A) Mitochondria B) Chloroplast C) Cytoplasm D) Nucleus

3.The net gain of ATP molecules during glycolysis is

A) 1 B) 2 C) 4 D) 6

4.The link reaction converts pyruvate into

A) Acetyl CoA B) Oxaloacetate C) Lactate D) Ethanol

5. Which enzyme complex catalyses oxidative decarboxylation of pyruvate?

A) RuBisCO B) Pyruvate dehydrogenase
C) ATP synthase D) Cytochrome oxidase

6. The Krebs cycle takes place in the

A) Cytosol B) Mitochondrial matrix
C) Inner mitochondrial membrane D) Intermembrane space

7. CO_2 is released during

A) Glycolysis
B) Oxidative decarboxylation and Krebs cycle
C) ETS
D) Photophosphorylation

8.Which step produces the maximum ATP during respiration?

A) Glycolysis B) Krebs cycle C) ETS D) Link reaction

9.The respiratory quotient (RQ) for carbohydrates is

A) 0.7 B) 0.9 C) 1.0 D) >1

10.In anaerobic respiration of plants, pyruvate is converted into

A) Lactic acid B) Acetyl Cozz C) Ethanol and CO_2 D) Malic acid

11.Which coenzyme acts as the final hydrogen acceptor in ETS?

A) FAD B) NAD^+ C) Oxygen D) Cytochrome c

12.ATP synthesis in mitochondria occurs by

A) Substrate-level phosphorylation B) Oxidative phosphorylation

C) Photophosphorylation D) Cyclic phosphorylation

13.The enzyme ATP synthase is located on the

A) Outer mitochondrial membrane B) Inner mitochondrial membrane

C) Matrix D) Intermembrane space

14.The first stable compound formed in Krebs cycle is

A) Citric acid B) Succinic acid C) Oxaloacetic acid D) Pyruvic acid

15.The number of ATP molecules formed from one glucose molecule in aerobic respiration is

A) 32 B) 34 C) 36 D) 38

16.The RQ value less than one indicates respiration of

A) Carbohydrates B) Proteins C) Fats D) Organic acids

17.ETS is also called

A) Cytochrome chain B) Glycolytic pathway

C) Calvin cycle D) Pentose phosphate pathway

18.During fermentation, ATP is produced by

A) ETS B) Oxidative phosphorylation

C) Substrate-level phosphorylation D) Chemiosmosis

19.Which of the following is not a respiratory substrate?

A) Glucose B) Fatty acid C) Protein D) Chlorophyll

20.Cyanide inhibits respiration by blocking

A) Glycolysis B) Krebs cycle C) Cytochrome oxidase D) ATP synthas

B. FILL IN THE BLANKS (5)

21.The breakdown of glucose into pyruvate is called _____.

22.The enzyme responsible for the conversion of fructose-6-phosphate to fructose-1,6-bisphosphate is _____.

23.The site of ETS is _____ mitochondrial membrane.

24.The terminal enzyme of respiratory chain is _____.

25.Fermentation occurs in the absence of _____.

C. TRUE / FALSE (5)

26.Glycolysis requires oxygen directly.

27.Krebs cycle is a cyclic pathway.

28.Fats yield more energy per gram than carbohydrates.

29.Anaerobic respiration produces more ATP than aerobic respiration.

30.ATP synthase works on the principle of chemiosmosis.

D. FIVE MARKS QUESTIONS

31.Describe glycolysis and explain its significance in plant respiratio

32.Explain the Krebs cycle with emphasis on energy yield.

33.Describe the electron transport system and oxidative phosphorylation.

34.Compare aerobic and anaerobic respiration in plants.

35.Explain the concept of respiratory quotient and its significance.

ANSWER KEY

A.MULTIPLE CHOICE QUESTIONS:

1 C | 2 C | 3 B | 4 A | 5 B | 6 B | 7 B | 8 C | 9 C | 10 C |
11 C | 12 B | 13 B | 14 A | 15 D | 16 C | 17 A | 18 C | 19 D | 20 C

B. FILL IN THE BLANKS:

21 Glycolysis | 22 Phosphofructokinase | 23 Inner | 24 Cytochrome oxidase | 25 Oxygen

C. TRUE / FALSE:

26 False | 27 True | 28 True | 29 False | 30 True

CHAPTER: 13- PLANT GROWTH AND DEVELOPMENT

Plant growth and development refer to the permanent increase in size and the progression of life stages in plants. Growth in plants is generally indeterminate due to the presence of meristematic tissues. Plant growth involves processes such as cell division, cell elongation, and cell differentiation. Development includes changes in form, structure, and function during the plant's life cycle. Plant growth regulators like auxins, gibberellins, cytokinins, ethylene, and abscisic acid control various growth responses. Environmental factors such as light, temperature, water, and nutrients significantly influence plant growth and development. Proper coordination of internal hormones and external factors ensures normal growth, flowering, and reproduction in plants.

