



BIOLOGY

Bio-Botany & Bio-Zoology
2 & 3 Mark Questions with Answers

VOLUME - I & II

11

EASY PASS
MINIMUM MATERIAL

Based on March 2019 Board Exam Pattern

சூர்யாவின்.....

சதம் விடிப்போம்....

SURYA PUBLICATIONS

(A unit of **Shyamala** Group)

No. 1, Sugar Mill Colony, Phone : 0462 - 2338899, 2338484.

Salai Kumaran illam, Mobile : 94431-58484,

Madurai Road, 94421-58484,

Tirunelveli - 627 001. 94425-58484.

E-mail: suryaguides@yahoo.com

website : www.suryapublications.in

Price : ₹ 60/-

kindly send me your key Answers to our email id - padasalai.net@gmail.com

Published By

B. ARUMUGAM

SURYA PUBLICATIONS

*(A unit of **Shyamala** Group)*

BANK ACCOUNT DETAILS

Account Name : Surya Publications
Account Number : 446971431
Bank Name : Indian Bank
IFSC Code : IDIB000T034
Branch Name : Tirunelveli Junction

Account Name : Surya Publications
Account Number : 510909010051752
Bank Name : City Union Bank
IFSC Code : CIUB0000230
Branch Name : Palayamkottai

kindly send me your key Answers to our email id - padasalai.net@gmail.com

CONTENTS

Chapter	Titles	Pages
BIO-BOTANY		
1	Living World	1
2	Plant Kingdom	9
3	Vegetative Morphology	14
4	Reproductive Morphology	23
5	Taxonomy and Systematic Botany	31
6	Cell: The Unit of Life	40
7	Cell Cycle	46
8	Biomolecules	51
9	Tissue and Tissue System	57
10	Secondary Growth	63
11	Transport in Plants	69
12	Mineral Nutrition	78
13	Photosynthesis	83
14	Respiration	89
15	Plant Growth and Development	95
BIO-ZOOLOGY		
1	The Living World	107
2	Animal Kingdom	113
3	Tissue Level of Organisation	120
4	Organ and Organ System	124
5	Digestion and Absorption	130
6	Respiration	138
7	Body Fluids and Circulation	145
8	Excretion	150
9	Locomotion and Movement	159
10	Neural Control and Coordination	166
11	Chemical Coordination and Integration	176
12	Trends in Economic Zoology	184



BIO-BOTANY

2 & 3 Marks

LIVING WORLD

EVALUATION

2 & 3 Marks

- Differentiate Homoiomerous and Heteromerous lichens.**
 - + Homoiomerous- Algal cells evenly distributed in the thallus
 - + Heteromerous- a distinct layer of algae and fungi present.
- Write the distinguishing features of Monera.**
 - + Prokaryotic organisms.
 - + It accommodates both autotrophic and heterotrophic organisms.
 - + Cell wall is present which made of peptidoglycan and mucopeptides.
- Why do farmers plant leguminous crops in crop rotations/ mixed cropping?**
 - + To replenish the soil nitrogen, the plants need nitrogen in the form of nitrate for protein.
 - + The root of leguminous crops are hosts to nitrogen fixing bacteria, which are able to extract nitrogen from the air, and make it available for the leguminous crops.
 - + After the leguminous crops are harvested, some nitrogen remains in the soil, available for the crop rotations / mixed crops.

ADDITIONAL

2 & 3 Marks

- What is meant by biosphere?**
 - + Earth is the life supporting planet with land forms like mountains, plateaus, glaciers, etc.,
 - + Life on earth exists within a complex structure called

2. What is meant by consciousness?

- + All organisms are capable of sensing their environment and respond to various physical, chemical and biological stimuli.
- + Animals sense their surroundings by sense organs.
- + This is called Consciousness.

3. Define homeostasis.

- + Property of self-regulation and tendency to maintain a steady state within an external environment which is liable to change is called homeostasis.

4. Define metabolism.

- + The sum total of all the chemical reactions taking place in a cell of living organism is called metabolism.
- + It is broadly divided into anabolism and catabolism.

5. What is meant by anabolism?

- + It is building up process.
- + Smaller molecules combine together to form larger molecule
- + Chemical energy is formed and stored
- + Example: Synthesis of proteins from amino acids

6. What is meant by catabolism?

- + Breaking down process
- + Larger molecule break into smaller units
- + The stored chemical energy is released and used
- + Example: Breaking down of glucose to CO₂ and water

7. Define virus.

- + Viruses are sub-microscopic, obligate intracellular parasites.
- + They have nucleic acid core surrounded by protein coat.

8. Write the living characters of viruses.

- + Presence of nucleic acid and protein.
- + Capable of mutation.
- + Ability to multiply within living cells.
- + Able to infect and cause diseases in living beings.

- + Show irritability.
- + Host –specific.

9. Write the non-living characters of viruses.

- + Can be crystallized.
- + Absence of metabolism.
- + Inactive outside the host.
- + Do not show functional autonomy.
- + Energy producing enzyme system is absent.

10. Define virology.

- + The study of viruses is called Virology.

11. What is capsid and capsomeres?

- + The virion is made up of two constituents, a protein coat called capsid and a core called nucleic acid.
- + The protein coat is made up of approximately 2130 identical protein subunits called capsomeres.

12. Define Bacteriophage.

- + Viruses infecting bacteria are called Bacteriophages.
- + It literally means ‘eaters of bacteria’ (Gr: Phagein = to eat).

13. What are the animal diseases of viral diseases?

- + Foot and mouth disease of cattle
- + Rabies of dog
- + Encephalomyelitis of horse

14. Define bacteriology.

- + The study of Bacteria is called Bacteriology.

15. What is meant by landing?

- + The process involving the recognition of phage to bacterium is called landing.

16. What is meant by pinning?

- + Once the contact is established between tail fibres and bacterial cell, tail fibres bend to anchor the pins and base plate to the cell surface. This step is called pinning.

17. What is transfection?

- + The step involving injection of DNA particle alone into the bacterial cell is called Transfection.

18. What is ghost?

- + After transfection, the empty protein coat leaving outside the cell is known as 'ghost'.

19. What is prophage?

- + The integrated phage DNA is now called prophage.

20. Define virion.

- + Virion is an intact infective virus particle which is non-replicating outside a host cell.

21. Define viroid.

- + Viroid is a circular molecule of ssRNA without a capsid.
- + The RNA of viroid has low molecular weight.

22. Define virusoids.

- + Virusoids are the small circular RNAs which are similar to viroids but they are always linked with larger molecules of the viral RNA.

23. What are prions?

- + Prions are proteinaceous infectious particles.
- + They are the causative agents for about a dozen fatal degenerative disorders of the central nervous system of humans and other animals.

24. Write the importance of need of classification.

- + Classification is essential to achieve following needs
- + To relate things based on common characteristic features.
- + To define organisms based on the salient features.
- + Helps in knowing the relationship amongst different groups of organisms.
- + It helps in understanding the evolutionary relationship between organisms

25. Write the Merits of five kingdom classification.

- + The classification is based on the complexity of cell structure and organization of thallus.
- + It is based on the mode of nutrition.
- + Separation of fungi from plants.
- + It shows the phylogeny of the organisms.

26. What is bacteriology?

- + The study of Bacteria is called Bacteriology.

27. What is nucleoid or genophore?

- + The Genetic material of bacteria is called nucleoid or genophore or incipient nucleus

28. Define plasmid.

- + Plasmids are extrachromosomal double stranded, circular, self-replicating, autonomous elements.
- + They contain genes for fertility, antibiotic resistant and heavy metals.

29. What are mesosomes?

- + Mesosomes are localized infoldings of plasma membrane produced into the cell in the form of vesicles, tubules and lamellae.
- + They are clumped and folded together to maximize their surface area and helps in respiration and in binary fission

30. What are polysomes or poly ribosomes?

- + The ribosomes are held together by mRNA and form polyribosomes or polysomes.

31. What is flagella?

- + Certain motile bacteria have numerous thin hair like processes of variable length emerge from the cell wall called flagella.

32. What is fimbriae or pili?

- + Pili or fimbriae are hair like appendages found on surface of cell wall of gram-negative bacteria

33. What are magnetosomes?

- + Intracellular chains of 40-50 magnetite (Fe_3O_4) particles are found in bacterium Aquaspirillum magnetotacticum and it helps the bacterium to locate nutrient rich sediments

34. Write the two types of respiration in bacteria.

- + Aerobic respiration
- + Anaerobic respiration

35. What is capnophilic bacteria?

- + Bacteria which require CO_2 for their growth are called as capnophilic bacteria. Example: Campylobacter.

36. Write the example for heterotrophic bacteria.

- + Parasites - Clostridium, Mycobacterium
- + Saprophytes - Bacillus mycoides
- + Symbiotic - Rhizobium

37. Write about binary fission in bacteria.

- + Under favourable conditions the cell divides into two daughter cells.
- + The nuclear material divides first and it is followed by the formation of a simple median constriction which finally results in the separation of two cells.

38. Define conjugation.

- + It is method of gene transfer the donor cell gets attached to the recipient cell with the help of pili.

39. Define transformation.

- + Transfer of DNA from one bacterium to another is called transformation.

40. What is transduction? Mention tis types.

- + Phage mediated DNA transfer is called Transduction
- + Transduction is of two types (i) Generalized Transduction (ii) Specialized or Restricted Transduction.

41. What is generalized transduction?

- + The ability of a bacteriophage to carry genetic material of any region of bacterial DNA is called generalised transduction.

42. What is specialized transduction?

- + The ability of the bacteriophage to carry only a specific region of the bacterial DNA is called specialized or restricted transduction.

43. What are heterocysts? Mention the function.

- + In some forms a large colourless cell is found in the terminal or intercalary position called Heterocysts.
- + They are involved in nitrogen fixation.

44. What are four types of ascocarps?

- + Cleistothecium
- + Perithecium Apothecium
- + Pseudothecium.

45. What is meant by ‘Toad stools’?

- + Fungi like Amanita phalloides, Amanita verna, Boletus satanus are highly poisonous due to the production of toxins.
- + These fungi are commonly referred as “Toad stools”.

46. What is meant by ‘aflatoxin’?

- + Aspergillus flavus infest dried foods and produce carcinogenic toxin called aflatoxin.

47. Define mycorrhizae.

- + The Symbiotic association between fungal mycelium and roots of plants is called as mycorrhizae.

48. Mention the Importance of Mycorrhizae.

- + Helps to derive nutrition in Monotropa, a saprophytic angiosperm,
- + Improves the availability of minerals and water to the plants.
- + Provides drought resistance to the plants

- + Protects roots of higher plants from the attack of plant pathogens

49. What is meant by Lichens?

- + The symbiotic association between algae and fungi is called lichens.
- + The algal partner is called Phycobiont or Photobiont and the fungal partner is called Mycobiont.

50. Write any three uses of lichens.

- + Usnic acid produced from lichens show antibiotic properties.
- + Lichens are sensitive to air pollutants especially to sulphur-di-oxide.
- + Therefore, they are considered as pollution indicators.
- + The dye present in litmus paper used as acid base indicator in the laboratories is obtained from Roccella montagnei.
- + Cladoniarangiferina (Reindeer moss) is used as food for animals living in Tundra regions.

51. What is meant by basidiolichen?

- + If the fungal partner of lichen belongs to basidiomycetes, it is called Basidiolichen.



2

PLANT KINGDOM

EVALUATION

2 & 3 Marks

1. **What is plectostele? give example.**
 - + Plectostele is a type of protostele in which xylem plates alternate with phloem plates.
 - + Example - Lycopodium clavatum
2. **What do you infer from the term pycnoxylic?**
 - + Pycnoxylic is a type of wood in Gymnosperms
 - + Compact with narrow medullary ray
 - + Example - Pinus
3. **Mention two characters shared by gymnosperms and angiosperms.**
 - + Both plant groups produce seeds
 - + Pollen tube helps in the transfer of male nucleus in both.
 - + Presence of Eustele.
 - + Presence of well organised plant body which is differentiated into roots, stem and leaves
4. **Do you think shape of chloroplast is unique for algae? Justify your answer.**
 - + Yes. I think the shape of chloroplast is unique for algae. Because it stores starch.
 - + Variation among the shapes of chloroplast is found in algae and is very unique to it especially in green algae.

SHAPE OF CHLOROPLAST

- | | |
|------------------|------------------|
| 1. Chlamydomonas | - Cup shaped |
| 2. Chara | - Discoid shaped |
| 3. Ulothrix | - Girdle shaped |

- | | |
|---------------|---------------------|
| 4. Oedogonium | - Reticulate shaped |
| 5. Spirogyra | - Spiral shaped |
| 6. Zygnema | - Stellate shaped |
| 7. Mougeoutia | - Plate like shaped |

5. Do you agree with the statement, 'Bryophytes need water for fertilization'? Justify your answer.

- + Yes. Because, in bryophytes for formation of diploid zygote water helps antherozoids to reach the archegonium to fuse zygote.

6. Differentiate haplontic and diplontic life cycle.

Haplontic life cycle

- + Gametophytic phase is dominant, photosynthetic and independent, whereas sporophytic phase is represented by the zygote. Zygote undergoes meiosis to restore haploid condition.
- + Example - Volvox, Spirogyra.

Diplontic life cycle

- + Sporophytic phase (2n) is dominant, photosynthetic and independent. The gametophytic phase is represented by the single to few celled gametophytes. The gametes fuse to form Zygote which develops into Sporophyte.
- + Example - Fucus, Gymnosperms and Angiosperms

ADDITIONAL

2 & 3 Marks

1. Write short notes on haplontic life cycle

- + Gametophytic phase is dominant, photosynthetic and independent, whereas sporophytic phase is represented by the zygote. Zygote undergoes meiosis to restore haploid condition. Example - Volvox, Spirogyra.

2. Write a note on diplontic life cycle in plants.

- + Sporophytic phase (2n) is dominant, photosynthetic and independent.

- + The gametophytic phase is represented by the single to few celled gametophytes. The gametes fuse to form Zygote which develops into Sporophyte.
 - + Example - Fucus, Gymnosperms and Angiosperms
- 3. What is haplodiplontic life cycle in plants?**
- + This type of life cycle is found in Bryophytes and pteridophytes which is intermediate between haplontic and diplontic type. Both the phases are multicellular. but they differ in their dominant phase.
- 4. Mention cryophytic algae.**
- + Algae growing in snow are called Cryophytic algae.
 - + Example - Chlamydomonas nivalis grow in snow covered mountains and impart red colour to the snow (Red snow).
- 5. What are epiphytic algae?**
- + A few algae grow on the surface of aquatic plants and are called epiphytic algae
 - + Example - Coleochaete, and Rhodymenia
- 6. Define algology or phycology.**
- + The study of algae is called algology or phycology.
- 7. What is isogamy?**
- + Fusion of morphologically and Physiologically similar gametes.
 - + Example - Ulothrix
- 8. What is Anisogamy?**
- + Fusion of either morphologically or physiologically dissimilar gametes.
 - + Example - Pandorina
- 9. What is oogamy?**
- + Fusion of both morphologically and physiologically dissimilar gametes.
 - + Example - Sargassum

10. Why are bryophytes called as non – vascular cryptogams?

- + Vascular tissue like xylem and phloem are completely absent, hence bryophytes are called Non-vascular cryptogams.

11. Why bryophytes are called amphibians of plant kingdom?

- + Bryophytes are also called as ‘amphibians of plant kingdom’ because they need water for completing their life cycle.

12. Why are pteridophytes called as vascular cryptogams?

- + But there is a plant group called Pteridophytes which are considered as first true land plants.
- + Further, they were the first plants to acquire vascular tissue namely xylem and phloem, hence called vascular cryptogams.

13. Define prothallus.

- + Spore mother cells undergo meiosis and produce spores (n).
- + Spore germinates to produce haploid, multicellular green, cordate shaped independent gametophytes called prothallus.

14. Define stele.

- + The term stele refers to the central cylinder of vascular tissues consisting of xylem, phloem, pericycle and sometimes medullary rays with pith.

15. What is eustele?

- + The stele is split into distinct collateral vascular bundles around the pith.
- + Example: Dicot stem.

16. Mention some fossil sources of India.

- + Shiwalik fossil park-Himachal Pradesh
- + Mandla Fossil park-Madhya Pradesh
- + Raajmahal Hills–Jharkhand
- + Ariyalur – Tamilnadu

17. Write any three salient features of angiosperms.

- + Vascular tissue is well developed.

- + The embryo sac remains enclosed in the ovary.
- + Pollen tube helps in fertilization
- + Double fertilization is present.
- + The endosperm is triploid.

18. Write the anatomical features of dicotyledons?

- + Vascular bundles are arranged in the form of a ring in stem.
- + Vascular bundles are open (Cambium present).
- + Secondary growth is present.

19. Write the anatomical features monocotyledons?

- + Vascular bundles are scattered in the stem
- + Vascular bundles are closed (Cambium absent).
- + Secondary growth is absent.



3

VEGETATIVE MORPHOLOGY

❖ EVALUATION ❖
2 & 3 Marks

1. How root climbers differ from stem climbers?

ROOT CLIMBERS	STEM CLIMBERS
+ Plants climbing with the help of adventitious roots are called Root climbers. + Example - Piper betel	+ Stem climbers may coil around the support clockwise or anti - clockwise. + Example - Ipomoea

2. Compare sympodial branching with monopodial branching.

Sympodial branching	Monopodial branching
The terminal bud ceases to grow after a period of growth and the further growth is taken care by successive or several lateral meristem or buds. This type of growth is also known as sympodial branching.	The terminal bud grows uninterrupted and produce several lateral branches. This type of growth is also known as monopodial branching.
Example - Cycas.	Example - Polyalthia, Swietenia, Antiaris.

3. Compare pinnate unicostate and palmate multicostate venation?

Pinnate unicostate venation	Palmate Multicostate venation
Only one mid rib in the centre which forms many lateral branches to form a network.	Two or more principal veins arising from a single point and they proceed outwards or upwards.

Example - Mangifera indica, Ficus religiosa, Nerium.	Example - Cucurbita, Luffa, Carica papaya, Indian plum, bay leaf.
---	---

ADDITIONAL**2 & 3 Marks****1. Why lateral roots are endogenous?**

- + Lateral roots are initiated in the pericycle and grow out through the cortex and epidermis, they are said to have an internal or endogenous.

2. What are Vegetative morphology deals with?

- + Vegetative morphology deals with the study of shape, size and structure of plants and their parts roots, stems and leaves.

3. Define climbers.

- + An elongated weak stem generally supported by means of climbing devices are called Climbers

4. What is meant by therophyte or ephemerals?

- + A plant that completes its life cycle in one growing season.
- + Example - Peas, maize, water melon, groundnut, sunflower, rice and so on.

5. Define geophytes.

- + Perennial herbs having a bulb, corm, rhizome or tuber as the underground stem are termed as geophytes.
- + Example - Phyllanthus amarus, Cleome viscosa.

6. What is shrubs?

- + A shrub is a perennial, woody plant with several main stems arising from the ground level.
- + Example - Hibiscus

7. What is meant by Liana?

- + Liana is a vine that is perennial and woody. Liana's are major components in the tree canopy layer of some tropical forests.

8. Define Biennial. Give example.

- + A plant that lives for two seasons, growing vegetatively during the first season and flowering and fruiting during the second season. Example - Onion, Lettuce, Fennel, Carrot, Radish, Cabbage and Spinach.

9. Define polycarpic.

- + A plant that grows for many years that flowers and set fruits for several seasons during the life span. When they bear fruits every year, they are called polycarpic.

10. Define monocarpic.

- + Some plants produce flowers and fruits only once and die after a vegetative growth of several years. These plants are called monocarpic.
- + Example - Bamboo, Agave, Musa, Talipot palm.

11. Compare root system and shoot system.

ROOT SYSTEM	SHOOT SYSTEM
They are sporophytes consisting of an axis with an underground "Root system"	They are sporophytes consisting of an axis with an aerial "Shoot System".
The shoot system has a stem, branches and leaves.	The root system consists of root and its lateral branches.

12. What is root cap?

- + Root tip is covered by a dome shaped parenchymatous cells called root cap.

13. Name the three distinct zones of root.

- + Meristematic Zone
- + Zone of Elongation
- + Zone of Maturation

14. What is the Adventitious root system?

- + Root developing from any part of the plant other than radicle is called adventitious root.

- + It may develop from the base of the stem or nodes or internodes.
- + Example - *Monstera deliciosa*, *Ficus benghalensis*, *Piper nigrum*.

15. Mention the primary functions of root.

- + Absorb water and minerals from soil.
- + Help to anchor the plant firmly in the soil.

16. Write the secondary functions of root.

- + In some plants, roots perform additional functions. These are called secondary functions.
- + To perform additional functions, these roots are modified in their structure.

17. What are Climbing (clasp or clinging) roots?

These roots are produced from the nodes of the stem which attach themselves to the support and help in climbing.

Example - *Epiperemnum pinnatum*, *Piper betel*, *Ficus pumila*.

18. What is epiphytic or velamen root?

- + Some epiphytic orchids develop a special kind of aerial roots which hang freely in the air.
- + These roots develop a spongy tissue called velamen which helps in absorption of moisture from the surrounding air.
- + Example - *Vanda*, *Dendrobium*, *Aerides*.

19. Write a note on haustorial roots.

- + These roots are found in parasitic plants. Parasites develop adventitious roots from stem which penetrate into the tissue of the host plant and suck nutrients.
- + Example - *Cuscuta* (dodder), *Cassytha*, *Orobanche* (broomrape), *Viscum* (mistletoe), *Dendrophthoe*.