A. MULTIPLE CHOICE QUESTIONS:

1.Increase in size of a plant due to increase in cell number is called

A) Cell enlargement B) Cell differentiation C) Cell division D) Cell elongation

2.Growth in plants is considered irreversible because

A) Cells lose water B) New cells are continuously formed

C) Increase in protoplasm is permanent D) Cells stop dividing

3.The region of maximum elongation in roots is

A) Root cap B) Meristematic zone

C) Elongation zone D) Maturation zone

4.Which type of growth occurs due to activity of vascular cambium?

A) Primary growth B) Secondary growth

C) Apical growth D) Intercalary growth

5.Sigmoid curve represents

A) Linear growth B) Exponential growth

C) Arithmetic growth D) Logistic growth

6.The formula for exponential growth is

A) $Lt = L_0 + rt$ B) $W_1 = W_0 e^{rt}$

C) $Lt = W_0 + t$ D) $G = r \times t$

7.Which plant hormone promotes cell elongation?

A) Cytokinin B) Auxin C) Ethylene D) Abscisic acid

8.Gibberellins are particularly known for

A) Root initiation B) Stem elongation

C) Leaf abscission D) Dormancy

9.Which hormone delays senescence in plants?

A) Auxin B) Ethylene C) Cytokinin D) ABA

10.The growth inhibitor hormone is

A) Gibberellin B) Auxin C) Abscisic acid D) Cytokinin

11.Ethylene is unique among plant hormones because it is

A) Water soluble B) Gaseous C) Lipid soluble D) Acidic

12.Photoperiodism is concerned with

A) Temperature B) Light quality

C) Duration of light D) Light intensity

13.Vernalisation refers to

A) Seed germination B) Flowering induced by cold

C) Senescence D) Fruit ripening

14.Short-day plants flower when

A) Days are longer than critical period B) Days are shorter than critical period

C) Days and nights are equal D) Light intensity is high

15.Which hormone is associated with fruit ripening?

A) Auxin B) Cytokinin C) Gibberellin D) Ethylene

16.Apical dominance is mainly regulated by

A) Cytokinin B) Gibberellin C) Auxin D) ABA

17.Senescence involves

A) Increase in chlorophyll B) Increase in metabolic activity

C) Programmed cell death D) Cell division

18.Which phase of growth shows maximum growth rate?

A) Lag phase B) Log phase

C) Stationary phase D) Decline phase

19.Intercalary meristem is commonly found in

A) Roots B) Woody stems

C) Grasses D) Leaves of dicots

20. Plant growth regulators are effective in

A) Very high concentration B) Very low concentration

C) Equal concentration D) Saturated concentration

B. FILL IN THE BLANKS

21. Increase in volume due to cell expansion is known as _____ growth.
22. The growth curve showing S-shape is called _____ curve.
23. Cytokinins are synthesised mainly in _____.
24. The removal of apical bud stimulates _____ growth.
25. Vernalisation response can be reversed by _____.

C. TRUE / FALSE

26. Plant growth is both quantitative and qualitative.
27. ABA promotes stomatal closure during water stress.
28. Gibberellins inhibit seed germination.
29. Long-day plants require long nights to flower.
30. Ethylene promotes senescence and abscission.

D.THREE MARKS QUESTIONS

31. Explain why plant growth is considered irreversible.
32. Describe the role of auxins in plant growth and development.
33. Explain the significance of photoperiodism in plants.
34. Describe the physiological role of gibberellins.
35. Explain senescence as a phase of plant development.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 C	2 C	3 C	4 B	5 D	6 B	7 B	8 B	9 C	10 C
11 B	12 C	13 B	14 B	15 D	16 C	17 C	18 B	19 C	20 B

B. FILL IN THE BLANKS:

21 Cell elongation	22 Sigmoid	23 Roots	24 Lateral	25 Devernalisation

C. TRUE / FALSE:

26 True	27 True	28 False	29 False	30 True

CHAPTER: 14- BREATHING AND EXCHANGE OF GASES

Breathing and exchange of gases are vital processes that supply oxygen to the body and remove carbon dioxide. Breathing involves inhalation and exhalation, which help move air in and out of the lungs. Exchange of gases occurs in the alveoli of the lungs by simple diffusion. Oxygen from inhaled air diffuses into the blood, while carbon dioxide diffuses from the blood into the alveoli. Transport of gases is carried out by blood, mainly through hemoglobin in red blood cells. Regulation of breathing is controlled by respiratory centers in the brain in response to carbon dioxide levels. Efficient breathing and gas exchange are essential for cellular respiration and energy production.