20. What are the Primary functions of stem?

- + Provides support and bears leaves, flowers and fruits.

- + It transports water and mineral nutrients to the other parts from the root.
- + It transports food prepared by leaves to other parts of the plant body.

21. What are the Secondary functions of stem?

- + Food storage- Example - Solanum tuberosum, Colocasia and Zingiber officinale
- + Perennation / reproduction – Example - Zingiber officinale, Curcuma longa
- + Water storage – Example - Opuntia
- + Bouyancy – Example - Neptunia
- + Photosynthesis – Example - Opuntia, Ruscus, Casuarina, Euphorbia, Caralluma.
- + Protection – Example - Citrus, Duranta, Bougainvillea, Acacia, Fluggea, Carissa.
- + Support - Example - Passiflora, Bougainvillea, Vitis, Cissus quadrangularis.

22. What are foliar buds?

- + Foliar buds - are those that grow on leaves from veins or from margins of the leaves.
- + Example - Begonia (Elephant ear plant) and Bryophyllum (Sprout leaf plant).

23. What are cauline buds?

- + Cauline buds - arise directly from the stem either from cut, pruned ends or from branches.
- + Adventitious buds function as propagules which are produced on the stem as tuberous structures.
- + Example - Dioscorea, Agave.

24. What are bulbils?

- + Bulbils are modified and enlarged bud, meant for propagation.

+ When bulbils detach from parent plant and fall on the ground,

they germinate into new plants and serve as a means of vegetative propagation.

25. What is phylloclade?

- + This is a green, flattened cylindrical or angled stem or branch of unlimited growth, consisting of a series of nodes and internodes at long or short intervals.
- + Phylloclade is characteristic adaptation of xerophytes

26. Define cladophyll.

- + The phylloclade takes over all the functions of leaves, particularly photosynthesis.
- + The phylloclade is also called as cladophyll.
- + Example - Opuntia

27. What is cladode?

- + Cladode is a flattened or cylindrical stem similar to Phylloclade but with one or two internodes only.
- + Example - Asparagus

28. Define pseudobulb.

- + Pseudobulb is a short erect aerial storage or propagating stem of certain epiphytic and terrestrial sympodial orchids.
- + Example - Bulbophyllum.

29. Define phyllome.

- + All the leaves of a plant together are referred to as phyllome.

30. Mention the characteristics of leaf.

- + Leaf is a lateral appendage of the stem.
- + It is borne at the node of the stem.
- + It is exogenous in origin.
- + It has limited growth.
- + It does not possess apical bud.
- + It has three main parts namely, leaf base, petiole and lamina.
- + Lamina of the leaf is traversed by vascular strands, called veins.

31. What are the primary functions of the leaf?

- + Photosynthesis
- + Transpiration
- + Gaseous exchange
- + Protection of buds
- + Conduction of water and dissolved solutes.

32. What are the secondary functions of the leaf?

- + Storage – Example - Aloe, Agave, Kalanchoe, Sedum, Brassica oleracea.
- + Protection – Example - Berberis, Opuntia, Argemone mexicana.
- + Support – Example - Gloriosa, Nepenthes
- + Reproduction – Example - Bryophyllum, Begonia, Zamioculcas.

33. Define pulvinus.

- + In legumes leafbase become broad, thick and swollen which is known as pulvinus. Example - Clitoria, Lablab, Cassia, Erythrina, Butea, Peltophorum.

34. Compare petiolate and sessile types of leaf.

PETIOLATE	SESSILE
A leaf with petiole is said to be petiolate.	Leaves that do not possess petiole is said to be sessile.
Example - Ficus, Hibiscus, Mangifera, Psidium.	Example - Calotropis, Gloriosa.

35. What are stipulate and exstipulate?

- + In most of the dicotyledonous plants, the leaf base bears one or two lateral appendages called the stipules. Leaves with stipules are called stipulate.
- + The leaves without stipules are called exstipulate or estipulate.

36. Differentiate between ligule and stipels.

Ligule	stipels
In some grasses (Monocots) an additional out growth is present between leaf base and lamina.	Sometimes, small stipule like outgrowths are found at the base of leaflets of a compound leaf.

37. What is Phyllode?

- + Phyllodes are flat, green-coloured leaf- like modifications of petioles or rachis.
- + The leaflets or lamina of the leaf are highly reduced or caducous.
- + The phyllodes perform photosynthesis and other functions of leaf. Example - Acacia auriculi formis (Australian acacia), Parkinsonia.

38. Write a note on pitcher.

- + The leaf becomes modified into a pitcher in Nepenthes and Sarracenia.
- + In Nepenthes the basal part of the leaf is laminar and the midrib continues as a coiled tendrillar structure.
- + The apical part of the leaf as modified into a pitcher the mouth of the pitcher is closed by a lid which is the modification of leaf apex.

39. Differentiate between circinate and convolute.

Circinate	Convolute
when the leaf is rolled from the apex towards the base like the tail of a dog, as in ferns.	when the leaf is rolled from one margin to the other, as in banana, aroids and Indian pennywort. Musa and members of Araceae.

40. What is dorsiventral leaf?

- + When the leaf is flat, with the blade placed horizontally,

most dicotyledons, it is said to be dorsiventral.

+ Example - Tridax.

41. What is isobilateral leaf?

+ When the leaf is directed vertically upwards, as in many monocotyledons, it is said to be isobilateral leaf.

+ Example - Grass.

42. What is heterophylly?

+ Occurrence of two different kinds of leaves in the same plant is called heterophylly.

+ Heterophylly is found in many aquatic plants.

43. Define geophytes.

+ Perennial herbs having a bulb, corm, rhizome or tuber as the underground stem are termed as geophytes. Example - Phyllanthus amarus, Cleome viscosa.

44. What is climbers (Vine).

+ An elongated weak stem generally supported by means of climbing devices are called Climbers (vines) which may be annual or perennial, herbaceous or woody.

45. What is meant by ptyxis?

+ Ptyxis is rolling or folding of individual leaves.

+ Two types: 1) Reclinate 2) Conduplicate



4

REPRODUCTIVE
MORPHOLOGY

EVALUATION

2 & 3 Marks

1. Find out the floral formula for a bisexual flower with bract, regular, pentamerous, distinct calyx and corolla, superior ovary without bracteole.

Br, EBrl, \oplus , $\sigma\sigma$ K₅, C₅, \underline{G}

2. Give the technical terms for the following:

- + a. A sterile stamen - Staminode
 + b. Stamens are united in one bunch - Monadelphous
 + c. Stamens are attached to the petals - Epipetalous

3. Differentiate between aggregate fruit with multiple fruit.

Aggregate fruit	Multiple fruit
Aggregate fruits develop from a single flower having an apocarpous pistil. Each of the free carpel is develops into a simple fruitlet. A collection of simple fruitlets makes an aggregate fruit.	A Multiple or composite fruit develops from the whole inflorescence along with its peduncle on which they are borne.
Example - polyalthia, Annona	Example - Pineapple, Jack fruit

ADDITIONAL

2 & 3 Marks

1. What is Inflorescence?

- + An inflorescence is a group of flowers arising from a branched or unbranched axis with a definite pattern.

2. Define terminal type of inflorescence.

- + Inflorescence grows as a part of the terminal shoot. Example

3. Define axillary type of inflorescence.

- + Inflorescence present in the axile of the nearest vegetative leaf. Example - Hibiscus rosa-sinensis

4. Differentiate between racemose and cymose.

Racemose	Cymose
Main axis of unlimited growth	Main axis of limited growth.
Flowers arranged in an acropetal succession	Flowers arranged in a basipetal succession
Opening of flowers is centripetal	Opening of flowers is centrifugal
Usually the oldest flower at the base of the inflorescence axis.	Usually the oldest flower at the top of the inflorescence axis.

5. What is capitulum?

- + A head or capitulum is a determinate or indeterminate, group of sessile or sub sessile flowers arising on a receptacle, often subtended by an involucre.
- + Example - Asteraceae

6. What are homogamous head?

- + This type of inflorescence exhibits single kind of florets.
- + Inflorescence has disc florets alone. Example - Vernonia, Ageratum
- + Inflorescence has Ray florets alone. Example - Launaea, Sonchus.

7. What are heterogamous head?

- + The inflorescence possesses both types of florets.
- + Disc florets at the centre of the head are tubular and bisexual whereas the ray florets found at the margin of the head which are ligulate pistillate (unisexual).
- + Example - Helianthus, Tridax.

8. What is hypanthodium?

- + Receptacle is a hollow, globose structure consisting unisexual flowers present on the inner wall of the receptacle.
- + Receptacle is closed except a small opening called ostiole which is covered by a series of bracts.
- + Male flowers are present nearer to the ostiole, female and neutral flowers are found in a mixed manner from middle below. Example - Ficus sp. (Banyan and Pipal).

9. What is coenanthium?

- + Circular disc like fleshy open receptacle that bears pistillate flowers at the center and staminate flowers at the periphery. Example - Dorstenia

10. Compare between hermaphroditic and monoecious.

- + Hermaphroditic: All the flowers of the plant are bisexual.
- + Monoecious: Both male and female flowers are present in the same plant Example - Coconut.

11. Define Asymmetric.

- + Flower lacks any plane of symmetry and cannot be divided into equal halves in any plane. Parts of such flowers are twisted. Example - Canna indica.

12. What are called isomerous and anisomerous?

- + Isomerous- Presence of same number of perianth parts in different whorls of a flower. Example - Hibiscus.
- + Anisomerous- Each whorl of flower contains different number of members. Example - Annona.

13. Discuss the types of Fusion of calyx.

- + Aposepalous: The flower with distinct sepals. Example - Brassica, Annona.
- + Synsepalous: The flower with united or fused sepals. Example - Hibiscus, Datura.

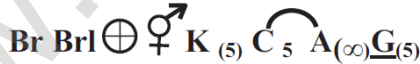
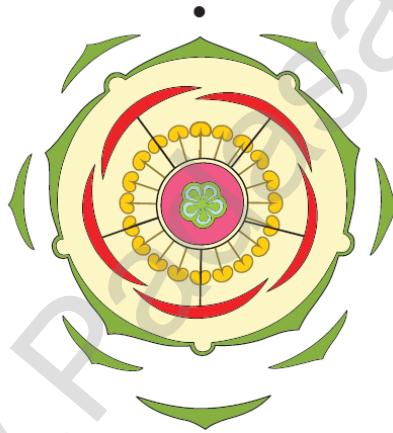
14. Differentiate between apocarpous and syncarpous.

Apocarpous	Syncarpous
A pistil contains two or more distinct carpels.	A pistil contains two or more carpels which are connate.
Example: Annona.	Example: Citrus, tomato.

15. Define hypanthium.

- + Staminal disk.
- + a fleshy, elevated often nectariferous cup like thalamus.

16. Draw floral diagram and Write Floral formula of Hibiscus rosa sinensis.



17. Compare septicidal and loculicidal.

- + Septicidal: Capsule splitting along septa and valves remaining attached to septa. Example - Linum, Aristolochia.
- + Loculicidal: Capsule splitting along locules and valves remaining attached to septa. Example - Lady's finger.

18. Differentiate poricidal and denticidal.

- + Poricidal: Dehiscence through terminal pores. Example -

- + Denticidal: Capsule opening at top exposing a number of teeth. Example - Primula, Cerastium.

19. Differentiate between dicotyledonous and monocotyledonous seed.

- + Dicotyledonous seed: Seed with two cotyledons.
- + Monocotyledonous seed: Seed with one cotyledon.

20. Differentiate between albuminous and ex – albuminous seed.

Albuminous or Endospermous seed	Ex-albuminous or non-endospermous seed
The cotyledons are thin, membranous and mature seeds have endosperm persistent and nourishes the seedling during its early development.	Food is utilized by the developing embryo and so the mature seeds are without endosperm. In such seeds, cotyledons store food and become thick and fleshy.
Example - Castor, sunflower, maize.	Example - Pea, Groundnut.

21. What is True fruit?

- + Ovary develops into fruit without any non-carpellary part. Example - Tomato, Mango

22. What is False fruit?

- + In addition to the ovary the non- floral parts like thalamus (Apple), perianth (jack fruit) and involucre and perianth (English walnut) develop into fruit.

23. What is Parthenocarpic fruit?

- + Development of fruits without fertilization. They are seedless fruits. Example - Banana

24. What is meant by terminal inflorescence?

- + Inflorescence grows as a part of the terminal shoot.
- + Example - Raceme of Nerium oleander

25. What is axillary inflorescence?

- + Inflorescence present in the axile of the nearest vegetative leaf.
- + Example - Hibiscus rosa-sinensis

26. Define cauliflorous.

- + Inflorescence developed directly from a woody trunk.
- + Example - Theobroma cocoa, Couropita guianensis. Observe the inflorescence of Jackfruit and Canon ball tree.

27. What is meant by flower sex?

- + Flower sex refers to the presence or absence of androecium and gynoecium within a flower.

28. What is perfect or bisexual flower?

- + When a flower contains both androecium and gynoecium is called perfect flower.

29. What is imperfect or unisexual flowers?

- + When the flower contains only one of the essential whorls is called Imperfect flower.

30. Differentiate between staminate flowers and pistillate flowers.

Staminate flowers	Pistillate flower
Flowers only with androecium alone are called staminate flowers.	Flowers with only gynoecium are called pistillate flowers.

31. What is plant sex refers to?

- + Plant sex refers to the presence and distribution of flowers with different sexes in an individual plant.

32. What is polygamous?

- + The condition in which bisexual and unisexual (staminate/pistillate) flowers occur in a same plant is called polygamous.
- + Example - Musa, Mangifera.

33. Define actinomorphic (or) radial or polysymmetric

- + The flower shows two mirror images when cut in any plane

- + Normally there are more than two planes of symmetry.
- + Example - Hibiscus, Datura, water lily.

34. Define aygomorphic or monosymmetric

- + The flower can be divided into equal halves in only one plane.
- + Zygomorphic flower can efficiently transfer pollen grains to visiting pollinators.
- + Example - Pisum, Bean, Cassia, Gulmohar, Salvia, Ocimum.

35. Define asymmetric.

- + Flower lacks any plane of symmetry and cannot be divided into equal halves in any plane. Parts of such flowers are twisted.
- + Example - Canna indica.

36. Define spirocyclic or hemicyclic.

- + Some parts are in whorls and others parts are in spirals is called spirocyclic aor hemicyclic.
- + Example - Nymphaea, Annona, Polyalthia

37. Write any three functions of fruit.

- + Edible part of the fruit is a source of food, energy for animals.
- + The fruit protects the seeds from unfavourable climatic conditions and animals.
- + Fruits provide source of medicine to humans.

Write any three significance of seeds.

- + The seed encloses and protects the embryo for next generation.
- + It contains food for the development of embryo.
- + It is a means for the dispersal of new individuals of the species.

38. Define thyrsus?

- + It is a 'Raceme of cymes'. Indefinite central axis bears lateral pedicellate cymes.
- + Example - Ocimum, Anisomelus.

39. Define verticil or verticillaster.

- + Main axis bears two opposite lateral sessile cymes at the axil of the node, each of it produces monochasial scorpioid lateral branches so that flowers are crowded around the node.
- + Example - Leonatis, Leucas.

40. What is cypsela?

- + Single seeded dry fruit, develops from bicarpellary, syncarpous, inferior ovary with reduced scales, hairy or feathery calyx lobes.
- + Example - Tridax, Helianthus.

41. What is caryopsis?

- + It is a one seeded fruit which develops from a monocarpellary, superior ovary. Pericarp is inseparably fused with seed.
- + Example - Oryza, Triticum.



5

TAXONOMY AND
SYSTEMATIC BOTANY

EVALUATION

2 & 3 Marks

1. **What is the role of national gardens in conserving biodiversity – discuss**
 - + National gardens act as a conservation centre for diversity, rare and endangered species.
 - + It can integrate information of diverse fields like Anatomy, Embryology, Phytochemistry, Cytology, Physiology and Ecology.
2. **Where will you place the plants which contain two cotyledons with cup shaped thalamus?**
 - + Class I - Dicotyledonae - Two cotyledons
 - + Sub-class 1 - Polypetalae - Free petals
 - + Series (iii) - Calyciflorae - cup shaped thalamus

ADDITIONAL

2 & 3 Marks

1. **Differentiate between taxonomy and systematics.**

Taxonomy	Systematics
Discipline of classifying organisms into taxa.	Broad field of biology that studies the diversification of species.
Governs the practices of naming, describing, identifying and specimen preservation.	Governs the evolutionary history and phylogenetic relationship in addition to taxonomy.
Classification + Nomenclature = Taxonomy	Taxonomy + Phylogeny = Systematics

2. Define morphological species.

- + When the individuals are similar to one another in one or more features and different from other such groups, they are called morphological species.

3. Define phylogenetic species.

- + An evolutionary species is a single lineage of ancestor descendent populations which maintains its identity from other such lineages which has its own evolutionary.

4. Compare anamorph and telomorph.

Anamorph	Telomorph
Asexual reproductive stage of fungus	Sexual reproductive stage of fungus

5. Define polynomial name.

- + Polynomial is a descriptive phrase of a plant.
- + Example: *Ranunculus calycibus retroflexis pedunculis falcatis caule erecto folius compositis*
- + It means butter cup with reflexed sepals, curved flower stalks, erect stem and compound leaves.

6. What do you know about binomial nomenclature?

- + Binomial nomenclature is scientific name of a species consists of two words
- + The first one is called genus name and second one is specific epithet.
- + Example: *Mangifera indica*. *Mangifera* - genus name; *indica* - specific epithet.

7. What is meant by nomenclature type?

- + ICN's second principle states that a specimen must be associated with the scientific name known as nomenclatural type.
- + A nomenclatural type is either a specimen or may be an illustration. Example: Herbarium sheet for vascular plants.

8. Define holotype.

- + A specimen or illustration originally cited by the author in protologue.
- + It is a definitive reference source for identity.
- + Citation of holotype and submission of it is one of the criteria for valid publication of a botanical name.

9. Define Isotype

- + Duplicate specimen of the holotype collected from same population by same person on same date with same field number.
- + They are the reliable duplicates of holotype and may be distributed to various herbaria of various regions.

10. Define lectotype

- + Specimen selected from original material serves as a type, when no holotype was designated at the time of publications or if holotype is missing or destroyed.

11. Define syntype.

- + When more than one specimen cited by the author in the protologue without designating holotype.

12. What are taxonomical aids?

- + Taxonomic aids are the tools for the taxonomic study.
- + Some techniques, procedures and stored information that are useful in identification and classification of organisms are called taxonomical aids.

13. Name some of the taxonomical aids.

- + Some of the taxonomical aids are keys, flora, revisions, monograph, catalogues, herbarium, botanical gardens etc.

14. What is key?

- + Taxonomic keys are the tools for the identification of unfamiliar plants.
- + These keys are based on characters which are stable and

15. Write a note on flora.

- + Flora is the document of all plant species in a given geographic area.
- + Flora consists of total number of plant species in an area and gives information about flowering season, fruiting season and distribution for the given geographic area.
- + It also provides details on rare and endemic species of that area.
- + Example: 'Flora of Tamil Nadu' Carnatic by K.M.Matthew.

16. What is meant by local flora?

- + It covers the limited areas, usually state, country, city or mountain range.
- + Example: Flora of Thiruvannamalai District by R. Vijaysankar, K. Ravikumar and P. Ravichandran.

17. What is monograph?

- + A Monograph is a complete global account of a taxon of any rank – family, genus or species at a given time.

18. What are catalogues?

- + Catalogues are the books of libraries rich in botanical titles.
- + They have special value in taxonomic studies.

19. Write the various steps included in herbarium preparation.

- + Plant collection
- + Documentation of field site data
- + Preparation of plant specimen
- + Mounting herbarium specimen
- + Herbarium labels.
- + Protection of herbarium sheets against mold and insects

20. Write the step of Protection of herbarium sheets against mold and insects.

- + Application of 2% Mercuric chloride, Naphthalene, DDT, carbon disulphide. Fu- migration using formaldehyde. Presently deep freezing (-20oC) method is followed throughout the world.

21. Write a list of International Botanic Garden.

- + New York Botanic garden, USA.
- + Royal Botanic Garden, Kew - England.
- + Botanical Gardens of the New South Wales, Sydney.
- + Rio- de jenerio Botanic Garden, Brazil.

22. Write any three uses of herbarium.

- + Herbarium provides resource material for systematic research and studies.
- + It is a place for orderly arrangement of voucher specimens.
- + Voucher specimen serves as a reference for comparing doubtful newly collected fresh specimens.

23. What is meant by classification?

- + The scientific basis for cataloguing and retrieving information about the tremendous diversity of flora is known as classification.

24. Name the various types of classification.

- + artificial classification
- + natural classification
- + phylogenetic classification

25. Write about Sub-class Polypetalae.

- + Plants with free petals and dichlamydeous flowers come under polypetalae.
- + It is divided into three series – Thalamiflorae, Disciflorae and Calyciflorae.

26. Name the various class gymnospermae.

- + Gymnospermae includes three families – Gnetaceae, Coniferae and Cycadaceae.

27. Write the Aims of chemotaxonomy.

- + To develop taxonomic characters which may improve existing system of plant classification.

+ To improve present day knowledge of phylogeny of plants.

28. Write the Aims of biosystematics.

- + To delimit the naturally occurring biotic community of plant species.
- + To establish the evolution of a group of taxa by understanding the evolutionary and phylogenetic trends.
- + To involve any type of data gathering based on modern concepts and not only on morphology and anatomy.
- + To recognize the various groups as separate biosystematic categories such as ecotypes, ecospecies, cenospecies and comparium.

29. Define biosystematics.

- + Biosystematics is an “Experimental, ecological and cytotaxonomy” through which life forms are studied and their relationships are defined.

30. What is karyotaxonomy?

- + Utilization of the characters and phenomena of cytology for the explanation of taxonomic problem is known as cytotaxonomy or karyotaxonomy.

31. Define serotaxonomy.

- + The classification of very similar plants by means of differences in the proteins they contain, to solve taxonomic problems is called serotaxonomy.

32. What is the importance of sero-taxonomy?

- + It determines the degree of similarity between species, genera, families etc. by comparing the reactions of antigens from various plant taxa with antibodies raised against the antigen of a given taxon.
- + Example: The assignment of Phaseolus aureus and P. mungo to the genus Vigna is strongly supported by serological evidence by Chrispeels and Gartner.

33. Write the uses of molecular taxonomy.

- + Molecular taxonomy helps in establishing the relationship of different plant groups at DNA level.

- + It unlocks the treasure chest of information on evolutionary history of organisms.

34. Write any three significance of molecular taxonomy.

- + It helps to identify a very large number of species of plants and animals by the use of conserved molecular sequences.
- + Using DNA data evolutionary patterns of biodiversity are now investigated.
- + DNA taxonomy plays a vital role in phylogeography, which ultimately helps in genome mapping and biodiversity conservation.
- + DNA- based molecular markers used for designing DNA based molecular probes, have also been developed under the branch of molecular systematics.

35. Write the Significance of DNA barcoding.

- + DNA barcoding greatly helps in identification and classification of organism.
- + It aids in mapping the extent of biodiversity.
- + DNA barcoding techniques require a large database of sequences for comparison and prior knowledge of the barcoding region.
- + However, DNA barcoding is a helpful tool to determine the authenticity of botanical material in whole, cut or powdered form.

36. What is cladistics?

- + The method of classifying organisms into monophyletic group of a common ancestor based on shared apomorphic characters is called cladistics

37. Write the need for cladistics.

- + Cladistics is now the most commonly used and accepted method for creating phylogenetic system of classifications.
- + Cladistics produces a hypothesis about the relationship of organisms to predict the morphological characteristics of organism.

Cladistics helps to elucidate mechanism of evolution

38. Draw the floral diagram of family Fabaceae.



39. Write systematic position of Solanaceae.

Kingdom:	Plantae
Class:	Dicotyledonae
Subclass:	Gamopetalae
Series:	Bicarpellatae
Order:	Polemoniales
Family:	Solanaceae

40. Draw the floral diagram of family solanaceae.



41. Write systematic position of Fabaceae family.

Kingdom:	Plantae
Class:	Dicotyledonae
Sub-class:	Polypetalae
Series:	Calyciflorae
Order:	Rosales
Family:	Fabaceae

42. Write systematic position of Liliaceae.

Kingdom:	Plantae
Class:	Monocotyledons
Series:	Coronarieae
Order:	Liliales
Family:	Liliaceae

43. Draw the floral diagram of family Liliaceae.



44. Write the floral formula for the following 1) Clitoria ternatea 2) Datura metel 3) Allium cepa

Clitoria ternatea - $Br., Brl., \%, \overset{\oplus}{\underset{\ominus}{\text{C}}}_5, A_{(9)+1}, \underline{G}_1$

Datura metel - $Br., Ebrl., \oplus, \overset{\oplus}{\underset{\ominus}{\text{C}}}_5, \overset{\oplus}{\underset{\ominus}{\text{C}}}_5, A_5, \underline{G}_{(2)}$

Allium cepa - $Br., Ebrl., \oplus, \overset{\oplus}{\underset{\ominus}{\text{P}}}_{(3+3)} + A_{3+3}, \underline{G}_{(3)}$



6

CELL:
THE UNIT OF LIFE

EVALUATION

2 & 3 Marks

- 1. Bring out the significance of phase contrast microscopy.**
 - + Phase contrast microscope is used to observe living cells, tissues and the cells cultured invitro during mitosis
- 2. State the protoplasm theory.**
 - + "Protoplasm Theory" was proposed by O. Hertwig (1892).
 - + All living organisms are composed of protoplasm.
 - + It is smaller in all living organisms.
 - + Only living material is necessary for life.

ADDITIONAL

2 & 3 Marks

- 1. What is mean by word 'cell'?**
 - + The word 'cell' comes from the Latin word 'Celle' which means 'a small compartment'.
- 2. Define resolution.**
 - + The term resolving power or resolution refers to the ability of the lenses to show the details of object lying between two points. It is the finest detail available from an object. It can be calculated using the following formula
 - + Resolution = $0.61\lambda / NA$
 - + Where, λ = wavelength of the light and NA is the numerical aperture.
- 3. Define numerical aperture.**
 - + It is an important optical constant associated with the optical lens denoting the ability to resolve.
 - + Higher the NA value greater will be the resolving power of the microscope.

4. Define magnification.

- + The optical increase in the size of an image is called magnification. It is calculated by the following formula
- + $\text{Magnification} = \frac{\text{size of image seen with the microscope}}{\text{size of the image seen with normal eye}}$

5. Write a note on compound microscope.

- + Microscope works on the lens system which basically relies on properties of light and lens such as reflection, magnification and numerical aperture.
- + The common light microscope which has many lenses are called as compound microscope.

6. What is primary magnification?

- + The first magnification of the microscope is done by the objective lens which is called primary magnification and it is real, inverted image.

7. What is secondary magnification?

- + The second magnification of the microscope is obtained through eye piece lens called as secondary magnification and it is virtual and inverted image

8. What is patch stop carrier?

- + A special effect in an ordinary microscope is brought about by means of a special component called 'Patch Stop Carrier'.

9. What are the two kind of electron microscopes?

- + Transmission Electron Microscope (TEM)
- + Scanning Electron Microscope (SEM)

10. Name the components of electron microscopes.

- + The components of the microscope are as follows:
 - + Electron Generating System
 - + Electron Condensor
 - + Specimen Objective
 - + Tube Lens
 - + Projector

11. What is micrometry?

- + The microscope also has facility to measure microscopic objects through a technique called 'micrometry'.
- + There are two scales involved for measuring.
 1. Ocular Micrometer
 2. Stage Micrometer

12. Write a note on observation led to the formulation of modern cell theory.

- + All organisms are made up of cells.
- + New cells are formed by the division of pre-existing cells.
- + Cells contains genetic material, which is passed on from parents to daughter cells.
- + All metabolic reactions take place inside the cells.

13. Write a note on endosymbiont theory?

- + Two eukaryotic organelles believed to be the descendants of the endosymbiotic prokaryotes.
- + The ancestors of the eukaryotic cell engulfed a bacterium and the bacteria continued to function inside the host cell.

14. What is flip flop movement?

- + The movement of membrane lipids from one side of the membrane to the other side by vertical movement is called flip flopping or flip flop movement.

15. What is endocytosis?

- + During endocytosis the cell wraps the cell surface membrane around the material and brings it into cytoplasm inside a vesicle.

16. What is phagocytosis?

- + Particle is engulfed by membrane, which folds around it and forms a vesicle.
- + The enzymes digest the material and products are absorbed by cytoplasm.

17. What is pinocytosis?

- + Fluid droplets are engulfed by membrane, which forms vesicles around them.

18. What is exocytosis?

- + Vesicles fuse with plasma membrane and eject contents. This passage of material out of the cell is known as exocytosis.
- + This material may be a secretion in the case of digestive enzymes, hormones or mucus.

19. Define signal transduction.

- + The process by which the cell receive information from outside and respond is called signal transduction.

20. What is meant by cytoplasmic streaming?

- + The movement of the cellular materials around the cell through a process called cytoplasmic streaming.

21. Write any three functions of golgi body.

- + Transporting and storing lipids.
- + Formation of lysosomes.
- + Production of digestive enzymes.
- + Cell plate and cell wall formation

22. Mention the functions of chloroplasts.

- + Photosynthesis
- + Light reactions takes place in granum,
- + Dark reactions take place in stroma,
- + Chloroplast is involved in photorespiration.

23. What is meant by Svedberg unit?

- + The size of ribosomes and their subunits are usually given in Svedberg unit a measure of a particle size dependent on the speed with which particle sediment in the ultracentrifuge.

24. What is polysomes?

- + During protein synthesis many ribosomes are attached to the

25. What is autophagy?

- + During adverse condition they digest their own cell organelles like mitochondria and endoplasmic reticulum

26. What is autolysis?

- + Lysosome causes self-destruction of cell on insight of disease they destroy the cells.

27. Write a note on glyoxysomes?

- + Glyoxysome is a single membrane bound organelle.
- + It is a sub cellular organelle and contains enzymes of glyoxylate pathway.
- + β -oxidation of fatty acid occurs in glyoxysomes of germinating seeds.
- + Example: Castor seeds.

28. Write a note on microbodies?

- + Eukaryotic cells contain many enzyme bearing membrane enclosed vesicles called microbodies.
- + They are single unit membrane bound cell organelles:
- + Example: peroxisomes and glyoxysomes.

29. What is sphaerosomes?

- + It is spherical in shape and enclosed by single unit membrane.
- + Example: Storage of fat in the endosperm cells of oil seeds.

30. What are Cell Inclusions?

- + The cell inclusions are the non-living materials present in the cytoplasm.
- + They are organic and inorganic compounds.

31. Write any three functions of the nucleus.

- + Controlling all the cellular activities
- + Storing the genetic or hereditary information.
- + Coding the information in the DNA for the production of enzymes and proteins

32. Define chromosome.

- + During cell division chromatin is condensed into an organized form called chromosome.

33. Define euchromatin.

- + The portion of Eukaryotic chromosome which is transcribed into mRNA contains active genes that are not tightly condensed during interphase is called Euchromatin.

34. Define heterochromatin.

- + The portion of a Eukaryotic chromosome that is not transcribed into mRNA which remains condensed during interphase and stains intensely is called Heterochromatin.

35. What is SAT chromosome?

- + A satellite or SAT Chromosome are short chromosomal segment or rounded body separated from main chromosome by a relatively elongated secondary constriction.

36. What is chromomeres?

- + Chromomeres are bead like accumulations of chromatin material which are visible along interphase chromosomes. They can be seen in polytene chromosomes. At metaphase they are not visible.

37. What is microphotography?

- + Images of structures observed through microscopes can be further magnified, projected and saved by attaching a camera to the microscope by a microscope coupler or eyepiece adaptor. Picture taken using an inbuilt camera in a microscope is called microphotography or microphotograph.

38. What is histochemistry?

- + Each component of the cell has different affinity towards different stains.
- + The technique of staining the cells and tissue is called 'histochemical staining' or 'histochemistry'.



7

CELL CYCLE

EVALUATION

2 & 3 Marks

1. Write any three significance of mitosis.

- + Genetic stability – daughter cells are genetically identical to parent cells.
- + Growth – as multicellular organisms grow, the number of cells making up their tissue increases. The new cells must be identical to the existing ones.
- + Repair of tissues - damaged cells must be replaced by identical new cells by mitosis.

2. Given an account of G_0 phase.

- + During interphase, the cells remain metabolically active without proliferation.
- + Cells can exist for long periods in G_0 phase. In G_0 cells cease growth with reduced rate of RNA and protein synthesis.
- + The G_0 phase is not permanent. Mature neuron and skeletal muscle cell remain permanently in G_0 .
- + G_0 cells are not dormant.

ADDITIONAL

2 & 3 Marks

1. What are the two types of nuclear division?

- + There are two types of nuclear division, as mitosis and meiosis.

2. What is known as haploid state?

- + In meiosis, the daughter cells contain half the number of chromosomes of the parent cell and is known as haploid state (n).

3. What is Cell Cycle?

- + A series of events leading to the formation of new cell is known as cell cycle. The phenomenal changes leading to formation of new population take place in the cell cycle.

4. What are histones?

- + Growth of the cell continues as replication of DNA occur, protein molecules called histones are synthesised and attach to the DNA.

5. Write a note on interphase.

- + Longest part of the cell cycle, but it is of extremely variable length.
- + The chromosomes are dispersed.
- + Actively involved in protein synthesis.

6. What is meant by C-Value?

- + C-Value is the amount in picograms of DNA contained within a haploid nucleus.

7. Define amitosis?

- + Amitosis is also called direct or incipient cell division. Here there is no spindle formation and chromatin material does not condense.

8. What is Karyokinesis?

- + Involves division of nucleus.
- + Nucleus develops a constriction at the center and becomes dumbbell shaped.
- + Constriction deepens and divides the nucleus into two.

9. What is Cytokinesis?

- + Involves division of cytoplasm.
- + Plasma membrane develops a constriction along nuclear constriction.
- + It deepens centripetally and finally divides the cell into two cells.

10. Write the drawback of amitosis.

- + Causes unequal distribution of chromosomes.
- + Can lead to abnormalities in metabolism and reproduction.

11. What is equational division?

- + The number of chromosomes in the parent and the daughter (Progeny) cells remain the same so it is also called as equational division.

12. What is closed mitosis?

- + In closed mitosis, the nuclear envelope remains intact and chromosomes migrate to opposite poles of a spindle within the nucleus.
- + Example: Many single celled eukaryotes including yeast and slime molds.

13. What is open mitosis?

- + In open mitosis, the nuclear envelope breaks down and then reforms around the 2 sets of separated chromosomes.
- + Example: Most plants and animals

14. Name the four stages of mitosis.

- + Mitosis is divided into four stages prophase, metaphase, anaphase and telophase

15. What is Kinetochore?

- + Kinetochore is a DNA-Protein complex present in the centromere DNA where the microtubules are attached.

16. What are the five sub stages of prophase I?

- + Prophase I is divided into 5 substages – Leptotene, Zygotene, Pachytene, Diplotene and Diakinesis

17. What is synapsis?

- + Pairing of homologous chromosomes takes place and it is known as synapsis. Chromosome synapsis is made by the formation of synaptonemal complex.

18. What are bivalent or tetrads?

- + The complex formed by the homologous chromosomes are called as bivalent or tetrads.

19. What are Chiasmata?

- + The homologous chromosomes remain attached at one or more points where crossing over has taken place.
- + These points of attachment where 'X' shaped structures occur at the sites of crossing over is called Chiasmata.

20. What is interkinesis?

- + The stage between the two meiotic divisions is called interkinesis which is short-lived.

21. What are tetrads?

- + After karyokinesis, cytokinesis follows and four haploid daughter cells are formed, called tetrads.

22. Write any three significance of Meiosis.

- + This maintains a definite constant number of chromosomes in organisms.
- + Crossing over takes place and exchange of genetic material leads to variations among species.
- + It leads to genetic variability by partitioning different combinations of genes into gametes through independent assortment.
- + Adaptation of organisms to various environmental stress.

23. What is mitogen?

- + The factors which promote cell cycle proliferation is called mitogen.
- + Plant mitogens include gibberellin, ethylene, Indole acetic acid, kinetin. These increase mitotic rate.

24. What are mitotic poisons?

- + Certain chemical components act as inhibitors of the mitotic cell division and they are called mitotic poisons.

25. What is endomitosis?

- + The replication of chromosomes in the absence of nuclear division and cytoplasmic division resulting in numerous copies within each cell is called endomitosis.
- + Example – polytene chromosome

26. What is anastral?

- + Anastral is present only in plant cells. No asters or centrioles are formed only spindle fibres are formed during cell division.

27. What is amphiastral?

- + In amphiastral, aster and centrioles are formed at each pole of the spindle during cell division. This is found in animal cells.

28. Write the differences between mitosis in plants and animals.

Mitosis in plants	Mitosis in animals
Centrioles are absent.	Centrioles are present.
Asters are not formed.	Asters are formed.
Cell division involves formation of a cell plate.	Cell division involves furrowing and cleavage of cytoplasm.
Occurs mainly at meristem.	Occurs in tissues throughout the body.



8

BIOMOLECULES

EVALUATION

2 & 3 Marks

1. **What are the factors affecting the rate of enzyme reaction?**
 - + Temperature, pH, Substrate Concentration, Enzyme Concentration, Michaelis-Menton Constant, Inhibitors of Enzyme.
2. **Distinguish between nitrogenous base and a base found in inorganic chemistry.**

Nitrogenous base:

- + A nitrogenous base is linked to pentose sugar through n-glycosidic linkage and forms a nucleoside. When a phosphate group is attached to a nucleoside it is called a nucleotide.

Base found in inorganic chemistry:

- + An inorganic base causes indicator to take on characteristic colors and usually refers to water-soluble hydroxides, e.g., sodium, potassium or ammonium hydroxide.

ADDITIONAL

2 & 3 Marks

1. **What is cellular pool?**
 - + The cell components are made of collection of molecules called as cellular pool, which consists of both inorganic and organic compounds.
2. **What are the properties of Water?**
 - + Adhesion and cohesion property
 - + High latent heat of vapourisation
 - + High melting and boiling point.

- + Universal solvent
- + Specific heat capacity

3. What are metabolites?

- + Most plants, fungi and other microbes synthesizes a number of organic compounds.
- + These components are called as metabolites which are intermediates and products of metabolism.

4. What are primary metabolites?

- + Primary metabolites are those that are required for the basic metabolic processes like photosynthesis, respiration, protein and lipid metabolism of living organisms.

5. What are secondary metabolites?

- + Metabolites does not show any direct function in growth and development of organisms of plants are called metabolites.

6. Tabulate the examples for primary metabolites.

Metabolites	Examples
Primary	
Enzymes	Protease, lipase, peroxidase
Amino acid	Proline, leucine
Organic acid	Acetic acid, lactic acid
Vitamins	A, B, C

7. Tabulate the examples for secondary metabolites.

Metabolites	Examples
Secondary	
Pigments	Carotenoids, anthocyanins
Alkaloids	Morphine, codeine
Essential oil	Lemon grass oil, rose oil
Toxins	Abrin, ricin
Lectins	Concanavalin A

Drugs	Vinblastin, curcumin
Polymeric substances	Rubber, gums, cellulose

8. What are macromolecules?

- + Organic molecules may be small and simple.
- + These simple molecules assemble and form large and complex molecules called macromolecules.
- + These include four main classes – carbohydrates, lipids, proteins and nucleic acids

9. What are Celluloses?

- + Cellulose is a structural polysaccharide made up of thousands of glucose units.
- + It has many industrial uses which include cellulose fibres as cotton, nitrocellulose for explosives, cellulose acetate for fibres of multiple uses and cellophane for packing.

10. What is Chitin?

- + Chitin is a homo polysaccharide with amino acids added to form mucopolysaccharide.
- + It forms the exoskeleton of insects and other arthropods. It is also present in the cell walls of fungi.

11. What are polymers?

- + All macromolecules except lipids are formed by the process of polymerisation, a process in which repeating subunits termed monomers are bound into chains of different lengths.
- + These chains of monomers are called polymers.

12. What is Glycans?

- + Polysaccharides are made of hundreds of monosaccharide units.
- + Polysaccharides also called “Glycans”.

13. What is glycosidic bond?

- + The bond formed between the glucose and fructose molecule by removal of water is called glycosidic bond.

14. What is amphoteric?

- + (NH₂), an acidic carboxylic group (COOH) and a hydrogen atom (H) and side chain or variable R group.
- + The amino acid is both an acid and a base and is called amphoteric.

15. What is isoelectric point?

- + A zwitterion also called as dipolar ion, is a molecule with two or more functional groups, of which at least one has a positive and other has a negative electrical charge and the net charge of the entire molecule is zero.
- + The pH at which this happens is known as the isoelectric point

16. Define anabolism and catabolism.

- + Anabolic means building up of organic molecules.
- + Synthesis of proteins from amino acids and synthesis of polysaccharides from simple sugars.

17. Define catabolism.

- + Catabolic means breaking down of larger molecules.
- + Digestion of complex foods and the breaking down of sugar in respiration.

18. What are extracellular enzymes?

- + Enzymes can be extracellular enzyme as secreted and work externally exported from cells.
- + Example: digestive enzymes.

19. What are intracellular enzymes?

- + Intracellular enzymes that remain within cells and work there. These are found inside organelles or within cells.
- + Example: insulin

20. Mention the role of Inhibitors of Enzyme.

- + Certain substances present in the cells may react with the enzyme and lower the rate of reaction. These substances are called inhibitors. It is of two types competitive and non-

21. What are inhibitors?

- + Certain substances present in the cells may react with the enzyme and lower the rate of reaction. These substances are called inhibitors. It is of two types competitive and non-competitive

22. Write a note on Allosteric Enzymes.

- + They modify enzyme activity by causing a reversible change in the structure of the enzyme active site. This in turn affects the ability of the substrate to bind to the enzyme. Such compounds are called allosteric inhibitors.
- + Example: The enzyme hexokinase which catalysis glucose to glucose-6 phosphate in glycolysis is inhibited by glucose 6 phosphate.

23. What is holoenzyme and apoenzymes?

Holoenzyme – Active enzyme with its non protein component.

Apoenzyme – The inactive enzyme without its non-protein component.

24. What are prosthetic groups?

- + Prosthetic groups are organic molecules that assist in catalytic function of an enzyme. Flavin adenine-dinucleotide (FAD) contains ribo-flavin (vit B2), the function of which is to accept hydrogen. 'Haem' is an iron-containing prosthetic group with an iron atom at its centre.