A. MULTIPLE CHOICE QUESTIONS:

1. The process of exchange of gases between atmosphere and lungs is called

A) Respiration B) Diffusion C) Breathing D) Ventilation

2. The functional unit of lungs where gas exchange occurs is

A) Bronchiole B) Alveolus C) Trachea D) Pleura

3. Which gas is transported mostly in dissolved form in blood?

A) Oxygen B) Nitrogen C) Carbon dioxide D) Carbon monoxide

4. Oxygen is transported in blood mainly bound to

A) Plasma proteins B) Myoglobin C) Haemoglobin D) Albumin

5.The affinity of haemoglobin for oxygen increases with

A) Increase in CO_2 B) Increase in H^+ concentration

C) Decrease in temperature D) Increase in temperature

6.Which factor shifts the oxygen dissociation curve to the right?

A) Decreased CO_2 B) Increased pH C) Increased temperature D) Decreased H^+ ions

7. Carbon dioxide is transported in blood mainly as

A) Dissolved gas B) Carbaminohaemoglobin C) Bicarbonate ions D) Carbonic acid

8. The enzyme carbonic anhydrase is present in

A) Plasma only B) RBC only C) WBC only D) Platelets

9. During inspiration, diaphragm

A) Relaxes and moves up B) Contracts and moves down

C) Relaxes and moves down D) Contracts and moves up

10. Tidal volume refers to

A) Volume of air inspired after forced inspiration B) Volume of air expired after forced expiration

C) Volume of air inspired or expired in a normal breath D) Total lung capacity

11. Residual volume is the volume of air

A) Expired forcefully B) Inspired forcefully

C) Left in lungs after forceful expiration D) Exchanged during normal breathing

12. Which lung volume cannot be measured by a spirometer?

A) Tidal volume B) Inspiratory reserve volume

C) Expiratory reserve volume D) Residual volume

13. The partial pressure of oxygen in alveoli is approximately

A) 40 mm Hg B) 60 mm Hg C) 95 mm Hg D) 104 mm Hg

14.Which of the following reduces oxygen-carrying capacity of blood?

A) Anaemia B) Polycythemia

C) Increased RBC count D) Increased haemoglobin

15. The Bohr effect explains the influence of

A) CO_2 and H^+ on oxygen binding B) Temperature on breathing rate

C) Pressure on diffusion D) Nitrogen on respiration

16Which condition results from chronic smoking?

A) Asthma B) Bronchitis C) Pneumonia D) Tuberculosis

17. Myoglobin differs from haemoglobin because it

A) Has four subunits B) Transports CO_2

C) Has higher affinity for oxygen D) Is present in RBCs

18. Exchange of gases across alveolar membrane occurs by

A) Active transport B) Facilitated diffusion

C) Simple diffusion D) Osmosis

19. Which structure prevents collapse of trachea?

A) Cartilaginous rings B) Pleura C) Epiglottis D) Alveoli

20.The normal breathing rate in adult humans is approximately

A) 6–8/min B) 12–16/min C) 20–24/min D) 30–35/min

B. FILL IN THE BLANKS

21. The movement of air into lungs is called _____.

22.The respiratory pigment in human blood is _____.

23.The pressure that drives breathing is called _____ pressure.

24.The blood–gas barrier is extremely thin to facilitate _____.

25.Carbon dioxide diffuses faster than oxygen because it is more _____.

C. TRUE / FALSE

26.Alveoli increase surface area for gas exchange.

27.Oxygen dissociation curve is sigmoid in shape.

28.Haemoglobin carries oxygen in dissolved form.

29.Expiration during normal breathing is an active process.

30.Partial pressure gradient determines direction of gas exchange.

D. THREE MARKS QUESTIONS

31.Explain the mechanism of inspiration in humans.

32.Describe the oxygen dissociation curve and its significance.

33.Explain how carbon dioxide is transported in blood.

34.Describe the role of haemoglobin in respiration.

35.Explain the causes and effects of emphysema.

E. FIVE MARKS QUESTIONS

36.Describe the structure of alveoli and explain their role in gas exchange.

37.Explain the process of exchange of gases at alveolar and tissue levels.

38.Describe the regulation of respiration in humans.
39.Explain lung volumes and capacities with suitable examples.
40.Describe respiratory disorders caused by pollution and smoking.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 C | 2 B | 3 C | 4 C | 5 C | 6 C | 7 C | 8 B | 9 B | 10 C |
11 C | 12 D | 13 D | 14 A | 15 A | 16 B | 17 C | 18 C | 19 A | 20 B

B. FILL IN THE BLANKS:

21 Inspiration | 22 Haemoglobin | 23 Intrapulmonary | 24 Diffusion | 25 Soluble

C. TRUE / FALSE:

26 True | 27 True | 28 False | 29 False | 30 True

CHAPTER: 15- BODY FLUIDS AND CIRCULATION

Body fluids and circulation are essential for transport of materials within the body. The main body fluids are blood and lymph, which help in transport, defense, and regulation. Blood consists of plasma and formed elements like red blood cells, white blood cells, and platelets. The human circulatory system includes the heart, blood vessels, and blood, forming a closed circulatory system. The heart pumps blood through arteries, veins, and capillaries to supply oxygen and nutrients to tissues. Lymph helps in the removal of excess tissue fluid and plays an important role in immunity. Proper circulation maintains internal balance and supports normal functioning of organs.

A. MULTIPLE CHOICE QUESTIONS:

1. The fluid connective tissue responsible for transport of hormones is

A) Lymph B) Blood C) Tissue fluid D) Plasma

2. Which plasma protein is primarily responsible for blood clotting?

A) Albumin B) Globulin C) Fibrinogen D) Prothrombin

3. The average life span of human erythrocytes is

A) 90 days B) 100 days C) 120 days D) 150 days

4. Which formed element of blood lacks nucleus and mitochondria?

A) RBC B) WBC C) Platelet D) Lymphocyte

5. Blood group AB is considered universal recipient because

A) It has both antigens B) It has no antigens C) It has no antibodies D) It has both antibodies

6. The Rh factor was discovered in

A) Humans B) Monkeys C) Rabbits D) Rats

7. Which blood vessel has maximum blood pressure?

A) Vein B) Artery C) Capillary D) Venule

8. The pacemaker of human heart is

A) AV node B) SA node C) Bundle of His D) Purkinje fibres

9. The tricuspid valve is present between

A) Left atrium and left ventricle B) Right atrium and right ventricle
C) Right atrium and left ventricle D) Left atrium and right atrium

10. Which event corresponds to ventricular systole?

A) Closure of semilunar valves B) Opening of atrioventricular valves
C) Ejection of blood into aorta D) Filling of ventricles

11. Cardiac output is the product of

A) Heart rate × Stroke volume B) Blood pressure × Heart rate

C) Stroke volume × Blood volume D) Blood pressure × Stroke volume

12. Which component of ECG represents ventricular depolarisation?

A) P wave B) QRS complex C) T wave D) PR interval

13. The blood pressure in veins is low because

A) Walls are thick B) Flow resistance is high C) They lack valves D) Blood flows slowly

14. Which leucocytes are mainly responsible for antibody production?

A) Neutrophils B) Eosinophils C) Lymphocytes D) Monocytes

15. Which factor does NOT affect blood pressure?

A) Cardiac output B) Peripheral resistance C) Blood viscosity D) Blood group

16. The movement of lymph is mainly assisted by

A) Heart pumping B) Valves and muscle contraction C) Diffusion D) Osmosis

17. Which vessel carries oxygenated blood from lungs to heart?

A) Pulmonary artery B) Pulmonary vein C) Aorta D) Vena cava

18. The function of platelets is related to

A) Immunity B) Oxygen transport C) Blood clotting D) Hormone transport

19. Which condition is caused by deficiency of clotting factors?

A) Anaemia B) Leukemia C) Haemophilia D) Thrombosis

20. The thick muscular wall of left ventricle is due to

A) Higher blood volume B) Higher pressure pumping C) Presence of valves D) Faster heart rate

B. FILL IN THE BLANKS

21.The liquid part of blood without clotting factors is called _____.

22.The normal blood pH in humans is approximately _____.

23.The valve between left atrium and left ventricle is _____ valve.

24.The process of clot formation is known as _____.

25.The ECG wave representing atrial depolarisation is _____.

C. TRUE / FALSE

26. Plasma constitutes about 55% of total blood volume.

27.Arteries always carry oxygenated blood.

28.SA node initiates the cardiac impulse.

29.Lymph contains RBCs and platelets.

30.Blood pressure is measured using a sphygmomanometer.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 C | 3 C | 4 A | 5 C | 6 B | 7 B | 8 B | 9 B | 10 C |
11 A | 12 B | 13 D | 14 C | 15 D | 16 B | 17 B | 18 C | 19 C | 20 B

B. FILL IN THE BLANKS:

21 Serum | 22 7.4 | 23 Bicuspid (Mitral) | 24 Coagulation | 25 P wave

C. TRUE / FALSE:

26 True | 27 False | 28 True | 29 False | 30 True

CHAPTER:16- EXCRETORY PRODUCTS AND THEIR ELIMINATION

Excretion is the process of removal of metabolic waste products from the body. Major excretory products in humans include ammonia, urea, carbon dioxide, and excess salts and water. The human excretory system mainly consists of kidneys, ureters, urinary bladder, and urethra. Kidneys filter blood through millions of nephrons to remove wastes and regulate water and ion balance. Urine formation involves three steps: glomerular filtration, tubular reabsorption, and tubular secretion. Other organs like lungs and skin also help in excretion by removing carbon dioxide and sweat. Efficient elimination of wastes is essential to maintain homeostasis and prevent toxicity.