25. Write about coenzymes.

- + Coenzymes are organic compounds which act as cofactors but do not remain attached to the enzyme. The essential chemical components of many coenzymes are vitamins. Example: NAD, NADP, Coenzyme A, ATP

26. List out the uses of Enzymes.

Enzyme	Source	Application
Bacterial protease	Bacillus	Biological detergents
Bacterial glucose isomerase	Bacillus	Fructose syrup manufacture

Fungal lactase	Kluyveromyces	Breaking down of lactose to glucose and galactose
Amylases	Aspergillus	Removal of starch in woven cloth production

27. **Tabulate between nucleoside and nucleotide.**

Nucleoside	Nucleotide
It is a combination of base and sugar.	It is a combination of nucleoside and phosphoric acid.
Examples	Examples
Adenosine = Adenine + Ribose	Adenylic acid = Adenosine + Phosphoric acid
Guanosine = Guanine + Ribose	Guanylic acid = Guanosine + Phosphoric acid
Cytidine = Cytosine + Ribose	Cytidylic acid = Cytidine + Phosphoric acid
Deoxythymidine = Thymine + Deoxyribose	Uridylic acid = Uridine + Phosphoric acid



9

TISSUE AND TISSUE SYSTEM

EVALUATION

2 & 3 Marks

1. **Why the cells of sclerenchyma and tracheids become dead?**
 - + Because, the cells are thickened by lignin. The content will become disorganized and used for lignification.

ADDITIONAL

2 & 3 Marks

1. **What is plant anatomy?**
 - + The study of internal structure and organisation of plant is called plant Anatomy.
2. **What is tissue?**
 - + A Tissue is a group of cells that are alike in origin, structure and function.
3. **What is histology?**
 - + The study of tissue is called histology.
4. **What is apical meristem?**
 - + Meristem present in apices of root and shoot.
 - + It is responsible for increase in the length of the plant, it is called as primary growth.
5. **What is intercalary meristem?**
 - + Meristem occurs between the mature tissues.
 - + It is responsible for elongation of internodes.
6. **What is lateral meristem?**
 - + Meristem occurs along the longitudinal axis of stem and root.
 - + It is responsible for secondary tissues and thickening of stem and root.

Example: Vascular cambium and cork cambium.

7. Write Quiescent centre concept.

- + Quiescent centre concept was proposed by Clowes (1961) to explain root apical meristem activity.
- + This centre is located between root cap and differentiating cells of the roots.
- + The apparently inactive region of cells in root pro-meristem is called quiescent centre.
- + It is the site of hormone synthesis and also the ultimate source of all meristematic cells of the meristem.

8. What are aerenchyma?

- + Parenchyma which contains air in its intercellular spaces.
- + It helps in aeration and buoyancy.
- + Example - Nymphae and Hydrilla.

9. Write notes on prosenchyma?

- + Parenchyma cells became elongated, pointed and slightly thick walled.
- + It provides mechanical support.

10. What are the types of collenchyma?

- + Angular collenchyma
- + Lacunar collenchyma
- + Lamellar collenchymas

11. What is angular collenchyma?

- + It is the most common type of collenchyma with irregular arrangement and thickening at the angles where cells meet.
- + Example - Hypodermis of Datura and Nicotiana

12. What is Lacunar Collenchyma?

- + The collenchyma cells are irregularly arranged.
- + Cell wall is thickening on the walls bordering intercellular spaces.
- + Example - Hypodermis of Ipomoea

13. What is Lamellar collenchyma?

- + The collenchyma cells are arranged compactly in layers(rows).
- + The Cell wall is thickening is at tangential walls.
- + These thickening appear as successive tangential layers.
- + Example - Hypodermis of Helianthus

14. What are the two types of sclerenchyma cells?

- + (i) Sclereids (ii) Fibres

15. What are brachydclereids?

- + Isodiametric sclereids, with hard cell wall.
- + It is found in bark, pith cortex, hard endosperm and fleshy portion of some fruits.
- + Example - Pulp of Pyrus.

16. What are macrosclereids?

- + Elongated and rod shaped cells, found in the outer seed coat of leguminous plants.
- + Example - Crotalaria and Pisum sativum.

17. What are astrosclereids?

- + Star cells with lobes or arms diverging form a central body.
- + They occur in petioles and leaves.
- + Example - Tea, Nymphae and Trochodendron.

18. What is syncyte?

- + Cell which is formed by fusion of cell is called Syncyte.
- + Example - Vessels, sieve tube

19. What is complex tissue? Mention its type.

- + A complex tissue is a tissue with several types of cells but all of them function together as a single unit.
- + It is of two types – xylem and phloem.

20. What is tissue system?

- + A group of tissues performing a similar function, irrespective of its position in the plant body, is called a tissue system.

21. What are the three systems in the plants?

- + Epidermal tissue system
- + Ground tissue system
- + Vascular tissue system

22. What is cuticle?

- + The outer walls of epidermal cells have a layer called cuticle.

23. What are stomata?

- + The minute openings found on the epidermis are called stomata.

24. What is silica cells?

- + Some of the epidermal cells of the grasses are filled with silica are called silica cells.

25. What are bulliform cells or motor cells?

- + Some cells of upper epidermis are larger and thin walled.
- + They are called bulliform cells or motor cells.
- + Example – Grasses

26. What are subsidiary cells?

- + In some plant's addition to guard cells, specialized epidermal cells are present which are distinct from other epidermal cells are called subsidiary cells.

27. What is Epiblema?

- + The outer layer of the root is known as piliferous layer or epiblema.
- + It is made up of single layer of parenchyma cells which are arranged compactly without intercellular spaces.

28. What is trichoblasts?

- + Piliferous layer of the root has two types of epidermal cells, long cells and short cells.
- + The short cells are called trichoblasts.
- + Trichoblasts are elongate into root hairs.

- + Epidermal hairs can also be in the form of stellate hairs (star shaped) present in plants.
- + Example - styra, many members of Malvaceae and Solanaceae.

29. What is Pericycle?

- + Pericycle is single or few layered parenchymatous found inner to the endodermis.
- + It is the outermost layer of the stele.
- + Rarely thick walled sclerenchymatous.
- + In angiosperms, pericycle gives rise to lateral roots.

30. What is Pith? Write its function.

- + The central part of the ground tissue is known as pith or medulla.
- + The cells in the pith generally stores starch, fatty substances, tannins, phenols, calcium oxalate crystals, etc.

31. What is Endodermis?

- + The cells of this layer are barrel shaped and arranged compactly without intercellular spaces.
- + Endodermis is the innermost cortical layer that separates cortex from the stele.
- + This layer may be a true endodermis as in root or it is an endodermis like layer in stems.

32. What are halophiles?

- + Plants that grow in salty environment are called halophiles.
- + Salt glands typically are found in halophytes.

33. What is guttation?

- + Hydathodes discharge liquid water with various dissolved substances from the interior of the leaf to its surface is called guttation.

34. Compare the Proto xylem and Meta xylem.

Proto xylem	Meta xylem
First formed primary xylem	Later formed primary xylem
Found in developing organs	Found in developed primary organs
Elements relatively smaller in size	Elements relatively larger in size

35. What is Hypodermis of the stem?

- + A few layers of sclerenchymatous cells lying below the epidermis constitute the hypodermis.
- + This layer gives mechanical strength to the plant.
- + It is interrupted here and there by chlorenchyma cells.

36. What is exarch?

- + Protoxylem lies towards the periphery and metaxylem that lies towards the centre is called exarch.
- + Example - roots.

37. What is endarch?

- + Protoxylem lies towards the center and meta xylem towards the periphery this condition is called endarch.
- + Example : stems.

38. What is centrarch?

- + Protoxylem is located in the center surrounded by the metaxylem is called centrarch.
- + In this type only one vascular strand is developed.
- + Example - Selaginella sp.

39. What is mesarch?

- + Protoxylem is located in the center surrounded by the metaxylem is called mesarch.
- + In this type several vascular strands are developed.
- + Example - Ophioglossum sp.

10

SECONDARY GROWTH

EVALUATION

2 & 3 Marks

1. **In a forest, if the bark of a tree is damaged by the horn of a deer. How will the plant overcome the damage?**
 - + When the bark of a tree is damaged, the tree first tries to seal the wound from the outside environment to prevent any microbial infection.
 - + The callus grows and cover/seals the wound.
2. **In which season the vessels of angiosperms are larger in size, why?**
 - + In spring season, the vessels of the angiosperms are the largest because spring season is the favourable season for the cambium activity.
 - + In the spring season, cambium is very active and produces a large number of xylary elements having vessels/tracheids with wide lumen.
3. **Continuous state of dividing tissue is called meristem. In connection to this, what is the role of lateral meristem?**
 - + The secondary growth in dicots and gymnosperms is brought about by two lateral meristems, vascular cambium and cork cambium.
 - + The vascular cambium is the lateral meristem that produces the secondary vascular tissues. i.e., secondary xylem and secondary phloem.
 - + The cells towards the outer side differentiate into phellem (cork) and those towards the inside as phelloderm (secondary cortex).

4. A timber merchant bought 2 logs of wood from a forest & named them A & B, The log A was 50 year old & B was 20 years old. Which log of wood will last longer for the merchant? Why?

- + The log A which was 50 years old will last longer for the merchant. Because, the tree in which the centre part of the wood will be darker in colour and is called heart wood. Its wood would be more durable and can also resist microbes.
- + Log B which is only 20 years old, will have lesser heart wood as compared to log A.

ADDITIONAL

2 & 3 Marks

1. What is Growth in girth?

- + The increase in girth is called secondary growth or growth in girth.

2. What is primary growth?

- + The plant organs originating from the apical meristems pass through a period of expansion in length and width. The roots and stems grow in length with the help of apical meristems. This is called primary growth or longitudinal growth.

3. What is secondary growth?

- + The gymnosperms and most angiosperms, including some monocots, show an increase in thickness of stems and roots by means of secondary growth or latitudinal growth.

4. What is fascicular cambium?

- + A strip of vascular cambium that is believed to originate from the procambium is present between xylem and phloem of the vascular bundle.
- + This cambial strip is known as intra-fascicular or fascicular cambium.

5. What is interfascicular cambium?

- + In between the vascular bundles, a few parenchymatous cells of the medullary rays that are in line with the fascicular

cambium become meristematic and form strips of vascular cambium. It is called interfascicular cambium.

6. Differentiate between Intrafascicular cambium and inter fascicular cambium.

Intrafascicular cambium	Interfascicular cambium
Present inside the vascular bundles	Present in between the vascular bundles.
Originates from the procambium.	Originates from the medullary rays.
Initially it forms a part of the primary meristem.	From the beginning it forms a part of the secondary meristem.

7. What is vascular cambial ring?

- + This interfascicular cambium joins with the intra-fascicular cambium on both sides to form a continuous ring.
- + It is called a vascular cambial ring.

8. Define Xylotomy.

- + The study of wood by preparing sections for microscopic observation

9. What is Porous Wood (or) Hard wood?

- + Generally, the dicotyledonous wood, which has vessels is called porous wood or hard wood.
- + Example - Morus rubra.

10. What is Non-porous Wood (or) Soft Wood?

- + Generally, the gymnosperm wood, which lacks vessels is known as non-porous wood or soft wood.
- + Example - Pinus.

11. Compare the Diffuse Porous Wood and Ring Porous Wood.

Diffuse porous wood	Ring porous wood
This type of wood is formed where the climatic conditions are uniform.	This type of wood is formed where the climatic conditions are not uniform.

The vessels are more or less equal in diameter in any annual ring.	The vessels are wide and narrow within any annual ring.
The vessels are uniformly distributed throughout the wood.	The vessels are not uniformly distributed throughout the wood.

12. Compare the Spring Wood and Autumn Wood.

Spring wood or Early wood	Autumn wood or Late wood
The activity of cambium is faster	Activity of cambium is slower
Produces large number of xylem elements.	Produces fewer xylem elements
Xylem vessels/ tracheids have wider lumen.	Xylem vessels/ tracheids have narrow lumen
Wood is lighter in colour and has lower density	Wood is darker in colour and has a higher density.

13. What is annual or Pseudo ring?

- + Additional growth rings are developed within a year.
- + the middle of a growing season, which results in the formation of more than one annual ring. Such rings are called pseudo- or false- annual rings.

14. Write the importance of Studying Growth Rings.

- + Age of wood can be calculated.
- + The quality of timber can be ascertained.
- + Radio-Carbon dating can be verified.
- + Past climate and archaeological dating can be made.
- + Provides evidence in forensic investigation.

15. What is Dendrochronology?

- + The determination of the age of a tree by counting the annual rings is called dendrochronology.

16. What is dendroclimatology?

- + It is a branch of dendrochronology concerned with constructing records of past climates and climatic events by analysis of tree growth characteristics, especially growth rings.

17. Define Tyloses.

- + In many dicot plants, the lumen of the xylem vessels is blocked by many balloon-like ingrowths from the neighbouring parenchymatous cells.
- + These balloon-like structures are called tyloses.

18. What is Sap Wood?

- + Sap wood and heart wood can be distinguished in the secondary xylem.
- + In any tree the outer part of the wood, which is paler in colour, is called sap wood or alburnum.

19. What is Heart Wood?

- + The centre part of the wood, which is darker in colour is called heart wood or duramen.

20. What is the use of Haematoxylin?

- + The dye, haematoxylin is obtained from the heart wood of Haematoxylum campechianum used to stain plant materials for observation under microscope, especially the nucleus of the cell.

21. What is use of Canada balsam?

- + Abies balsamea is a gymnospermic plant.
- + It produces Canada balsam, from its resin ducts.
- + It is used as mounting medium for microscopic slide preparation.

22. What is Phellem? (Cork)

- + It is the protective tissue composed of non-living cells with suberized walls and formed centrifugally (outward) by the phellogen (cork cambium) as part of the periderm.
- + It replaces the epidermis in older stems and roots of many

- + It is characterized by regularly arranged tiers and rows of cells.
- + It is broken here and there by the presence of lenticels.

23. What is Phellogen? (Cork cambium)?

- + It is a secondary lateral meristem. It comprises homogenous meristematic cells unlike vascular cambium.
- + It arises from epidermis, cortex, phloem or pericycle (extrastelar in origin).
- + Its cells divide periclinally and produce radially arranged files of cells.
- + The cells towards the outer side differentiate into phellem (cork) and those towards the inside as phelloderm (secondary cortex).

24. What is Phelloderm? (Secondary cortex)

- + It is a tissue resembling cortical living parenchyma produced centripetally (inward) from the phellogen as a part of the periderm of stems and roots in seed plants.

25. Define rhytidome.

- + Rhytidome is a technical term used for the outer dead bark which consists of periderm and isolated cortical or phloem tissues formed during successive secondary growth.
- + Example - Quercus.

26. What is bark?

- + The term 'bark' is commonly applied to all the tissues outside the vascular cambium of stem (i.e., periderm, cortex, primary phloem and secondary phloem).

27. What is cork?

- + Cork is an impermeable buoyant material, Cork is composed of suberin, a hydrophobic substance and, because of its impermeable, buoyant, elastic, and fire retardant properties, used as a bottle stopper.



TRANSPORT IN PLANTS

EVALUATION

2 & 3 Marks

- If the concentration of salt in the soil is too high and the plants may wilt even if the field is thoroughly irrigated. Explain.**

 - + High salt concentration results in high osmotic potential of the soil solution, so the plant has to use more energy to absorb water.
 - + Under extreme salinity conditions, plants may be unable to absorb water and will wilt even if the surrounding soil is thoroughly irrigated.
- How phosphorylase enzyme opens the stomata in starch sugar interconversion theory?**

 - + The enzyme phosphorylase hydrolyses starch into sugar and high pH Followed by endosmosis and the opening of stomata during light. The vice versa takes place during the night.
- List out the non-photosynthetic parts of a plant that need a supply of sucrose?**

 - + Roots, tubers, stems of older plants, flowers, developing fruits.
- What are the parameters which control water potential?**

 - + Water potential can be determined by,
 - + Solute concentration or solute potential (Ψ_s)
 - + Pressure potential (Ψ_p)

ADDITIONAL

2 & 3 Marks

- What is short distance transport? Give example?**

 - + Involvement of few cells, mostly in the lateral direction.

kindly send me your key Answers to our email id - padasalai.net@gmail.com

- + They are the connecting link to xylem and phloem from root hairs or leaf tissues respectively.
- + Examples - Diffusion, Imbibition, and Osmosis.

2. What is Long distance Transport. Give example?

- + Transport within the network of xylem or phloem is an example for long distance transport.
- + Examples - Ascent of Sap and Translocation of Solutes.

3. What is Passive Transport?

- + It is a downhill process which utilizes physical forces like gravity and concentration.
- + No energy expenditure is required.
- + It includes diffusion, facilitated diffusion, imbibition, and osmosis.

4. What is Active Transport?

- + It is a biological process and it runs based on the energy obtained from respiration. It is an uphill process.

5. What is Cell to Cell Transport?

- + Cell to cell or short distance transport covers the limited area and consists of few cells.
- + They are the facilitators or tributaries to the long-distance transport.
- + The driving force for the cell to cell transport can be passive or active.

6. What is Diffusion?

- + The net movement of molecules from a region of their higher concentration to a region of their lower concentration along a concentration gradient until an equilibrium is attained.

7. What is porin?

- + Porin is a large transporter protein found in the outer membrane of plastids, mitochondria and bacteria which facilitates smaller molecules to pass through the membrane.

8. What is aquaporin?

- + Aquaporin is a water channel protein embedded in the plasma membrane.
- + It regulates the massive amount of water transport across the membrane.

9. What is Carrier Protein?

- + Carrier protein acts as a vehicle to carry molecules from outside of the membrane to inside the cell and vice versa.
- + Due to association with molecules to be transported, the structure of carrier protein gets modified until the dissociation of the molecules.

10. What is fumigation?

- + A mixture of Formalin and Potassium permanganate produces enormous fumes which will kill all pathogens in an enclosed area is known as fumigation and operates by diffusion.

11. What is uniport?

- + In this molecule a single type moves across a membrane independent of other molecule in be direction.

12. What is symport?

- + The term symport is used to denote an integral membrane protein that simultaneously transports two types of molecules across the membrane in the same direction.

13. What is antiport?

- + An antiport is an integral membrane transport protein that simultaneously transports two different molecules, in opposite directions, across the membrane.

14. What is Imbibition? Give an example of Imbibition.

- + Colloidal systems such as gum, starch, proteins, cellulose, agar, gelatin when placed in water, will absorb a large volume of water and swell up.
- + These substances are called imbibants and the phenomenon is imbibition.

Examples:- The swelling of dry seeds

- + The swelling of wooden windows, tables, doors due to high humidity during the rainy season.

15. What is the Significance of Imbibition?

- + During germination of seeds, imbibition increases the volume of seed enormously and leads to bursting of the seed coat.
- + It helps in the absorption of water by roots at the initial level.

16. Define Water Potential?

- + Water potential is potential energy of water in a system compared to pure water when both temperature and pressure are kept the same.

17. How can be Water Potential Determined?

- + Water potential (Ψ) can be determined by,
- + Solute concentration or Solute potential (Ψ_s)
- + Pressure potential (Ψ_p)

18. What is Suction pressure?

- + Increased DPD favours endosmosis or it sucks the water from hypotonic solution; hence Renner (1935) called it as Suction pressure.
- + It is equal to the difference of osmotic pressure and turgor pressure of a cell.

19. What is Diffusion pressure Deficit?

- + Pure solvent (hypotonic) has higher diffusion pressure.
- + Addition of solute in pure solvent lowers its diffusion pressure.
- + The difference between the diffusion pressure of the solution and its solvent at a particular temperature and atmospheric pressure is called as Diffusion Pressure Deficit (DPD).

20. What is Osmosis?

- + Osmosis is a special type of diffusion.
- + It represents the movement of water or solvent molecules through a selectively permeable membrane from the place

of its higher concentration (high water potential) to the place of its lower concentration (low water potential).

21. What is Hypertonic?

- + Hypertonic (Hyper = High; tonic = solute). This is a strong solution (low solvent/ high solute / low Ψ) which attracts solvent from other solutions.

22. What is Hypotonic?

- + Hypotonic (Hypo = low; tonic = solute). This is a weak solution (high solvent /low or zero solute / high Ψ) and it diffuses water out to other solutions.

23. What is Isotonic?

- + Isotonic (Iso = identical; tonic = solute). It refers to two solutions having same concentration. In this condition the net movement of water molecule will be zero.

24. What is Endosmosis? Give an example?

- + Endosmosis: Endosmosis is defined as the osmotic entry of solvent into a cell or a system when it is placed in a pure water or hypotonic solution.
- + Example: dry raisins (high solute and low solvent) placed in the water, it swells up due to turgidity.

25. What is Exosmosis?

- + Exosmosis is defined as the osmotic withdrawal of water from a cell or system when it is placed in a hypertonic solution.
- + In a plant cell, it leads to plasmolysis.

26. What is Plasmolysis?

- + When a plant cell is kept in a hypertonic solution, water leaves the cell due to exosmosis.
- + As a result of water loss, protoplasm shrinks and the cell membrane is pulled away from the cell wall and finally, the cell becomes flaccid is named as plasmolysis.

27. What is reverse Osmosis?

- + Reverse Osmosis follows the same principles of osmosis, but in the reverse direction.
- + In this process, movement of water is reversed by applying pressure to force the water against a concentration gradient of the solution.

28. What are Stomata?

- + The epidermis of leaves and green stems possess many small pores called stomata. The length and breadth of stomata is about 10-40 μ and 3-10 μ respectively.
- + Mature leaves contain between 50 and 500 stomata per mm². Stomata are made up of two guard cells.

29. What are the theories proposed opening and closing of stomata?

- + Different theories have been proposed regarding opening and closing of stomata.
- + The important theories of stomatal movement are as follows,
- + Theory of Photosynthesis in guard cells
- + Starch – Sugar interconversion theory
- + Active potassium transport ion concept.

30. What is Ascent of sap?

- + The water within the xylem along with dissolved minerals from roots is called sap and its upward transport is called ascent of sap.

31. Define Term Root pressure.

- + The term ‘Root Pressure’ is defined as “a pressure developing in the tracheary elements of the xylem as a result of metabolic activities of the root”.

32. What is Cohesion?

- + Water molecules are bound together by a strong mutual attraction force called cohesion.

33. What is cavitation?

- + The continuity of water column is sometimes blocked by air bubbles through a process called cavitation.
- + But water molecules diffuse to adjacent cells to continue the journey.

34. What is adhesion?

- + Water molecules and the hydrophilic wall of the xylem stick together by a force called adhesion.

35. What is Transpiration?

- + The loss of excess of water in the form of vapour from various aerial parts of the plant is called transpiration.
- + Transpiration is a kind of evaporation but differs by the involvement of biological system.

36. What are the types of Transpiration?

- + Stomatal transpiration
- + Lenticular transpiration
- + Cuticular transpiration

37. Define the term Plant Anti-transpiration.

- + The term antitranspirant is used to designate any material applied to plants for the purpose of retarding transpiration.
- + An ideal antitranspirant checks the transpiration process without disturbing the process of gaseous exchange.

38. What are the Significance of transpiration?

- + Transpiration leads to loss of water, as stated earlier in this lesson 95% of absorbed water is lost in transpiration. It seems to be an evil process to plants.
- + However, number of process like absorption of water, ascent of sap and mineral absorption directly relay on the transpiration.

39. What is known as accessory cell?

- + Guard cells are attached to surrounding epidermal cells known as subsidiary cells or accessory cells.

40. What are the External Factors affecting transpiration?

- + Atmospheric humidity, Temperature, Light, Wind velocity, Atmospheric pressure, Water.

41. What are the Internal factors affecting transpiration?

- + Leaf area, Leaf structure.

42. Define the term Phylloclade and Cladode?

- + In Opuntia, the stem is flattened to look like leaves called Phylloclade.

43. What is Guttation. Give an example?

- + Excess water exudates as liquid from the edges of the leaves and is called guttation.
- + Example: Grasses, tomato, potato, brinjal and Alocasia.

44. What are Hydathodes and Epithem?

- + Guttation occurs through stomata like pores called hydathodes generally present in plants that grow in moist and shady places.

45. Define Sink?

- + Sink is defined as any organ in plants which receives food from source. Example: Roots, tubers, developing fruits and immature leaves.

46. What are the merits of mass flow hypothesis?

- + When a woody or herbaceous plant is girdled, the sap contains high sugar containing exudates from cut end.
- + Positive concentration gradient disappears when plants are defoliated.

47. Define flux and influx?

- + Movement of ions into and out of cells or tissues is termed as transport or flux. Entry of the ion into cell is called influx and exit is called efflux.

48. Define Donnan equilibrium.

- + The cation concentration would be greater in the internal than in the external solution.

- + This electrical balance or equilibrium controlled by electrical as well as diffusion phenomenon is known as the Donnan equilibrium.

49. What are the objections of mass flow hypothesis?

- + This hypothesis explains the unidirectional movement of solute only. However, bidirectional movement of solute is commonly observed in plants.
- + Osmotic pressure of mesophyll cells and that of root hair do not confirm the requirements.
- + This theory gives passive role to sieve tube and protoplasm, while some workers demonstrated the involvement of ATP.



12

MINERAL NUTRITION

EVALUATION

2 & 3 Marks

- The nitrogen is present in the atmosphere in huge amount but higher plants fail to utilize it. Why?**
 - + The gaseous nitrogen must be fixed in the form of Nitrate salts in the soil to facilitate absorption by plants.
 - + Nitrogen fixation can occur only by Non Biological means (Industrial processes or by lightning) and Biological means (Bacteria / cyanobacteria Fungi)
 - + Therefore, higher plants cannot utilize the atmospheric Nitrogen.
- Why is that in certain plants deficiency symptoms appear first in younger parts of the plants while in others, they do so in mature organs:**
 - + When deficiency symptoms appear first in old and younger leaves, it is mainly due to mobility of minerals.
 - + Based on this they are classified into Actively mobile minerals and Relatively immobile minerals - Nitrogen, Phosphours, Potassium, Magnesium, Chlorine, Sodium, Zinc and Molybdenum.
 - + Deficiency symptoms first appear on old and senescent leaves due to active movement of minerals to younger leaves due to immobile minerals – calcium, sulphur, iron, boron and copper.
- Plant A in a nutrient medium shows whiptail disease. Plant B in a nutrient medium shows a Little leaf disease. Identify mineral deficiency of plant A and B?**
 - + Plant-A - in nutrient medium shows whiptail disease: Mineral deficiency is due to Molybdenum
 - + Plant-B - in a nutrient medium shows little leaf disease: Mineral deficiency is due to zinc.

4. Write the role on nitrogenase enzyme in nitrogen fixation?

- + Nitrogen fixation is the first step in Nitrogen cycle, during which gaseous nitrogen from the atmosphere is fixed. It requires nitrogenase enzyme complex, nitrogenase is active only in anaerobic condition.
- + To create this anaerobic condition, a pigment known leg-haemoglobin is synthesized in the nodules which acts as oxygen scavenger and removes oxygen.

ADDITIONAL**2 & 3 Marks****1. What are macronutrients? Give example.**

- + Essential minerals which are required in higher concentration are called Macronutrients.
- + Examples: C, H, O, N, P, K, Ca, Mg and S.

2. What are Micronutrients? Give example.

- + Essential minerals which are required in less concentration called are as Micronutrients.
- + Examples: Fe, Mn, Cu, Mo, Zn, B, Cl and Ni

3. Name some structural components minerals.

- + Minerals like Carbon, Hydrogen, Oxygen and Nitrogen.

4. Name the Chelating agents.

- + EDTA (Chemical Chelating Agent), EDTA (Ethylene Diamine Tetra Acetic acid)

5. Define Siderophores.

- + Siderophores (iron carriers) are Iron chelating agents produced by bacteria.
- + They are used to chelate ferric Iron (Fe³⁺) from environment and host.

6. Define Calmodulin.

- + Calmodulin is a Ca²⁺ modulating protein in eukaryotic cells.

It is a heat stable protein involved in fine metabolic regulations.

7. What is meant by manganese toxicity?

- + Increased Concentration of Manganese will prevent the uptake of Fe and Mg, prevent translocation of Ca to the shoot apex and cause their deficiency.
- + The symptoms of manganese toxicity are appearance of brown spots surrounded by chlorotic veins.

8. What is Aluminium Toxicity?

- + Aluminium toxicity causes precipitation of nucleic acid, inhibition of ATPase, inhibition of cell division and binding of plasma membrane with Calmodulin.

9. Define Hydroponics (or) Soilless culture.

- + It is a method of growing plants in nutrient solution.
- + In hydroponics, roots are immersed in the solution containing nutrients and air is supplied with help of tube.

10. Define aeroponics.

- + Aeroponics is a system where roots are suspended in air and nutrients are sprayed over the roots by a motor driven rotor.

11. What is nitrogen fixation?

- + The process of converting atmospheric nitrogen (N_2) into ammonia is termed as nitrogen fixation.

12. What are two types of nitrogen fixation?

- + Biological, Non-Biological.

13. What is non-biological fixation?

- + Nitrogen fixation by chemical process in industry.
- + Natural electrical discharge during lightening fixes atmospheric nitrogen.

14. What is biological nitrogen fixation?

- + Symbiotic bacterium like Rhizobium fixes atmospheric nitrogen.
- + Cyanobacteria found in Lichens, Anthoceros, Azolla and coralloid roots of Cycas also fix nitrogen.
- + Non-symbiotic like Clostridium also fix nitrogen.

15. Define bacteroide.

- + A membrane bound bacterium is formed inside the nodule and is called bacteroide.

16. Define leghaemoglobin.

- + Nitrogenase enzyme is active only in anaerobic condition.
- + To create this anaerobic condition, a pigment known as leghaemoglobin is synthesized in the nodules which acts as oxygen scavenger and removes the oxygen.
- + Nitrogen fixing bacteria in root nodules appears pinkish due to the presence of this leghaemoglobin pigment.

17. Define nitrification.

- + Ammonia is converted into Nitrite by Nitrosomonas bacterium. Nitrite is then converted into Nitrate by Nitrobacter bacterium.

18. What is Nitrate Assimilation?

- + The process by which nitrate is reduced to ammonia is called nitrate assimilation.

19. Define Ammonification.

- + Decomposition of organic nitrogen from dead plants and animals into ammonia is called ammonification.
- + Organism involved in this process are Bacillus ramosus and Bacillus vulgaris.

20. Define Denitrification.

- + Nitrates in the soil are converted back into atmospheric nitrogen by a process called denitrification.
- + Bacteria involved in this process are Pseudomonas, Thiobacillus and Bacillus subtilis.

21. Define Transamination.

- + Transfer of amino group (NH_3^+) from glutamic acid glutamate to keto group of keto acid.
- + Glutamic acid is the main amino acid from which other amino

- + Transamination requires the enzyme transaminase and co enzyme pyridoxal phosphate.

22. What are parasites?

- + Organisms deriving their nutrient from another organism (host) and causing disease to the host are called parasites.

23. What is total stem parasite?

- + The leafless stem twine around the host and produce haustoria is called Total stem parasite. Example - Cuscuta

24. What is total root parasite?

- + The organism which do not have stem axis and grow in the roots of host plants produce haustoria is called Total root parasite. Example - Rafflesia, Balanophora.

25. What is partial parasite?

- + Plants of this group contain chlorophyll and synthesize carbohydrates.
- + Water and mineral requirements are dependent on host plant.
- + Example - Viscum

26. Define Lichens.

- + It is a mutual association of Algae and Fungi. Algae prepares food and fungi absorbs water and provides thallus structure.

27. What are mycorrhizae?

- + Fungi associated with roots of higher plants including Gymnosperms.
- + Example - Pinus.



13

PHOTOSYNTHESIS

EVALUATION

2 & 3 Marks

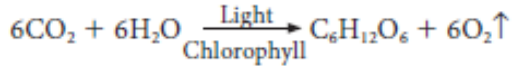
- Two groups (A & B) of bean plants of similar size and same leaf area were placed in identical conditions. Group A was exposed to light of wavelength 400-450nm & Group B to light of wavelength of 500-550nm. Compare the photosynthetic rate of the 2 groups giving reasons.
 - + A Group of plants exposed to light of 400-450 nm : Chlorophyll a shows maximum absorption peak at 450nm blue region. Hence rate of photosynthesis will be high
 - + B group of plants expose to light of 500-550 nm : This wavelength refers to green region of the spectrum. Rate of photosynthesis does not increase due to this. chlorophyll does not absorb light in the green region but reflects green. So plants appear green. Rate of Photosynthesis is negligible in these plants.
- A tree is believed to be releasing oxygen during night time. Do you believe the truthfulness of this statement? Justify your answer by giving reasons?
 - + It is not true.
 - + This is because Oxygen is evolved during the light reaction of photosynthesis only. This reaction occurs only in the presence of light. Therefore, oxygen cannot be released during night time.

ADDITIONAL

2 & 3 Marks

- Define Photosynthesis.
 - + Photosynthesis is referred as photochemical oxidation and reduction reactions carried out with help of light, converting solar energy into Chemical energy.

2. Write the overall equation of photosynthesis.



3. What is Bioluminescence?

- + Bioluminescence is the production and emission of light by a living organism.

4. What is Quantasomes?

- + Inner surface of lamellar membrane consists of small spherical structure called as Quantasomes.
- + They are morphological expression of physiological photosynthetic units, located on the inner membrane of thylakoid lamellae.

5. What are carotenoids?

- + Carotenoids are yellow to orange pigments, mostly tetra-terpens and these pigments absorb light strongly in the blue to violet region of visible spectrum.
- + These pigments protect chlorophyll from photo-oxidative damage. Hence, they are called as shield pigments.

6. What are phycobilins?

- + They are proteinaceous pigments, soluble in water, and do not contain Mg and Phytol tail.
- + They exist in two forms such as Phycocyanin found in cyanobacteria
- + Phycoerythrin found in rhodophycean algae (Red algae).

7. What is Light reaction (or) Hills reaction?

- + Photosynthesis is an Oxidation and Reduction process.
- + Water is oxidised to release O_2 and CO_2 is reduced to form sugars.
- + The first phase requires light and is called light reaction or Hill's reaction.

8. What are the two phases find in light reaction?**Photo-oxidation Phase:**

- + Absorption of light energy.
- + Transfer of energy from accessory pigments to reaction centre.
- + Activation of Chlorophyll 'a' molecule.

Photo Chemical Phase:

- + Photolysis of water and oxygen evolution
- + Electron transport and synthesis of assimilatory power.

9. What is Dark reaction (or) Calvin Benson cycle?

- + Fixation and reduction of CO_2 into carbohydrates with the help of assimilatory power produced during light reaction.
- + This reaction does not require light and is not directly light driven.
- + Hence, it is called as Dark reaction or Calvin-Benson cycle.

10. What is Photophosphorylation?

- + When the pigment molecule is in an excited state, this excitation energy is utilised for the phosphorylation.
- + Phosphorylation takes place with the help of light generated electron and hence it is known as photophosphorylation.

11. Define Fluorescence.

- + The electron from first singlet state (S_1) returns to ground state (S_0) by releasing energy in the form of radiation energy (light) in the red region and this is known as fluorescence.

12. Define Phosphorescence.

- + Electron from Second Singlet State (S_2) may return to next higher energy level (S_1) by losing some of its extra energy in the form of heat.
- + From first singlet state (S_1) electron further drops to first triplet state (T_1).

- + Triplet State is unstable having half life time of 10⁻³ seconds and electrons returns to ground state with emission of light in red region called as phosphorescence.

13. What is Photolysis?

- + When the pigment system II is active it receives light and the water molecule splits into OH⁻ ions and H⁺ ions.
- + The OH⁻ ions unite to form water molecules again and release O₂ and electrons.

14. What is non-cyclic photophosphorylation?

- + Electrons released from the photosystem II are not cycled back. It is used for the reduction of NADP⁺ in to NADPH + H⁺.
- + During the electron transport it generates ATP and hence this type of photophosphorylation is called non-cyclic photophosphorylation.

15. What is Z- Scheme?

- + The electron flow looks like the appearance of letter 'Z' and so known as Z scheme.

16. What are the three phases found in the dark reaction?

- + Carboxylation (fixation), Reduction (Glycolytic Reversal), Regeneration.

17. What are Oxidative and substrate level phosphorylation?

- + Phosphorylation taking place during respiration is called as oxidative phosphorylation and ATP produced by the breakdown of substrate is known as substrate level phosphorylation.

18. What is Photo phosphorylation?

- + Phosphorylation is the process of synthesis of ATP by the addition of inorganic phosphate to ADP.
- + The addition of phosphate here takes place with the help of light generated electron and so it is called as photophosphorylation.
- + It takes place in both cyclic and non-cyclic electron transport.

19. What is Bundle sheath chloroplast? And Mesophyll chloroplast?

- + Bundle sheath chloroplast: Larger chloroplast, thylakoids not arranged in granum and rich in starch.
- + Mesophyll Chloroplast: Smaller chloroplast, thylakoids arranged in granum and less starch.

20. Define the term Kranz Anatomy?

- + It is the German term meaning a halo or wreath.
- + In C₄ plants vascular bundles are surrounded by a layer of bundle sheath.
- + Bundle sheath is surrounded by a ring of mesophyll cells.
- + The characteristic feature of C₄ plants is the presence of dimorphic chloroplast.

21. What are the Significance of C₄ cycle?

- + Plants having C₄ cycle are mainly of tropical and sub-tropical regions and are able to survive in environment with low CO₂ concentration.
- + C₄ plants are partially adapted to drought conditions.
- + Oxygen has no inhibitory effect on C₄ cycle since PEP carboxylase is insensitive to O₂.
- + Due to absence of photorespiration, CO₂ Compensation Point for C₄ is lower than that of C₃ plants.

22. What are the Significance of CAM cycle?

- + It is advantageous for succulent plants to obtain CO₂ from malic acid when stomata are closed.
- + During day time stomata are closed and CO₂ is not taken but continue their photosynthesis.
- + Stomata are closed during the day time and help the plants to avoid transpiration and water loss.

23. What are the Significance of photorespiration?

- + Glycine and Serine synthesised during this process are precursors of many biomolecules like chlorophyll, proteins, nucleotides.

- + It consumes excess NADH 1 H₁ generated.
- + Glycolate protects cells from Photo oxidation.

24. What are the factors affecting photosynthesis?

- + Factors affecting photosynthesis are further grouped into External or Environmental factors and Internal factors.
- + External factors: Light, carbon dioxide, temperature, water, mineral and pollutants.
- + Internal factors: Pigments, protoplasmic factor, accumulation of carbohydrates, anatomy of leaf and hormones.

25. What is Emerson's Enhancement Effect?

- + Emerson modified his first experiment by supplying shorter wavelength of light (red light) along with longer wavelength of light (far red light).
- + He found that the monochromatic light of longer wavelength (far red light) when supplemented with shorter wavelength of light (red light) enhanced photosynthetic yield and recovered red drop.
- + This enhancement of photosynthetic yield is referred to as Emerson's Enhancement Effect.



14

RESPIRATION

EVALUATION

2 & 3 Marks

1. What are enzymes involved in phosphorylation and dephosphorylation reactions in EMP pathway?

Enzymes of Phosphorylation reactions:

- + Hexokinase
- + Phosphofructo kinase

Enzymes of Dephosphorylation reactions :

- + Phosphoglycerate Kinase
- + Pyruvate kinase

2. Respiratory quotient is zero in succulent plants. Why?

- + In some succulent plants like *Opuntia*, *Bryophyllum* carbohydrates are partially oxidised to organic acid, particularly malic acid without corresponding release of CO_2 but O_2 is consumed hence the RQ value will be zero.



(Glucose)

(Malic acid)

- + RQ of glucose in succulents = Zero molecule of CO_2 / 3 molecules of O_2 = 0 (Zero)

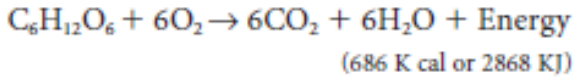
ADDITIONAL

2 & 3 Marks

1. Define respiration.

- + Respiration is a biological process in which oxidation of various food substances like carbohydrates, proteins and fats take place and as a result of this, energy is produced where O_2 is taken in and CO_2 is liberated.

2. Write the overall process of respiration?



3. What is meant by floating respiration?

- + When carbohydrate or fat or organic acid serves as respiratory substrate and it is called floating respiration.

4. What is protoplasmic respiration?

- + When respiration utilizing protein as a respiratory substrate, it is called protoplasmic respiration.

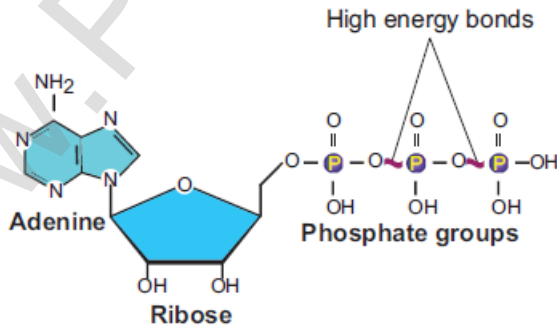
5. Define Compensation point.

- + The point at which CO_2 released in respiration is exactly compensated by CO_2 fixed in photosynthesis that means no net gaseous exchange takes place, it is called compensation point

6. Why ATP is called energy currency of the cell?

- + On hydrolysis, ATP releases energy (7.3 k cal) and its found in all living cells and hence it is called universal energy currency of the cell.

7. Draw the molecule structure of ATP.



8. Define redox reactions.

- + The reaction in which NAD^+ and FAD gain (reduction) or lose (oxidation) electrons are called redox reaction.

9. Define aerobic respiration.

- + Respiration occurring in the presence of oxygen is called aerobic respiration.

10. What are the two types of Respiration?

- + Aerobic respiration, Anaerobic respiration

11. What are the four major steps in aerobic respiration?

- + Glycolysis
- + Pyruvate oxidation (Link reaction)
- + Krebs cycle (TCA cycle)
- + Electron Transport Chain (Terminal oxidation).

12. What is meant by anaerobic respiration?

- + In the absence of molecular oxygen glucose is incompletely degraded into either ethyl alcohol or lactic acid.

13. Define glycolysis.

- + Glycolysis is a linear series of reactions in which 6-carbon glucose is split into two molecules of 3-carbon pyruvic acid.

14. What is energy budget?

- + In the pay off phase, totally 4ATP and 2NADH + H⁺ molecules are produced. Since 2ATP molecules are already consumed in the preparatory phase, the net products in glycolysis are 2ATPs and 2NADH + H⁺.