A. MULTIPLE CHOICE QUESTIONS:

1. The main nitrogenous waste excreted by humans is

A) Ammonia B) Urea C) Uric acid D) Creatinine

2. The functional unit of kidney responsible for urine formation is

A) Neuron B) Nephron C) Glomerulus D) Malpighian body

3. Ultrafiltration occurs at

A) Loop of Henle B) PCT C) Glomerulus D) DCT

4. The filtration membrane of nephron is formed by

A) Endothelium only B) Basement membrane only
C) Podocytes only D) Endothelium, basement membrane and podocytes

5. Selective reabsorption mainly occurs in

A) Bowman's capsule B) PCT C) Loop of Henle D) Collecting duct

6. The counter-current mechanism operates in

A) PCT and DCT B) Glomerulus and PCT
C) Loop of Henle and vasa recta D) Collecting duct and DCT

7. Which hormone increases permeability of collecting ducts to water?

A) Aldosterone B) ADH C) Renin D) ANF

8. Juxtaglomerular apparatus is concerned with regulation of

A) Blood glucose B) Blood volume and pressure C) Blood pH D) Filtration rate only

9. Which part of nephron is impermeable to water?

A) Descending limb of Henle B) Ascending limb of Henle
C) PCT D) Collecting duct

10. The concentration of urea is highest in

A) Renal artery B) Renal vein C) Urine D) Blood plasma

11. Which nitrogenous waste is excreted mainly by birds?

A) Ammonia B) Urea C) Uric acid D) Creatine

12. The hormone aldosterone mainly regulates

A) Water balance B) Na^+ and K^+ balance C) Glucose reabsorption D) Urea secretion

13. The Bowman's capsule and glomerulus together form

A) Nephron loop B) Renal corpuscle C) Renal pyramid D) Vasa recta

14. The pH of normal human urine is usually

A) Strongly acidic B) Neutral C) Slightly acidic D) Strongly alkaline

15. Which substance is completely reabsorbed under normal conditions?

A) Urea B) Creatinine C) Glucose D) Uric acid

16. Micturition is controlled by

A) Only spinal reflex B) Only voluntary muscles
C) Both reflex and voluntary control D) Only involuntary muscles

17. The presence of excess proteins in urine indicates

A) Diabetes mellitus B) Kidney malfunction C) Liver disease D) Anaemia

18. Which vessel brings blood to the glomerulus?

A) Renal vein B) Efferent arteriole C) Afferent arteriole D) Vasa recta

19. Dialysis is recommended when there is failure of

A) Liver B) Lungs C) Kidneys D) Heart

20. The main driving force for glomerular filtration is

A) Osmotic pressure B) Hydrostatic pressure C) Diffusion D) Active transport

B. FILL IN THE BLANKS

21. The process of removal of nitrogenous wastes from the body is called _____.

22.The functional unit of kidney in vertebrates is _____.

23.The hormone that decreases blood pressure by vasodilation is _____.

24.The long loop present in nephrons of mammals helps in _____.

25.The involuntary release of urine is known as _____.

C. TRUE / FALSE

26.Ammonotelic animals require less water for excretion.

27.The ascending limb of Henle's loop is permeable to water.

28.ADH secretion increases urine concentration.

29.The renal vein carries blood rich in urea.

30.Artificial kidney works on the principle of diffusion.

D. THREE MARKS QUESTIONS

31.Explain how the structure of the nephron is related to its function in urine formation.

32.Describe the counter-current mechanism and its significance in mammals.

33.Explain the role of ADH and aldosterone in maintaining water and electrolyte balance.

34.Describe the process of micturition and its neural control.

35.Differentiate between ammonotelism, ureotelism, and uricotelism with suitable examples.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 B | 3 C | 4 D | 5 B | 6 C | 7 B | 8 B | 9 B | 10 C |
11 C | 12 B | 13 B | 14 C | 15 C | 16 C | 17 B | 18 C | 19 C | 20 B

B. FILL IN THE BLANKS:

21 Excretion | 22 Nephron | 23 Atrial natriuretic factor (ANF) | 24 Concentration of urine | 25 Incontinence

C. TRUE / FALSE:

26 False | 27 False | 28 True | 29 False | 30 True

CHAPTER:17- LOCOMOTION AND MOVEMENT

Locomotion and movement enable organisms to change position and perform various activities. Movement refers to any change in position of body parts, while locomotion involves movement of the whole body from one place to another. In humans, movement is brought about by the coordinated action of muscles, bones, and joints. The skeletal system provides support and acts as levers for movement. Muscles contract and relax to produce movement, with skeletal muscles being responsible for voluntary actions. Different types of joints allow varied movements such as bending, rotation, and gliding. Proper coordination between the nervous system and musculoskeletal system ensures efficient locomotion and movement.