15. What is pyruvate oxidation (or) Link reaction?

- + Two molecules of pyruvate formed by glycolysis in the cytosol enters into the mitochondrial matrix.
- + In aerobic respiration this pyruvate with coenzyme A is oxidatively decarboxylated into acetyl CoA by pyruvate dehydrogenase complex.
- + This reaction is irreversible and produces two molecules of NADH + H⁺ and 2CO₂.
- + It is also called transition reaction or Link reaction.

16. Name the Enzymes used in pyruvate dehydrogenase.

- + Pyruvate dehydrogenase complex consist of three distinct enzymes,.
- + Pyruvate dehydrogenase.
- + Dihydrolipoyl transacetylase.
- + Dihydrolipoyl dehydrogenase

17. Define TCA cycle.

- + TCA cycle starts with condensation of acetyl CoA with oxaloacetate in the presence of water to yield citrate or citric acid.
- + It is also known as Citric Acid Cycle (CAC) or Tri Carboxylic Acid (TCA) cycle.

18. What is meant by substrate level phosphorylation?

- + During the conversion of succinyl CoA to scinate by the enzyme succinyl CoA synthetase or succinate thiokinase, a molecule of ATP synthesis from substrate without entering the electron transport chain is called substrate level phosphorylation.

19. What is direct phosphorylation?

- + Direct transfer of phosphate moiety from substrate molecule to ADP and is converted into ATP is called substrate phosphorylation or direct phosphorylation or trans-phosphorylation.

20. Define amphibolic pathway.

- + Krebs cycle is primarily a catabolic pathway, but it provides precursors for various biosynthetic pathways there by an anabolic pathway too is called amphibolic pathway.

21. Define gluconeogenesis.

- + The synthesis of glucose from certain non-carbohydrate carbon substrates such as proteins and lipids are called gluconeogenesis.

22. What are cristae?

- + In mitochondria, the inner membrane is folded in the form of finger projections towards the matrix called cristae.

23. What is Oxidative phosphorylation?

- + The transfer of electrons from reduced coenzyme NADH to oxygen *via* complexes I to IV is coupled to the synthesis of ATP from ADP and inorganic phosphate (Pi) which is called Oxidative phosphorylation.

24. Define climacteric.

- + Abnormal rise in respiratory rate of ripening in fruits is called Climacteric. Examples are apple, banana, mango, papaya, pear.

25. Why Mitochondria is called as power house of cell?

- + Huge amount of energy is generated in mitochondria in the form of ATP molecules are called 'power house of the cell'.

26. Mention the electron transport chain inhibitors.

- + 2,4 DNP (Dinitrophenol) - It prevents synthesis of ATP from ADP, as it directs electrons from Co Q to O₂
- + Cyanide - It prevents flow of electrons from Cytochrome a₃ to O₂
- + Rotenone - It prevents flow of electrons from NADH 1 H₁/FADH₂ to Co Q
- + Oligomycin - It inhibits oxidative phosphorylation

27. Define respiration quotient (RQ).

- + The ratio of volume of carbon dioxide given out and volume of oxygen taken in during respiration is called Respiratory Quotient or Respiratory ratio.
- + RQ value depends upon respiratory substrates and their oxidation.

$$RQ = \frac{\text{Volume of CO}_2 \text{ liberated}}{\text{Volume of O}_2 \text{ consumed}}$$

28. Mention the Significance of RQ.

- + RQ value indicates which type of respiration occurs in living cells, either aerobic or anaerobic.
- + It also helps to know which type of respiratory substrate is involved.

29. Define fermentation.

- + Some organisms can respire in the absence of oxygen is called fermentation or anaerobic respiration.

30. What are the uses of Alcoholic in Industrial?

- + In bakeries, it is used for preparing bread, cakes, biscuits.
- + In beverage industries for preparing wine and alcoholic drinks.
- + In producing vinegar and in tanning, curing of leather.
- + Ethanol is used to make gasohol (a fuel that is used for cars in Brazil).

31. Compare between Glycolysis and Fermentation.

Glycolysis	Fermentation
Glucose is converted into pyruvic acid.	Starts from pyruvic acid and is converted into alcohol or lactic acid.
It takes place in the presence or absence of oxygen.	It takes place in the absence of oxygen.
Net gain is 2ATP.	No net gain of ATP molecules.

32. What are the Significance of pentose phosphate pathway?

HMP shunt is associated with the generation of two important products, NADPH and pentose sugars, which play a vital role in anabolic reactions.

Coenzyme NADPH generated is used for reductive biosynthesis and counter damaging the effects of oxygen free radicals

- + Ribose-5-phosphate and its derivatives are used in the synthesis of DNA, RNA, ATP, NAD^+ , FAD and Coenzyme A.
- + Erythrose is used for synthesis of anthocyanin, lignin and other aromatic compounds.



15

PLANT GROWTH AND DEVELOPMENT

EVALUATION

2 & 3 Marks

- 1. What are the parameters used to measure growth of plants?**
 - + Increase in length or girth.
 - + Increase in fresh or dry weight.
 - + Increase in area or volume.
 - + Increase in number of cells produced.
- 2. What is plasticity?**
 - + Plants follow different pathways in response to environment or phases of life to form different kinds of structures is called plasticity.
 - + Example - Heterophylly in cotton and coriander.

ADDITIONAL

2 & 3 Marks

- 1. Define growth?**
 - + Growth is defined as an irreversible permanent increase in size, shape, number, volume and dry weight.
 - + Plant growth occurs by cell division, cell enlargement, differentiation and maturation.
- 2. Define Monocarpic annual.**
 - + Monocarpic annual plants produce flowers only once during lifetime and dies. Example - Paddy and Bean.
- 3. Define Monocarpic Perennials?**
 - + Monocarpic perennials produce flowers only once during life time but the plants survive for many years. Example - Bamboo.

4. Define polycarpic perennials?

- + Polycarpic perennials produce flowers every year during life time.
- + Example - Coconut.

5. What are the three phases of growth?

- + Formative phase
- + Elongation phase
- + Maturation phase

6. What is called as Arithmetic growth rate?

- + If the length of a plant organ is plotted against time, it shows a linear curve and this growth is called arithmetic growth.

7. Compare absolute growth rates with relative growth rate

Absolute growth rate	Relative growth rate
Increase in total growth of two organs measured and compared per unit time is called absolute growth rate.	The growth of the given system per unit time expressed per unit initial parameter is called relative growth rate.

8. Define Etiolation.

- + Light has its own contribution in the growth of the plant.
- + Light is important for growth and photosynthesis.
- + Light stimulates healthy growth.
- + Absence of light may lead to yellowish in colour. This is called etiolation.

9. What are the internal factors in plant growth?

- + Plant growth is influenced by a variety of internal factors.
- + Genes are intracellular factors for growth.
- + Phytohormones are intracellular factors for growth. Example - auxin, gibberellin, cytokinin.
- + C/N ratio.

10. How the Actual growth of plant is calculated.

$$\text{Actual growth in length} = \frac{\text{Distance travelled by the pointer} \times \text{radius of the pulley}}{\text{Length of the pointer}}$$

11. Define Differentiation.

- + The process of maturation of meristematic cells to specific types of cells performing specific functions is called differentiation.

12. What is Dedifferentiation?

- + The living differentiated cells which had lost capacity to divide, regain the capacity to divide under certain conditions.
- + Hence, dedifferentiation is the regaining of the ability of cell division by the differentiated cells.
- + Example - Interfascicular cambium and Vascular cambium.

13. Define Redifferentiation.

- + Differentiated cells, after multiplication again lose the ability to divide and mature to perform specific functions.
- + This is called redifferentiation.
- + Example - Secondary xylem and Secondary phloem.

14. Define Plasticity.

- + Plants follow different pathways in response to environment or phases of life to form different kinds of structures.
- + This ability is called plasticity.

15. What are phytohormones?

- + The term phytohormones is implied to those chemical substances which are synthesized by plants and thus, naturally occurring.

16. What are plant growth hormones?

- + Five major groups of hormones viz., auxins, gibberellins, cytokinins, ethylene and abscisic acid.

17. Define Synergistic effect.

- + The effect of one or more substance in such a way that both promote each other's activity.
- + Example - Activity of auxin and gibberellins or cytokinins.

18. What is Antagonistic effect?

- + The effect of two substances in such a way that they have opposite effects on the same process.
- + One accelerates and other inhibits.
- + Example - ABA and gibberellins during seed or bud dormancy.
- + ABA induces dormancy and gibberellins break it.

19. Define Anti-Auxins.

- + Anti-auxin compounds when applied to the plant inhibit the effect of auxin.
- + Example - 2, 4, 5-Tri Iodine Benzoic Acid (TIBA) and Naphthylphthalamine.

20. What is Apical dominance?

- + Suppression of growth in lateral bud by apical bud due to auxin produced by apical bud is termed as apical dominance.

21. Write any three Agricultural role of Auxin.

- + It is used to eradicate weeds. Example - 2,4-D and 2,4,5-T.
- + Synthetic auxins are used in the formation of seedless fruits (Parthenocarpic fruit).
- + It is used to break the dormancy in seeds.
- + Induce flowering in Pineapple by NAA & 2,4-D.
- + Increase the number of female flowers and fruits in cucurbits.

22. Write the Physiological Effects of Gibberellins

- + It produces extraordinary elongation of stem caused by cell division and cell elongation.
- + Rosette plants (genetic dwarfism) plants exhibit excessive internodal growth when they are treated with gibberellins.

This sudden elongation of stem followed by flowering is called bolting.

- + Gibberellin breaks dormancy in potato tubers.

23. Define Bolting,

- + Rosette plants (genetic dwarfism) plants exhibit excessive internodal growth when they are treated with gibberellins.
- + This sudden elongation of stem followed by flowering is called bolting.

24. What is Richmond lang effect?

- + Application of cytokinin delays the process of aging by nutrient mobilization. It is known as Richmond Lang effect.

25. What does mean of Bioassay?

- + Bioassay means testing of substances for their activity in causing a growth response in a living plant or its part.

26. What is called Zeatin?

- + Lethan and Miller isolated and identified a new cytokinin called Zeatin from unripe grains of maize.
- + The most widely occurring cytokinin in plants is Iso Pentenyl adenine (IPA).

27. Write any three the agricultural role of gibberellins.

- + Formation of seedless fruits without fertilization is induced by gibberellins
- + It helps in crop improvement.
- + It increases yield.
- + Promotes elongation of inter-node in sugarcane without decreasing sugar content.
- + Promotion of flowering in long day plants even under short day conditions.
- + It stimulates the seed germination.

28. Write any three Agricultural role of Ethylene.

- + Ethylene normally reduces flowering in plants except in Pine apple and Mango.
- + It increases the number of female flowers and decreases the number of male flowers.
- + Ethylene spray in cucumber crop produces female flowers and increases the yield.

29. Why ABA is called stress hormone?

- + It inhibits the shoot growth and promotes growth of root system.
- + This character protect the plants from water stress. Hence, ABA is called as stress hormone.

30. What is phytochrome?

- + Phytochrome is a bluish biliprotein pigment responsible for the perception of light in photo physiological process.

31. What is Photoperiodism?

- + The physiological change on flowering due to relative length of light and darkness (photoperiod) is called Photoperiodism.

32. Define long day plants.

- + The plants that require long critical day length for flowering are called long day plants or short night plants. Example - Pea, Barley and Oats.

33. What are short long day plants?

- + These are long day plants but should be exposed to short day lengths during early period of growth for flowering. Example - Wheat and Rye.

34. Define short day plants.

- + The plants that require a short critical day length for flowering are called short day plants or long night plants.
- + Example - Tobacco, Cocklebur, Soybean, Rice and Chrysanthemum.

35. What are long short day plants?

- + These are actually short-day plants but they have to be exposed to long days during their early periods of growth for flowering.

36. What is Intermediate day plants?

- + These require a photoperiod between long day and short day for flowering.
- + Example - Sugarcane and Coleus.

37. Define day Neutral plants.

- + There are a number of plants which can flower in all possible photoperiods.
- + They are also called photo neutrals or indeterminate plants.
- + Example - Potato, Rhododendron, Tomato and Cotton.

38. What is Photoperiodic induction?

- + The phenomenon of conversion of leaf primordia into flower primordia under the influence of suitable inductive cycles is called photoperiodic induction.
- + Example - Xanthium (SDP) – 1 inductive cycle and Plantago (LDP) – 25 inductive cycles.

39. Define Florigen.

- + The nature of flower producing stimulus has been elusive so far. It is believed by many physiologists that it is a hormone called florigen.

40. What is the importance of Photoperiodism?

- + The knowledge of photoperiodism plays an important role in hybridisation experiments.
- + Photoperiodism is an excellent example of physiological pre-conditioning that is using an external factor to induce physiological changes in the plant.

41. Define Vernalization.

- + Many species of biennials and perennials are induced to flower by low temperature exposure (0°C to 5°C).
- + This process is called Vernalization.

42. What is Devernalization?

- + Reversal of the effect of vernalization is called devernalization.

43. Write the Practical applications of vernalization.

- + Vernalization shortens the vegetative period and induces the plant to flower earlier.
- + It increases the cold resistance of the plants.
- + It increases the resistance of plants to fungal disease.
- + Plant breeding can be accelerated.

44. What is Seed germination?

- + The activation and growth of embryo from seed into seedling during favourable conditions is called seed germination.

45. What are the 2 types of germination?

- + Epigeal germination
- + Hypogeal germination

46. What is Seed dormancy?

- + The condition of a seed when it fails to germinate even in suitable environmental condition is called seed dormancy.

47. What is Epigeal germination?

- + During epigeal germination cotyledons are pushed out of the soil.
- + This happens due to the elongation of the hypocotyl.
- + Example - Castor and Bean.

48. What is hypogeal germination? with an example?

- + During hypogeal germination cotyledons remain below the soil due to rapid elongation of epicotyls
- + Example - Maize

49. What is Scarification?

- + Mechanical and chemical treatments like cutting or chipping of hard tough seed coat and use of organic solvents to remove waxy or fatty compounds are called as Scarification.

50. What is Stratification?

- + Seeds of rosaceous plants (Apple, Plum, Peach and Cherry) will not germinate until they have been exposed to well aerated, moist condition under low temperature (0°C to 10°C) for weeks to months.
- + Such treatment is called Stratification.

51. Define Impaction.

- + In some seeds water and oxygen are unable to penetrate micropyle due to blockage by cork cells.
- + These seeds are shaken vigorously to remove the plug which is called Impaction.

52. What is Senescence?

- + Senescence refers to all collective, progressive and deteriorative processes which ultimately lead to complete loss of organization and function.

53. Define Phyto gerontology.

- + The branch of botany which deals with ageing, abscission and senescence is called Phyto gerontology.

54. Expand - PCD.

- + Senescence is controlled by plants own genetic programme and death of the plant or plant part consequent to senescence is called Programmed Cell Death.

55. What is Abscission?

- + Abscission is a physiological process of shedding of organs like leaves, flowers, fruits and seeds from the parent plant body.

56. Mention the Factor affecting senescence.

- + ABA and ethylene accelerate senescence while auxin and cytokinin retard senescence.
- + Nitrogen deficiency increases senescence whereas nitrogen supply retards senescence.
- + High temperature accelerates senescence but low temperature retards senescence.
- + Senescence is rapid in dark than in light.
- + Water stress leads to accumulation of ABA leading to senescence.

◆◆



BIO-ZOOLOGY

2 & 3 Marks

www.Padasalai.Net

kindly send me your key Answers to our email id - padasalai.net@gmail.com

THE LIVING WORLD

EVALUATION 2 & 3 Marks

1. Why mule is sterile in nature?

- + Crosses between Male Donkey and Female Horse results in Mule. It is sterile because
- + They can't produce sperm (male reproductive cell) and an egg (female reproductive cell)
- + Their varied chromosome number i.e. female horse has 32 chromosome number and male donkey has 31 chromosome number.

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

- + Charles Darwin explains that the evolutionary connection of species by the process of natural selection.

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

- + Because the animals and elephants are facing food and water scarcity due to massive deforestation.

4. Differentiate between probiotics and pathogenic bacteria

PROBIOTICS	PATHOGENIC BACTERIA
Beneficial	Harmful
Curd is one of the best sources of probiotics, which are friendly bacteria that can improve our health. E.g. Lactobacillus sp.	One of the bacterial diseases with the highest disease burden is tuberculosis, caused by the bacterium Mycobacterium tuberculosis.

5. What is the difference between a zoo and wild life sanctuary?

ZOO	WILD LIFE SANCTUARY
Places where wild animals are kept in protected environments under human care.	A naturally occurring sanctuary.
It enables us to study their food habits and behaviour.	An island, that provides protection for species poaching. A protected area geographic territory within which wildlife is protected. Refuges can preserve animals that are endangered.

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

- + Yes.
- + The accuracy and authenticity is more significant in the molecular tools, such as DNA barcoding, DNA hybridization, DNA fingerprinting, Restriction Fragment Length Polymorphisms (RFLP) analysis, and Polymerase Chain Reaction (PCR) sequencing.

ADDITIONAL

2 & 3 Marks

1. Define biodiversity.

- + The presence of a large number of species in a particular ecosystem is called 'biological diversity' or in 'biodiversity'.

2. What are the characters of living organisms?

- + The characters of living organisms are, cellular organization, nutrition, respiration, metabolism, growth, response to stimuli, movement, reproduction, excretion, adaptation and homeostasis.

kindly send me your key Answers to our email id - padasalai.net@gmail.com

3. What is Classification?

- + Classification is a process by which things are grouped in convenient categories, based on easily observable characters.

4. What is taxonomy?

- + This science of classification is called taxonomy. (or) Taxonomy is the science of arrangement of living organisms along with classification, description, identification, and naming of organisms which includes all flora and fauna including microorganisms of the world.

5. What is systematic?

- + Systematics is identifying, describing, naming, arranging, preserving and documenting the organisms.

6. What is cladogram?

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

7. Name the three domains of life.

- + Archaea, Bacteria, Eukarya

8. What does the taxonomical hierarchy include?

- + The taxonomical hierarchy includes seven categories namely kingdom, phylum, class, order, family, genus and species.

9. Define species.

- + It is a group of animals having similar morphological features or traits and is reproductively isolated to produce fertile offspring.

10. Define genus.

- + It is a group of closely related species which have evolved from a common ancestor.

11. Define monotypic genus.

- + In some genus there is only one species which is called as monotypic genus

- + E.g. Red panda is the only species in the genus Ailurus: Ailurusfulgens

12. Define polytypic genus.

- + If there are more than one species in the genus it is known as polytypic genus.
- + Example 'cats' come under the Genus Felis, which has a number of closely related species, Felisdomestica (domestic cat), Felis margarita (jungle cat). Felissilvestris (wild cat)

13. Define family.

- + It is a taxonomic category which includes a group of related genera with less similarity as compared to genus and species.
- + For example, the family Felidae includes the genus Felis (cats) and the genus Panthera (lions, tigers, leopards).

14. Define order.

- + It includes an assemblage of one or more related families which show few common features.
- + One or more similar families are grouped together to form an order.
- + For example, family Canidaeand Felidaeare placed in the order Carnivora.

15. Define class.

- + It includes one or more related orders with some common characters.
- + For example, order Primata comprising monkeys, apes and man is placed in the Class Mammalia, along with the order Carnivora which includes dogs and cats.

16. Define phylum.

- + The group of classes with similar distinctive characteristics constitutes a phylum.
- + The classes Pisces, Amphibia, Reptilia, Aves and Mammalia constitute the next higher category, phylum Chordata.

17. What is binomial nomenclature?

- + This system of naming the organism is called Binomial Nomenclature.
- + Each name has two components, a generic name and a specific epithet.
- + Example – Pavo – Generic name, cristatus – Species name.

18. What is meant by trinomial nomenclature?

- + Trinomen means, three names: generic name, species name and sub-species name.
- + It is the extension of binominal nomenclature system which has an addition of subspecies.
- + Example - Corvus splendens splendens

19. What is tautonymy?

- + The practice of naming the animals in which the generic name and species name are the same, is called Tautonymy.
- + Example - Naja naja

20. What are taxonomical Keys?

- + Keys are based on comparative analysis of the similarities and dissimilarities of organisms.
- + There are separate keys for different taxonomic categories.

21. What is Museum?

- + Biological museums have collection of preserved plants and animals for study and ready reference.
- + Specimens of both extinct and living organisms can be studied.

22. What are Zoological parks?

- + These are places where wild animals are kept in protected environments under human care.
- + It enables us to study their food habits and behaviour.

23. What does printed taxonomical tools consist of?

- + Printed taxonomical tools consist of identification cards, description, field guides and manuals.

2 ANIMAL KINGDOM

EVALUATION 2 & 3 Marks

- Why are spongin and spicules important to a sponge?**
 - + Because, the body is supported by a skeleton made up of calcareous and siliceous spicules or spongin.
- What are the four characteristics common to most animals?**
 - + All animals are (i) Eukaryotic (ii) Multicellular (iii) Heterotrophs (iv) Sexual reproduction
- List the features that all vertebrates show at some point in their development.**
 - + Presence of elongated rod like notochord below the nerve cord and above the alimentary canal.
 - + A dorsal hollow or tubular fluid filled nerve cord lies above the notochord and below the dorsal body wall.
 - + Presence of pharyngeal gill slits or clefts in all chordates at some stage of their lifecycle.
- Compare closed and open circulatory system.**

Closed circulatory system	Open circulatory system
The blood is circulated through blood vessels. (arteries, veins and capillaries)	The blood remains filled in tissue spaces due to the absence of blood capillaries.
Example- Annelids, Cephalochordates and Vertebrates	Example- Arthropods, Molluscs, Echinoderms and Urochordates

5. Compare schizocoelom with enterocoelom.

Schizocoelom	Enterocoelom
The body cavity is formed by splitting of mesoderm.	The body cavity is formed from the mesodermal pouches of archenteron.
E.g. Annelids, Arthropods, Molluscs	E.g. Echinoderms, Hemichordates and Chordates

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

- + Enterocoelomata have a true coelom called enterocoel, formed from the archenteron or digestive tube.

7. Choose the term that does not belong in the following group and explain why it does not belong? Notochord, cephalisation, dorsal nerve cord and Radial symmetry.

- + 'Radial symmetry'.
- + Notochord, cephalisation, dorsal nerve cord - Belongs to nervous system; 'Radial symmetry' - not belong to the group.

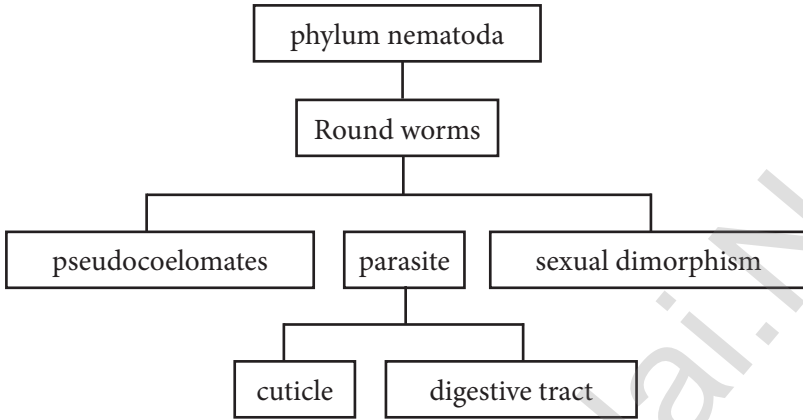
8. Why flatworms are called acoelomates?

- + Since there is no body cavity in these animals, their body is solid without a perivisceral cavity, this restricts the free movement of internal organs.

9. What are flame cells?

- + Specialized excretory cells called flame cells help in osmoregulation and excretion.
- + Example- Platyhelminthes.

10. Concept Mapping - Use the following terms to create a concept map that shows the major characteristic features of the phylum nematoda:



11. In which phyla is the larva trochophore found?

- + Phylum Annelids and Mollusca.

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

- + In tunicate, the larval stage possesses notochord, a dorsal hollow nerve cord, pharyngeal slits and a post anal tail.
- + The adult stage possesses pharyngeal slits only, others were disappeared.

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

Cartilaginous fishes	Living jawless fishes
Belong to Chondrichthyes.	Belong to Cyclostomata.
Jawed animals.	Jawless animals.
Predaceous animals.	Ectoparasitic animals.
Respiration by lamelliform gills.	Respiration by gill slits.
Ex: Shark	Ex: Lamprey

14. List three features that characterize bony fishes.

- + Bony endoskeleton.
- + Skin covered by ganoid, cycloid or ctenoid scales.
- + Respiration by four pairs of filamentous gills.

15. List the functions of air bladder in fishes.

- + Helps in gaseous exchange (Lung fishes).
- + For maintaining buoyancy (Ray finned fishes).

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

- + Body is covered by dry and cornified skin with epidermal scales or scutes.
- + They lay cleidoic eggs with extra-embryonic membranes like amnion, allantois, chorion and yolk sac.
- + Excretion by metanephric kidneys and are uricotelic.
- + Internal fertilization takes place.

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

- + The endoskeleton is fully ossified (bony) and the long bones are hollow with air cavities (pneumatic bones).

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

- + No. The numbers of eggs produced by an oviparous will be more than the viviparous.
- + Because, the development of young ones takes place outside the body. The eggs are more prone to environmental conditions and predators, to overcome the loss, more eggs are produced by oviparous animals.

ADDITIONAL

2 & 3 Marks

1. Define diploblastic animals.

- + Animals in which the cells are arranged in two embryonic layers, the external ectoderm, and internal endoderm are called diploblastic animals.

2. Define triploblastic animals.

- + Animals in which the developing embryo has three germinal layers, outer ectoderm, inner endoderm and middle mesoderm are called triploblastic animals.

3. What is meant by symmetry?

- + Symmetry is the body arrangement in which parts that lie on opposite side of an axis are identical.

4. What are called asymmetrical?

- + Any plane passing through the centre of the body does not divide them into two equal halves are called asymmetrical.
- + Example – Sponges.

5. What is called radial symmetry?

- + When any plane passing through the central axis of the body divides an organism into two identical parts, it is called radial symmetry.
- + The body parts are arranged around the central axis.
- + Example – Coelenterates.

6. What is bilateral symmetry?

- + Animals which have two similar halves on either side of the central plane is called bilateral symmetry.
- + Example – Platyhelminthes.

7. What is biradial symmetry?

- + Animals which possess two pairs of symmetrical sides are said to be biradial symmetry.
- + Biradial symmetry is the combination of radial and bilateral symmetry.
- + Example – Ctenophores.

8. Define coelom.

- + Coelom is a body cavity between the body wall and the alimentary canal and it is lined with mesoderm.

9. Define acoelomates.

- + Animals which do not possess a body cavity are called acoelomates.
- + Example - Flatworm

10. What are pseudocoelom?

- + In some animals, the body cavity is not fully lined by the mesodermal epithelium, but the mesoderm is formed as scattered pouches between the ectoderm and endoderm, such a body cavity is called a pseudocoel.
- + Example: Round worms.

11. Define eucoelom.

- + Eucoelom or true coelom is a fluid-filled cavity that develops within the mesoderm and is lined by mesodermal epithelium called peritoneum.

12. What is metamerism?

- + In some animals, the body is externally and internally divided into a series of repeated units called segments with a serial repetition of some organs is called metamerism.

13. What is notochord?

- + Notochord is mesodermally derived rod like structure formed on the dorsal side during embryonic development in some animal.

14. Differentiate between protostomia and deuterostomia.

Protostomia	Deuterostomia
Embryonic blastopore develops into mouth.	Embryonic blastopore develops into anus.
It includes acoelomata, pseudocoelomata and schizocoelomata.	It includes enterocoelomata.

15. What are choanocytes?

- + Choanocytes or collar cells are specialised flattened cells lining the spongocoel and the canals in sponges.

16. Define hermaphrodites.

- + The ova and sperms are produced by the same individual are called hermaphrodites.

17. Mention the uses of cnidocytes.

- + Cnidoblasts are used for anchorage, defense, and to capture the prey.

18. Define metagenesis.

- + Alteration of haploid sexual and diploid asexual generation in the life cycle of an animal is called metagenesis or alteration of generation.
- + Example – Cnidarians.

19. What is meant by Bioluminescence?

- + The ability of a living organism to emit light is called bioluminescence.
- + Example - Ctenophores.



3

TISSUE LEVEL OF ORGANISATION

EVALUATION

2 & 3 Marks

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

- + Columnar, but unequal in size.
- + They are single layered but appears to be multi-layered because the nuclei lie at different levels in different cells.

2. Differentiate white adipose tissue from brown adipose tissue.

White adipose tissue.

- + Adipose tissues are found in subcutaneous tissue, surrounding the kidneys, eyeball, heart, etc.
- + Adipose tissue is called 'white fat' or white adipose tissue.
- + White fat stores nutrients.

Brown adipose tissue

- + The adipose tissue which contains abundant mitochondria is called 'Brown fat' or Brown adipose tissue.
- + Brown fat is used to heat the blood stream to warm the body.
- + Brown fat produces heat by non-shivering thermogenesis in neonates.

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

- + Because it connects all the organ systems of the body by transporting oxygen, nutrients, hormones, etc. and removing wastes from these organs.

4. Differentiate between elastic fibres and elastic connective tissue.

Elastic fibres	Elastic connective tissue
It is found in the skin as the leathery dermis and forms fibrous capsules of organs such as kidneys, bones, cartilages, muscles, nerves and joints.	It contains high proportion of elastic fibres. It allows recoil of tissues following stretching.

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

- + Filtration - Squamous epithelium
- + Secretion - Glandular epithelium
- + Absorption - Columnar epithelium
- + Protection - Transitional epithelium

ADDITIONAL

2 & 3 Marks

1. Define tissue?

- + Groups of cells that are similar in structure and perform common or related functions are called 'tissues'.

2. Why tissues are called living fibres?

- + Tissues are organized in specific proportions and patterns to form organs like lungs, heart, stomach, kidneys, ovaries, testes etc; hence the tissues are called the 'living fabrics'.

3. What is organ system?

- + If two or more organs perform common physical and chemical functions they are called 'organ systems'.
- + Example - digestive system, respiratory system, circulatory system, excretory system, etc.

4. Define histology

- + The study of tissues is called histology.

5. Mention the four primary tissue types.

- + epithelial tissue (covering)
- + connective tissue (support)
- + muscle tissue (movement)
- + nervous tissue (control)

6. Write the various function of epithelial tissues.

- + The functions of epithelium include protection, absorption, filtration, excretion, secretion and sensory reception.

7. Name the some of the epithelial tissue disorders.

- + Eczema, Psoriasis, Epithelial carcinoma and severe asthma

8. Classify exocrine glands.

- + Based on the mode of secretion exocrine glands are classified as merocrine, holocrine and apocrine.

9. Write the various types of cell junction with its functions.

- + Three types of cell junctions are found in the epithelium and other tissues. These are called as tight, adhering and gap junctions.
- + Tight junctions - help to stop substances from leaking across a tissue.
- + Adhering junctions - perform cementing to keep neighbouring cells together.
- + Gap junctions - facilitate the cells to communicate with each other by connecting the cytoplasm of adjoining cells, for rapid transfer of ions, small molecules and sometimes big molecules.

10. What are tendons?

- + Connective tissue that attach skeletal muscles to bones.

11. What are ligaments?

- + Connective tissue that attach bone to bones.

12. Different between cartilage and bones.

Cartilage	Bones
solid	Hallow
Pliable	Non - pliable
chondrocytes are enclosed in small cavities within the matrix secreted by them	The bone cells (osteocytes) are present in the spaces called lacunae.
present in the tip of nose, outer ear joints, ear pinna, between adjacent bones of the vertebral column, limbs and hands in adults.	provides structural frame to the body

13. What is autopsy?

- + Autopsy is a post-mortem (dissection of a dead body) examination to discover the cause of death or the extent of disease.

14. What are the types of muscles?

- + Muscles are of three types, skeletal, smooth and cardiac.

15. What are intercalated discs?

- + It is present in cardiac muscles.
- + It is a communication junction at some fusion points allows the cells to contract as a unit.



4

ORGAN AND ORGAN SYSTEM

EVALUATION

2 & 3 Marks

- 1. What characteristics are used to identify the earthworms?**
 - + Earthworm is light brown in colour, with purplish tinge at the anterior end.
 - + The body of the earthworm divides into a number of compartments called segments or metameres.
 - + In gardens, they can be traced by their faecal deposits known as worm castings on the soil surface.
- 2. What are earthworm casts?**
 - + The undigested particles along with soil are passed out through the anus, as worm castings or vermicasts.
- 3. How do earthworms breathe?**
 - + The outer surface of the skin is richly supplied with blood capillaries which aid in the diffusion of gases.
 - + Oxygen diffuses through the skin into the blood while carbon dioxide from the blood diffuses out.
 - + The skin is kept moist by mucous and coelomic fluid and facilitates exchange of gases.
- 4. Why do you call cockroach a pest?**
 - + They destroy food and contaminate with their offensive odour.
 - + The presence of cockroaches is a sign of unhygienic condition and they are the carriers of a number of bacterial diseases. So, they are called as pests.
- 5. Comment on the functions of alary muscles?**
 - + The triangular muscles that are responsible for blood circulation in the cockroach are called alary muscles (13 pairs).

- + One pair of these muscles is found in each segment on either side of the heart.
- 6. Name the visual units of the compound eyes of cockroach.**
- + Each eye is formed of about 2000 simple eyes called the ommatidia through which the cockroach can receive several images of an object.
- 7. How does the male frog attract the female for mating?**
- + The male frog has a pair of vocal sacs and a copulatory or nuptial pad on the ventral side of the first digit of each forelimb.
 - + Vocal sacs assist in amplifying the croaking sound of frog.
- 8. Write the types of respiration seen in frog.**
- + Cutaneous, buccal and pulmonary respiration are the three types of respiration seen in frog.
- 9. Differentiate between peristomium and prostomium in earthworm.**
- + Peristomium -The mouth is found in the centre of the first segment of the body.
 - + Prostomium - Overhanging the mouth is a small flap called the upper lip.
- 10. Give the location of clitellum and spermathecal openings in Lampito mauritii.**
- + In mature worms, segments 14 to 17 may be found swollen with a glandular thickening of the skin called the clitellum.
 - + Spermathecal openings are three pairs of small ventrolateral apertures lying inter-segmentally between the grooves of the segments 6/7, 7/8 and 8/9.
- 11. Differentiate between tergum and a sternum.**
- + The sclerites of the dorsal side is called tergum.
 - + The sclerites of the ventral side are called sternum.
- 12. Head of cockroach is called hypognathous. Why?**
- + The mouth parts are directed downwards so it is hypognathous.

- + It is formed by the fusion of six segments and shows great mobility in all directions due to a flexible neck.

13. What are the components of blood in frog?

- + Plasma [60%] and blood cells [40 %], red blood cells, white blood cells, and platelets.

ADDITIONAL

2 & 3 Marks

1. Write the classification of earthworm?

Phylum : Annelida
Class : Oligochaeta
Order : Haplotaxida
Genus : *Lampito*
Species : *mauritii*

2. What is typhlosole?

- + The dorsal wall of the intestine is folded into the cavity as the typhlosole.

3. What are lateral hearts? Mention its function.

- + In the anterior part of the body the dorsal vessel is connected with the ventral vessel by eight pairs of commissural vessels or the lateral hearts lying in the 6th to 13th segments.
- + These vessels run on either side of the alimentary canal and pump blood from the dorsal vessel to the ventral vessel.

4. Mention the various types of nephridia present in earthworm.

- + pharyngeal or tufted nephridia
- + Micronephridia or Integumentary nephridia
- + Meganephridia or septal nephridia

5. What is meant by protandrous?

- + The sperm develops earlier than the production of ova.

6. Why do earth worm is called “Friends of farmer”?

- + Earthworms are known as “friends of farmer” because they

make burrows in the soil and make it porous which helps in respiration and penetration of developing plant roots.

7. What is meant by vermitech?

+ Vermiculture, vermicomposting, vermiwash and wormery are inter-linked and interdependent processes, collectively referred as Vermitech.

8. What is vermiculture?

+ Artificial rearing or cultivation of earthworms involves new technology for the betterment of human beings. This process is known as Vermiculture.

9. What is meant by vermicomposting?

+ The process of producing compost using earthworms is called Vermicomposting.

10. What is vermiwash? Mention its uses.

+ Vermiwash is a liquid manure or plant tonic obtained from earthworm. It is used as a foliar spray and helps to induce plant growth.

11. What is meant by wormery or wormbin?

+ Earthworms can be used for recycling of waste food, leaf, litter and biomass to prepare a good fertilizer in container known as wormery or wormbin.

12. Why do cockroaches are called vectors?

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

13. Classify cockroach.

Phylum : Arthropoda

Class : Insecta

Order : Orthoptera

Genus : *Periplaneta*

Species : *Americana*

14. What are spiracles or stigmata?

- + In cockroach, Branched tubes known as trachea open through 10 pairs of small holes called spiracles or stigmata, present on the lateral side of the body.

15. Compare anal styles and anal cerci in Cockroach.

- + Male bears a pair of short and slender anal styles in the 9th sternum which are absent in the female.
- + In both sexes, the 10th segment bears a pair of jointed filamentous structures called anal cerci and bears a sense organ that is receptive to vibrations in air and land.

16. Define poikilotherms.

- + The animal body temperature varies with the varying environmental temperature is called poikilotherms

17. Classify Frog.

Phylum : Chordata

Class : Amphibia

Order : Anura

Genus : *Rana*

Species : *hexadactyla*

18. What are nictitating membrane?

- + In frog, eyes are protected by a thin movable lower eyelid, thick immovable upper eyelid and a third transparent eyelid called nictitating membrane.

19. Write a note on sexual dimorphism in frog.

- + Sexual dimorphism is exhibited clearly during the breeding season.
- + The male frog has a pair of vocal sacs and a copulatory or nuptial pad on the ventral side of the first digit of each forelimb.
- + Vocal sacs assist in amplifying the croaking sound of frog.
- + Vocal sacs and nuptial pads are absent in the female frogs.

20. What is sinus venosus?

- + Sinus venosus is a large, thin walled, triangular chamber, which is present on the dorsal side of the heart of frog.

21. What is truncus arteriosus?

- + Truncus arteriosus is a thick walled and cylindrical structure which is obliquely placed on the ventral surface of the heart of frog.

22. Write any two economic importance of frog.

- + It helps to maintain our ecosystem.
- + Frogs are used in traditional medicine for controlling blood pressure and for its anti aging properties.



5

DIGESTION AND ABSORPTION

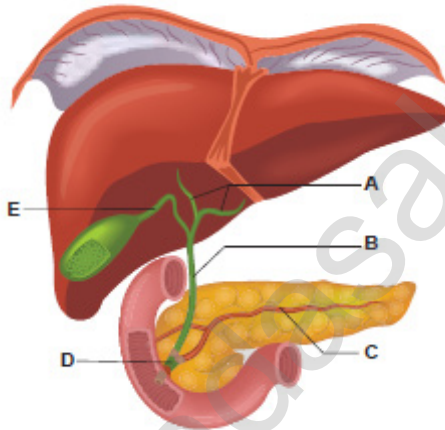
EVALUATION

2 & 3 Marks

- Why are villi present in the intestine and not in the stomach?**
 - + Because, they increase the intestinal absorptive surface area in the intestine. The villi are the units of absorption.
- Bile juice contains no digestive enzymes, yet it is important for digestion. Why?**
 - + Bile juice emulsifies fat into fat globules.
 - + Bile salts reduce the surface tension of fat droplets and break them into small globules.
 - + It activates lipases to digest lipids.
- List the chemical changes that starch molecule undergoes from the time it reaches the small intestine.**
 - + Starch molecule undergoes maltose into glucose in the small intestine.
 - + When the food reaches the first part of the small intestine, pancreatic juice (enzymes) act on it.
 - + Pancreatic amylase converts glycogen and starch into maltose.
- How do proteins differ from fats in their energy value and their role in the body?**
 - + Proteins differ from fats in their energy value is 5.65 Kcal; fats contain 9.45 Kcal.
 - + Proteins are the source of amino acids required for growth and repair of body cells.
- Digestive secretions are secreted only when needed. Discuss.**
 - + Digestive secretions are secreted only when needed. Because, they are continuous process.

6. Label the given diagram.

- A – Right and Left hepatic duct of liver
- B – Common bile duct
- C – Pancreatic duct
- D – Hepato - pancreatic duct
- E – Cystic duct



ADDITIONAL

2 & 3 Marks

1. Write the various process of digestion.

+ Ingestion, Digestion, Absorption, Assimilation, Egestion.

2. What are the parts in the alimentary canal?

+ The alimentary canal consists of mouth, buccal cavity, pharynx, oesophagus, stomach, intestine, rectum and anus.

3. What is thecodont?

+ Each tooth is embedded in a socket in the jaw bone; this type of attachment is called thecodont.

4. What is meant by diphypodont?

+ Human beings and many mammals form two sets of teeth

during their life time, a set of 20 temporary milk teeth (deciduous teeth) which gets replaced by a set of 32 permanent teeth (adult teeth). This type of dentition is called diphyodont.

5. Define heterodont.

- + The permanent teeth are of four different types namely, Incisors (I), Canines (C), Pre-molars (PM), and Molars (M).
- + Such different types of teeth are called heterodont.

6. What is dental formula? Write the dental formula for human.

- + Arrangement of teeth in each half of the upper and lower jaw, in the order of I, C, PM and M can be represented by a dental formula.
- + In human the dental formula is $2123/2123$.

7. Define Plaque.

- + Mineral salts like calcium and magnesium are deposited on the teeth and form a hard layer of 'tartar' or calculus called plaque.

8. What is gingivitis?

- + If the plaque formed on teeth is not removed regularly, it would spread down the tooth into the narrow gap between the gums and enamel and causes inflammation, called gingivitis, which leads to redness and bleeding of the gums and to bad smell.

9. What is GERD?

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

10. What is the role of epiglottis?

- + A cartilaginous flap called epiglottis prevents the entry of food into the glottis (opening of trachea) during swallowing.

11. What is peyer's patches?

- + Along with villi, the ileal mucosa also contain mucus secreting goblet cells and lymphoid tissue known as Peyer's patches which produce lymphocytes.

12. What is meant by crypts of Leiberkuhn?

- + The wall of the small intestine bears crypts between the base of villi called crypts of Leiberkuhn

13. What are vermiform appendix?

- + The caecum is a small blind pouch like structure that opens into the colon and it possesses a narrow finger like tubular projection called vermiform appendix.

14. How does the piles or haemorrhoids are caused?

- + The anal mucosa is folded into several vertical folds and contains arteries and veins called anal columns. Anal column may get enlarged and causes piles or haemorrhoids.