A. MULTIPLE CHOICE QUESTIONS:

1. The smallest contractile unit of a myofibril is

A) Myosin B) Actin C) Sarcomere D) Z-line

2. Which type of muscle fibre contains intercalated discs?

A) Skeletal muscle B) Smooth muscle C) Cardiac muscle D) Visceral muscle

3. During muscle contraction, the length of which band remains constant?

A) I band B) A band C) H zone D) Z line

4. The neurotransmitter released at neuromuscular junction is

A) Dopamine B) Acetylcholine C) Adrenaline D) Noradrenaline

5. The functional unit of muscle contraction is

A) Myosin filament B) Actin filament C) Sarcomere D) Myofibril

6. Which ion plays a key role in initiating muscle contraction?

A) Na^+ B) K^+ C) Ca^{2+} D) Mg^{2+}

7. ATP binding to myosin head causes

A) Power stroke B) Release of myosin from actin

C) Formation of cross-bridge D) Muscle relaxation

8. Which protein masks the myosin-binding site on actin?

A) Troponin B) Tropomyosin C) Titin D) Nebulin

9. Rigor mortis occurs due to

A) Excess ATP B) Absence of ATP

C) Presence of Ca^{2+} D) Lack of oxygen only

10. The type of joint between atlas and axis vertebrae is

A) Hinge joint B) Pivot joint C) Ball and socket joint D) Gliding joint

11. Which joint allows maximum movement in humans?

A) Shoulder joint B) Elbow joint C) Knee joint D) Hip joint

12. Which bone is not a part of appendicular skeleton?

A) Humerus B) Femur C) Vertebra D) Scapula

13. The number of cervical vertebrae in humans is

A) 5 B) 7 C) 12 D) 33

14. Which muscle is involuntary but striated?

A) Smooth muscle B) Skeletal muscle C) Cardiac muscle D) Visceral muscle

15. The Z-line is composed mainly of

A) Actin B) Myosin C) Troponin D) Connective proteins

16. Which part of myosin has ATPase activity?

A) Tail B) Head C) Neck D) Hinge region

17. Which disorder is caused due to autoimmune destruction of acetylcholine receptors?

A) Muscular dystrophy B) Myasthenia gravis C) Arthritis D) Tetany

18. The bone forming the pelvic girdle is

A) Ilium B) Ischium C) Pubis D) All of these

19. Which muscle fatigue results due to accumulation of

A) Oxygen B) Lactic acid C) Glucose D) ATP

20. The antagonistic muscle pair responsible for bending and straightening of arm is

A) Deltoid and trapezius B) Biceps and triceps

C) Quadriceps and hamstrings D) Sartorius and gracilis

B. FILL IN THE BLANKS

21.The sliding filament theory was proposed by _____ and _____.
22.The connective tissue covering the entire muscle is called _____.
23.The region of sarcomere containing only thick filaments is _____.
24.The joint between skull and first cervical vertebra is _____ joint.
25.The structural protein that provides elasticity to muscle is _____.

C. TRUE / FALSE Smooth muscles are multinucleate and striated.
26.Calcium ions bind to troponin during muscle contraction.
27.Skeletal muscles are under voluntary control.
28.The A band shortens during muscle contraction.
29.Osteoporosis leads to increased bone density.

D. THREE MARKS ANSWER QUESTIONS

31.Explain the molecular mechanism of muscle contraction with reference to cross-bridge cycle.
32.Describe the structure of a synovial joint and explain how it facilitates movement.
33.Explain the role of calcium ions in regulation of muscle contraction and relaxation.
34.Describe the functional differences between red and white muscle fibres.
35.Explain the causes and symptoms of myasthenia gravis.

ANSWER KEY

A.MULTIPLE CHOICE QUESTIONS

1 C | 2 C | 3 B | 4 B | 5 C | 6 C | 7 B | 8 B | 9 B | 10 B |
11 A | 12 C | 13 B | 14 C | 15 D | 16 B | 17 B | 18 D | 19 B | 20 B

B. FILL IN THE BLANKS:

21 Huxley and Hanson	22 Epimysium	23 H zone	24 Atlanto	occipital | 25 Titin

C.TRUE / FALSE:

26 False | 27 True | 28 True | 29 False | 30 False

CHAPTER: 18- NEURAL CONTROL AND COORDINATION

Neural control and coordination help organisms respond quickly and appropriately to internal and external stimuli. The nervous system is divided into the central nervous system, peripheral nervous system, and autonomic nervous system. Neurons are the structural and functional units of the nervous system and transmit nerve impulses. The brain and spinal cord process information and coordinate activities of the body. Reflex actions provide immediate responses through reflex arcs without direct involvement of the brain. The autonomic nervous system regulates involuntary functions through sympathetic and parasympathetic divisions. Efficient neural control ensures proper coordination, balance, and survival of the organism.

A. MULTIPLE CHOICE QUESTIONS

1. The resting membrane potential of a neuron is mainly due to

A) Equal distribution of Na^+ and K^+ B) Higher permeability to K^+ than Na^+
C) Active transport of Na^+ only D) Diffusion of Cl^- only

2. The threshold potential of a neuron is approximately

A) –90 mV B) –70 mV C) –55 mV D) +30 mV

3. During depolarisation of axonal membrane, there is

A) Efflux of Na^+ B) Influx of Na^+ C) Efflux of K^+ D) Influx of K^+

4. Repolarisation of axon membrane occurs due to

A) Opening of Na^+ channels B) Closing of K^+ channels

C) Efflux of K^+ ions D) Influx of Na^+ ions

5. The myelin sheath in peripheral nerves is formed by

A) Oligodendrocytes B) Astrocytes C) Schwann cells D) Microglia

6. Saltatory conduction occurs in

A) Unmyelinated fibres B) Myelinated fibres C) Dendrites D) Cell body

7. Which part of brain regulates body temperature and hunger?

A) Cerebellum B) Hypothalamus C) Thalamus D) Medulla oblongata

8. The centre for regulation of respiration is located in

A) Pons and medulla B) Cerebellum C) Hypothalamus D) Midbrain

9. The cerebrospinal fluid is present in

A) Central canal and ventricles B) Spinal nerves only C) Cranial nerves only D) Grey matter only

10. Which lobe of cerebrum is associated with vision?

A) Frontal B) Parietal C) Temporal D) Occipital

11. The neurotransmitter released at excitatory synapse is usually

A) GABA B) Glycine C) Acetylcholine D) Serotonin

12. Which structure connects two cerebral hemispheres?

A) Corpus callosum B) Pons C) Medulla D) Thalamus

13. The autonomic nervous system controls

A) Voluntary muscles B) Skeletal muscles only C) Involuntary activities D) Reflex action only

14. Which hormone is called emergency hormone?

A) Thyroxine B) Insulin C) Adrenaline D) Cortisol

15. The sympathetic nervous system causes

A) Constriction of bronchioles B) Decrease in heart rate

C) Dilation of pupils D) Increase in digestion

16. Which part of ear is responsible for dynamic equilibrium?

A) Cochlea B) Utricle C) Saccule D) Semicircular canals

17. The hormone melatonin is secreted by

A) Pituitary gland B) Thyroid gland C) Pineal gland D) Adrenal gland

18. Reflex actions are primarily controlled by

A) Cerebrum B) Cerebellum C) Spinal cord D) Hypothalamus

19. Which of the following is a mixed nerve?

A) Optic nerve B) Olfactory nerve C) Facial nerve D) Auditory nerve

20. The region of brain responsible for coordination of voluntary movements is

A) Cerebrum B) Cerebellum C) Medulla D) Thalamus

B. FILL IN THE BLANKS

21.The gap between two adjacent neurons is called _____.

22.The potential difference across the resting axonal membrane is called _____.

23.The protective membranes covering the brain and spinal cord are called _____.

24.The neurotransmitter that inhibits nerve impulse transmission is _____.

25.The structural and functional unit of the nervous system is _____.

C. TRUE / FALSE

26.Grey matter of brain consists mainly of nerve fibres.
27.Action potential follows all-or-none principle.
28.Sympathetic nervous system prepares the body for emergency situations.
29.Cerebellum controls thinking and intelligence.
30. Chemical synapses are slower than electrical synapses.

D. TWO MARKS QUESTIONS

31.Define resting membrane potential and explain its significance in nerve impulse conduction.
32. Differentiate between sympathetic and parasympathetic nervous systems.
33.Explain the role of hypothalamus as a neuroendocrine regulator.
34.What is saltatory conduction? Why is it faster than continuous conduction?
35.Explain the significance of reflex action in humans.

E. FIVE MARKS QUESTIONS

36. Describe the generation and conduction of nerve impulse along a myelinated neuron.
37. Explain the structure and functions of cerebrum, cerebellum, and medulla oblongata.
38. Describe the mechanism of synaptic transmission at a chemical synapse.
39 Explain the role of autonomic nervous systems in maintaining homeostasis.
40. Describe the structure of the human eye and explain the mechanism of vision.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS:

1 B | 2 C | 3 B | 4 C | 5 C | 6 B | 7 B | 8 A | 9 A | 10 D |
11 C | 12 A | 13 C | 14 C | 15 C | 16 D | 17 C | 18 C | 19 C | 20 B

B.FILL IN THE BLANKS:

21 Synaptic cleft | 22 Resting membrane potential | 23 Meninges | 24 GABA | 25 Neuron

C. TRUE / FALSE:

26 False | 27 True | 28 True | 29 False | 30 True

CHAPTER:19- CHEMICAL COORDINATION AND INTEGRATION

Chemical coordination and integration in the body are carried out by hormones secreted by endocrine glands. Hormones are chemical messengers that regulate growth, development, metabolism, and reproduction. The endocrine system includes glands such as the pituitary, thyroid, adrenal, pancreas, and gonads. Hormones are released directly into the bloodstream and act on specific target organs. The pituitary gland acts as the master gland by controlling other endocrine glands. Feedback mechanisms help maintain hormonal balance and homeostasis in the body. Proper hormonal coordination is essential for normal physiological functioning and adaptation to changes.

A. MULTIPLE CHOICE QUESTIONS:

1. Hormones are best described as

A) Enzymes B) Nutrients C) Chemical messengers D) Antibodies

2. Which hormone is secreted by pars distalis of pituitary gland?

A) Oxytocin B) ADH C) Growth hormone D) Melatonin

3. The hormone responsible for milk ejection is
A) Prolactin B) Oxytocin C) Estrogen D) Progesterone
4. Which gland is called the master gland of the endocrine system?
A) Thyroid B) Pituitary C) Hypothalamus D) Adrenal
5. The iodine-containing hormone is
A) Insulin B) Glucagon C) Thyroxine D) Cortisol
6. Which hormone lowers blood glucose level?
A) Glucagon B) Adrenaline C) Insulin D) Cortisol
7. The adrenal medulla secretes
A) Aldosterone B) Cortisol C) Adrenaline and noradrenaline D) Thyroxine
8. Which hormone is responsible for metamorphosis in frog?
A) Growth hormone B) Thyroxine C) Prolactin D) Cortisol
9. Parathyroid hormone increases blood calcium level by
A) Increasing calcitonin B) Increasing bone deposition
C) Increasing bone resorption D) Decreasing intestinal absorption
10. Which hormone shows antagonistic action to insulin?
A) Thyroxine B) Cortisol C) Glucagon D) ADH
11. Hormones that act on target cells via second messenger are
A) Steroid hormones B) Amino acid derivatives C) Protein hormones D) Fatty acids
12. The second messenger involved in adrenaline action is
A) cAMP B) Ca^{2+} C) IP_3 D) DAG
13. Which endocrine gland develops from ectoderm?
A) Thyroid B) Adrenal medulla C) Parathyroid D) Pancreas
14. The hormone regulating basal metabolic rate is
A) Insulin B) Cortisol C) Thyroxine D) Glucagon
15. Which disorder is caused due to hypersecretion of growth hormone in adults?
A) Dwarfism B) Gigantism C) Acromegaly D) Cretinism
16. Calcitonin is secreted by
A) Parathyroid gland B) Thyroid gland C) Adrenal gland D) Pituitary gland
17. Which hormone is also called stress hormone?
A) Insulin B) Cortisol C) Oxytocin D) Thyroxine
18. Target cells of hormones must possess
A) Enzymes B) Transport proteins C) Specific receptors D) Ribosomes
19. Pineal gland secretes hormone that regulates
A) Growth B) Metabolism C) Circadian rhythm D) Blood glucose
20. Which hormone is NOT protein in nature?
A) Insulin B) Prolactin C) Thyroxine D) Growth hormone

B. FILL IN THE BLANKS
21.Hormones that are effective in very small quantities are called _____.
22.The hormone secreted by posterior pituitary that regulates water balance is _____.
23.The endocrine part of pancreas is called _____.
24.Hyposecretion of thyroxine in children causes _____.
25.The feedback regulation of hormones is mostly _____ in nature.

C. TRUE / FALSE

26.Steroid hormones bind to intracellular receptors.
27.Calcitonin decreases blood calcium level.
28.Hypothalamus produces releasing and inhibiting hormones.
29.Glucagon decreases blood glucose level.
30.Hormones are transported through blood to target organs.

D. TWO MARKS QUESTIONS:

31.Explain how hormones differ from enzymes in their mode of action.
32.Describe the role of hypothalamus in endocrine regulation.
33.Explain the mechanism of action of steroid hormones.
34.Differentiate between endocrine and exocrine glands.
35.Explain the hormonal regulation of blood calcium level in humans.

ANSWER KEY

A. MULTIPLE CHOICE QUESTIONS

1 C | 2 C | 3 B | 4 B | 5 C | 6 C | 7 C | 8 B | 9 C | 10 C |
11 C | 12 A | 13 B | 14 C | 15 C | 16 B | 17 B | 18 C | 19 C | 20 C

B. FILL IN THE BLANKS:

21 Chemical messengers | 22 ADH | 23 Islets of Langerhans | 24 Cretinism | 25 Negative

C. TRUE / FALSE:

26 True | 27 True | 28 True | 29 False | 30 True