15. Name the three pairs of salivary glands with ducts.

- + parotids gland - Stenson's duct
- + sub-maxillary/ sub-mandibular - Wharton's duct
- + sublingual - Bartholin's duct or duct of Rivinis

16. What is meant by glisson's capsule.

- + Each lobe of liver has many hepatic lobules (functional unit of liver) and is covered by a thin connective tissue sheath called the Glisson's capsule.

17. Define deglutition.

- + The bolus is then passed into the pharynx and then into the oesophagus by swallowing or deglutition.

18. Define peristalsis.

- + The bolus further passes down through the oesophagus to the stomach by successive waves of muscular contraction called peristalsis.

19. What is sphincter of oddi?

- + The opening of the hepato-pancreatic duct into the duodenum is guarded by a sphincter called the sphincter of Oddi

20. What is the role of rennin?

- + proteolytic enzyme found in gastric juice of infants is rennin helps in the digestion of milk protein, caseinogen to casein in the presence of calcium ions.

21. Define assimilation.

- + All the body tissues utilize the absorbed substance for their activities and incorporate into their protoplasm, this process is called assimilation.

22. What is roughage?

- + The digestive waste and unabsorbed substances in the ileum enter into the large intestine and it mostly contains fibre called roughage.

23. What is meant by defaecation?

- + The egestion of faeces through the anal opening is called defaecation.
- + It is a voluntary process and is carried out by a peristaltic movement.

24. Mention the symptoms of kwashiorkor.

- + Symptoms are dry skin, pot-belly, oedema in the legs and face, stunted growth, changes in hair colour, weakness and irritability.

25. What is marasmus? Mention its symptoms.

- + Marasmus is an acute form of protein malnutrition.
- + This condition is due to a diet with inadequate carbohydrate and protein.
- + Such children are suffer from diarrhoea, body becomes lean and weak (emaciated) with reduced fat and muscle tissue with thin and folded skin.

26. What is meant by indigestion?

- + It is a digestive disorder in which the food is not properly digested leading to a feeling of fullness of stomach. It may be due to inadequate enzyme secretion, anxiety, food poisoning, over eating, and spicy food.

27. What is meant by constipation?

- + In this condition, the faeces are retained within the rectum because of irregular bowel movement due to poor intake of fibre in the diet and lack of physical activities.

28. What are vomiting?

- + It is reverse peristalsis.
- + Harmful substances and contaminated food from stomach are ejected through the mouth.
- + This action is controlled by the vomit centre located in the medulla oblongata.
- + A feeling of nausea precedes vomiting.

29. What is jaundice?

- + It is the condition in which liver is affected and the defective liver fails to break down haemoglobin and to remove bile pigments from the blood.
- + Deposition of these pigments changes the colour of eye and skin yellow.
- + Sometimes, jaundice is caused due to hepatitis viral infections.

30. Define liver cirrhosis

- + Chronic disease of liver results in degeneration and destruction of liver cells resulting in abnormal blood vessel and bile duct leading to the formation of fibrosis.
- + It is also called deserted liver or scarred liver.
- + It is caused due to infection, consumption of poison, malnutrition and alcoholism.

31. How are gall stones are formed?

- + Any alteration in the composition of the bile can cause the formation of stones in the gall bladder.
- + The stones are mostly formed of crystallized cholesterol in the bile.
- + The gall stone causes obstruction in the cystic duct, hepatic duct and also hepato-pancreatic duct causing pain, jaundice and pancreatitis.

32. What is meant by appendicitis or peritonitis ?

- + It is the inflammation of the vermiform appendix, leading to severe abdominal pain.
- + The treatment involves the removal of appendix by surgery.
- + If treatment is delayed the appendix may rupture and results in infection of the abdomen, called peritonitis.

33. What is hiatus hernia?

- + It is a structural abnormality in which superior part of the stomach protrudes slightly above the diaphragm.

34. Write the reason for hitus hearnia.

- + In some people, injury or other damage may weaken muscle tissue, by applying too much pressure (repeatedly) on the muscles around the stomach while coughing, vomiting, and straining during bowel movement and lifting heavy object.

35. Write a note on peptic ulcer.

- + It refers to an eroded area of the tissue lining (mucosa) in the stomach or duodenum.
- + Ulcer is mostly due to infections caused by the bacterium *Helicobacter pylori*.
- + It may also be caused due to uncontrolled usage of aspirin or certain anti-inflammatory drugs.

36. What is meant by oral hydration therapy?

- + This involves drinking plenty of fluids – sipping small amounts of water at a time to rehydrate the body.

37. Mention the reason for obesity.

- + It is caused due to the storage of excess of body fat in adipose tissue.
- + It may induce hypertension, atherosclerotic heart disease and diabetes.
- + Obesity may be genetic or due to excess intake of food, endocrine and metabolic disorders.

38. How is BMI is calculated?

- + Degree of obesity is assessed by body mass index (BMI).
- + A normal BMI range for adult is 19-25; above 25 is considered as obese.
- + BMI is calculated as body weight in Kg, divided by the square of body height in meters.

39. How is BMI calculated for a 50 Kg person with a height of 160 cms?

- + $BMI = \text{Body weight in Kg} / \text{Square of body height in meters.}$
- + $BMI = 50 / (1.62)^2 = 19.5$



6

RESPIRATION

EVALUATION

2 & 3 Marks

1. Name the respiratory organs of flatworm, earthworm, fish, prawn, cockroach and cat.

Name of the animal	Respiratory organ
1) Flatworm	Body surface
2) Earthworm	Moist skin
3) Fish	Gills
4) Prawn	Gill chamber
5) Cockroach	Tracheal tubes
6) Cat	Vascularised lungs

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

+ Carbonic anhydrase.

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

+ External nostrils → Nasal cavity → Pharynx → Larynx → Trachea

4. Which structure seals the larynx when we swallow?

+ Epiglottis. It prevents the food from entering into the larynx and avoids choking of food.

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

+ The diameters of most airways are relatively large.

+ For smaller air ways there are many in parallel, making their combined diameter large.

+ Air has a low viscosity.

6. How the body makes long-term adjustments when living in high altitude.

- + When the person moves on a long-term basis to mountains from sea level, the body begins to make respiratory and haematopoietic adjustments.
- + To overcome this situation, kidneys accelerate the production of hormone erythropoietin, which stimulates the bone marrow to produce more RBCs.

7. Why is pneumonia considered a dangerous disease?

- + Pneumonia is compromised immune systems are likely to respond to treatment, less able to cope with the stress on the organs caused.
- + Bacterial pneumonia is serious as it causes severe symptoms. Viral pneumonia can be fatal since it triggers a severe inflammation of the lungs.

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

- + In the alveolar region only, oxygen and carbon dioxide gases exchange take place.
- + Because the alveoli are lined by thin, vascularized and permeable to respiratory gases.
- + The primary site for the exchange of gases is the alveoli.

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

- + Pulmonary respiration : Nostrils → Nasal cavities → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli → Capillaries → Pulmonary vein → Heart → Arteries → Capillaries → Body tissues.
- + Cellular respiration : Body tissues → Capillaries → veins → Heart → Pulmonary artery → Capillaries → Alveoli → Bronchioles → Bronchi → Trachea → Larynx → Pharynx → Nasal cavities → Nostrils.

10. Explain the conditions which creates problems in oxygen transport.

- + When a person travels quickly from sea level to elevations above 8000ft, where the atmospheric pressure and partial pressure of oxygen are lowered, the individual responds with symptoms of acute mountain sickness (AMS)–headache, shortness of breath, nausea and dizziness due to poor binding of O₂ with haemoglobin.

ADDITIONAL

2 & 3 Marks

1. Define respiration.

- + The term respiration refers to the exchange of oxygen and carbondioxide between environment and cells of our body where organic nutrients are broken down enzymatically to release energy.

2. What are the parts include in the human respiratory system?

- + The respiratory system includes the external nostrils, nasal cavity, the pharynx, the larynx, the trachea, the bronchi and bronchioles and the lungs which contain the alveoli.

3. What are conducting zone and respiratory zone?

- + The parts starting from the external nostrils up to the terminal bronchioles constitute the conducting zone.
- + The alveoli and the ducts are called the respiratory zone.

4. What is surfactant?

- + Surfactant is a substance synthesize and secrete by thicker type II cells of alveoli.

5. Write the characteristic features of respiratory surface.

- + surface area must be very large and richly supplied with blood vessels
- + should be extremely thin and kept moist
- + should be in direct contact with the environment
- + should be permeable to respiratory gases

6. What is meant by ventilation?

- + The movement of air between the atmosphere and the lungs is known as ventilation or breathing.

7. Name the two phases of breathing.

- + Inspiration and expiration are the two phases of breathing.

8. What is inspiration?

- + Inspiration is the movement of atmospheric air into the lungs

9. What is expiration?

- + Expiration is the movement of alveolar air that diffuse out of the lungs.

10. What is meant by spirometer?

- + An instrument called Spirometer is used to measure the volume of air involved in breathing movements for clinical assessment of a person's pulmonary function.

11. What is tidal volume?

- + Tidal volume is the amount of air inspired or expired with each normal breath.
- + It is approximately 500 mL.,

12. What is inspiratory reserve volume (IRV)?

- + Additional volume of air a person can inspire by forceful inspiration is called
- + Inspiratory Reserve Volume.
- + The normal value is 2500–3000 mL.

13. What is meant by expiratory reserve volume (ERV)?

- + Additional volume of air a person can forcefully exhale by forceful expiration is called Expiratory Reserve Volume.
- + The normal value is 1000–1100 mL.

14. What is residual volume (RV)?

- + The volume of air remaining in the lungs after a forceful expiration. It is approximately 1100–1200 mL.

15. Define vital capacity (VC).

- + The maximum volume of air that can be moved out during a single breath following a maximal inspiration.
- + $VC=ERV+TV+IRV$

16. Differentiate between inspiratory capacity (IC) and expiratory capacity (EC).

Inspiratory capacity (IC)	Expiratory capacity (EC).
The total volume of air a person can inhale after normal expiration.	The total volume of air a person can exhale after normal inspiration.
It includes tidal volume and inspiratory reserve volume.	It includes tidal volume and expiratory reserve volume.
$IC=TV+IRV$	$EC=TV+ERV$

17. What is meant by total lung capacity (TLC)?

- + The total volume of air which the lungs can accommodate after forced inspiration
- + is called Total Lung Capacity.
- + This includes the vital capacity and the residual volume.
- + It is approximately 6000mL.
- + $TLC=VC+RV$

18. What is minute respiratory volume?

- + The amount of air that moves into the respiratory passage per minute is called minute respiratory volume.
- + Minute respiratory volume = 6 Litres/minute (for a normal healthy man).

19. Define dead space.

- + Some of the inspired air never reaches the gas exchange areas but fills the respiratory
- + passages where exchange of gases does not occur.
- + This air is called dead space.

20. Write a note on methaemoglobin.

- + If the iron component of the haemmoieties is in the ferric state, than the normal ferrous state, it is called methaemoglobin.
- + Methaemoglobin does not bind O₂.

21. What is oxygen haemoglobin dissociation curve?

- + A sigmoid curve (S-shaped) is obtained when percentage saturation of haemoglobin with oxygen is plotted against pO₂. This curve is called oxygen haemoglobin dissociation curve

22. What is nitrogen narcosis?

- + The increase in blood nitrogen content can lead to a condition called nitrogen narcosis.

23. What is Asthma?

- + Asthma is characterized by narrowing and inflammation of bronchi and bronchioles and difficulty in breathing.

24. Name some of the common allergens.

- + Common allergens for asthma are dust, drugs, pollen grains, certain food items
- + like fish, prawn and certain fruits etc.

25. What is emphysema?

- + Emphysema is chronic breathlessness caused by gradual breakdown of the thin walls of the alveoli decreasing the total surface area of a gaseous exchange.
- + (or) widening of the alveoli is called emphysema.

26. What is bronchitis? Mention its symptoms,

- + The bronchi when it gets inflated due to pollution smoke and cigarette smoking, causes bronchitis.
- + The symptoms are cough, shortness of breath and sputum in the lungs.

27. What is pneumonia? Write its symptoms.

- + Inflammation of the lungs due to infection caused by bacteria

7 BODY FLUIDS AND CIRCULATION

EVALUATION

2 & 3 Marks

- 1. Right ventricular wall is thinner than the left ventricular wall. Why?**
 - + Because the right ventricle pumps deoxygenated blood into the pulmonary artery which carries blood to the lungs only; the left ventricle pumps blood into the aorta which distributes oxygenated blood to all parts of the body.
- 2. What might be the effect on a person whose diet has less iron content?**
 - + Decreasing RBCs, poor oxygen supply, leads to less iron content.
 - + A person whose diet is deficient in iron will not have sufficient haemoglobin production in his body.
 - + An person feels tired and giddy since oxygen supply in the body will be less because of the reduced number of RBCs in the blood.
- 3. What is lymph? Write its function.**
 - + The colourless fluid inside the lymphatics is called lymph.
 - + It prevents the invading microorganisms from reaching the blood stream.
- 4. What are the heart sounds? When and how are these sounds produced?**
 - + Rhythmic contraction and expansion of heart is called heart-beat.
 - + The contraction of the heart is called systole and the relaxation of the heart is called diastole.
 - + The first heart sound (lub) is associated with the closure of

kindly send me your key Answers to our email id - padasalai.net@gmail.com

the tricuspid and bicuspid valves whereas second heart sound (dub) is associated with the closure of the semilunar valves.

+ These sounds are of clinical diagnostic significance.

5. Distinguish between arteries and veins

Arteries	Veins
Carry blood away from the heart to the tissues of the body	Carry blood from the tissues of the body back to the heart
They are usually positioned deeper within the body	They are usually positioned closer beneath the surface of the skin
Narrow lumen	Wider lumen
They would generally remain open if blood flow stopped, due to their thick muscular layer.	They would collapse if blood flow stops.

6. Distinguish between open and closed circulation

OPEN CIRCULATION	CLOSED CIRCULATION
Blood is pumped by a heart into the body cavities, where tissues are surrounded by the blood	Blood is pumped by a heart through vessels, and does not normally fill body cavities.
Example: Molluscs, Arthropods.	Example: Vertebrates, few invertebrates.

7. Distinguish between mitral valve and semi lunar valve

Mitral valve	Semi lunar valve
It is located between left auricle and left ventricle.	It is located at the base aorta and pulmonary artery.
It carries oxygenated blood	It carries deoxygenated blood

ADDITIONAL**2 & 3 Marks**

1. **Mention the three types of extracellular fluids.**
 - + Interstitial fluid, plasma and lymph
1. **What is meant by haematocrit?**
 - + The ratio of red blood cells to blood plasma is expressed as haematocrit.
2. **What is serum?**
 - + Plasma without fibrinogen is called serum
3. **Write a note on lymph fluid.**
 - + The lymph fluid flowing out of the lymph nodes flow into large collecting duct which finally drains into larger veins that runs beneath the collar bone, the subclavian vein and is emptied into the blood stream.
4. **What are called as sinusoids?**
 - + The narrow passages in the lymph nodes are the sinusoids that are lined with macrophages.
5. **Name the various types of the blood vessels.**
 - + The vessels carrying the blood are of three types; they are the arteries, veins and capillaries.
6. **Mention the three layers of blood vessel.**
 - + Tunica intima, tunica media and tunica externa.
7. **Write the three layers of heart wall made up of.**
 - + Outer epicardium, middle myocardium and inner endocardium.
8. **What are semilunar valves?**
 - + The opening of right and left ventricles into the pulmonary artery and aorta are guarded by aortic and pulmonary valves and are called semilunar valves.
9. **Define trabeculae corneae.**
 - + The myocardium of the ventricle is thrown into irregular muscular ridges called trabeculae corneae.
10. **Write the role of chordae tendinae.**
 - + The trabeculae corneae are modified into chordae tendinae.
 - + The opening and closing of the semilunar valves are achieved

11. What is heart beat?

- + Rhythmic contraction and expansion of heart is called heart beat.

12. What is meant by systole and diastole?

- + The contraction of the heart is called systole and the relaxation of the heart is called diastole.

13. Define cardiac cycle.

- + The events that occur at the beginning of heart beat and lasts until the beginning of next beat is called cardiac cycle. It lasts for 0.8 seconds.

14. What is meant by cardiac output?

- + The amount of blood pumped out by each ventricle per minute is called cardiac output (CO).
- + It is a product of heart rate (HR) and stroke volume (SV).

15. Define blood pressure.

- + Blood pressure is the pressure exerted on the surface of blood vessels by the blood.
- + This pressure circulates the blood through arteries, veins and capillaries.

16. What is meant by baroreceptor reflex?

- + The primary reflex pathway for homeostatic control of mean arterial pressure is the baroreceptor reflex.
- + The baroreceptor reflex functions every morning when you get out of bed.

17. What is meant by orthostatic hypotension?

- + The decrease in blood pressure upon standing is known as orthostatic hypotension.

18. Give an account on systemic circulation.

- + In systemic circulation, the oxygenated blood entering the aorta from the left ventricle is carried by a network of arteries, arterioles and capillaries to the tissues.
- + The deoxygenated blood from the tissues collected by venules, veins and vena cava and emptied into the right atrium.

19. What is meant by embolus?

- + Embolism is the obstruction of the blood vessel by abnormal mass of materials such as fragment of the blood clot, bone fragment or an air bubble.
- + Embolus may lodge in the lungs, coronary artery or liver and leads to death.

20. What is Aneurysm?

- + The weakened regions of the wall of the artery or veins bulges to form a balloon like sac.
- + Unruptured aneurysm may exert pressure on the adjacent tissues or may burst causing massive haemorrhage.

21. What is meant by hypertension?

- + Hypertension is the most common circulatory disease.
- + The normal blood pressure in man is 120/80 mmHg.
- + In cases when the diastolic pressure exceeds 90 mm Hg and the systolic pressure exceeds 150 mm Hg persistently, the condition is called hypertension.

22. What is atherosclerosis?

- + Coronary heart disease occurs when the arteries are lined by atheroma.
- + The build-up of atheroma contains cholesterol, fibres, dead muscle and platelets and is termed Atherosclerosis.

23. Define stroke.

- + Stroke is a condition when the blood vessels in the brain bursts.
- + Also called as brain haemorrhage.

24. What is meant by angina pectoris?

- + Angina pectoris (ischemic pain in the heart muscles) is experienced during early stages of coronary heart disease.
- + Atheroma may partially block the coronary artery and reduce the blood supply to the heart.
- + As a result, there is tightness or choking with difficulty in breathing.
- + This leads to angina or chest pain.



8

EXCRETION

EVALUATION

2 & 3 Marks

- 1. Arrange the following structures in the order that a drop of water entering the nephron would encounter them.**

 - + Afferent arteriole → Glomerulus → Bowman's capsule → Proximal tubule → Loop of Henle → Distal tubule → Collecting duct → Renal pelvis
- 2. Name the three filtration barriers that solutes must come across as they move from plasma to the lumen of Bowman's capsule. What components of the blood are usually excluded by these layers?**

 - + Glomerular capillary endothelium, Basal lamina, and Epithelium of Bowman's capsule
- 3. What forces promote glomerular filtration? What forces opposes them? What is meant by net filtration pressure?**

 - + Forces promote glomerular filtration - Glomerular Hydrostatic Pressure promotes glomerular filtration.
 - + Forces opposes them - Colloid Osmotic Pressure within glomerular capillary and Hydrostatic pressure within Bowman's capsule.
 - + Net filtration pressure - Net filtration pressure = Glomerular hydrostatic pressure - (Colloidal osmotic pressure + Capsular hydrostatic pressure).

Net filtration pressure = 55mmHg - (30mmHg+15mmHg) = 10mmHg.
- 4. In which segment of the nephron most of the re-absorption of substances takes place?**

 - + In proximal convoluted tubule of the nephron.

5. **When a molecule or ion is reabsorbed from the lumen of the nephron, where does it go? If a solute is filtered and not reabsorbed from the tubule, where does it go?**
 - + It is reabsorbed into the efferent arteriole which leaves the nephron and enters the peritubular capillaries.
 - + It will finally reach the distal convoluted tubule of the nephron and enter the collecting duct to be sent out as waste in the form of urine.
6. **Which segment is the site of secretion and regulated reabsorption of ions and pH homeostasis?**
 - + Distal convoluted tubule of the nephron.
7. **What solute is normally present in the body to estimate GFR in humans?**
 - + Creatinine.
8. **Which part of the autonomic nervous system is involved in micturition process?**
 - + Sympathetic and parasympathetic nervous system is involved in micturition process.
 - + Somatic motor neuron.
 - + Spinal reflex.
9. **If the afferent arteriole of the nephron constricts, what happens to the GFR in that nephron? If the efferent arteriole constricts what happens to the GFR in that nephron? Assume that no auto regulation takes place.**
 - + If the afferent arteriole of a nephron constricts, the Glomerular Filtration Rate (GFR) in that nephron decreases.
 - + If the efferent arteriole of a nephron constricts, the Glomerular Filtration Rate (GFR) in that nephron increases.
 - +
10. **With regards to toxicity and the need for dilution in water, how different are ureotelic and uricotelic excretions? Give examples of animals that use these types of excretion?**

kindly send me your key Answers to our email id - padasalai.net@gmail.com

Ureotelic excretion	Uricotelic excretion
The process of excretion of urea.	The process of excretion of uric acid.
In terms of toxicity, urea is more toxic than uric acid but it is soluble in water and is thus excreted as urine.	In terms of toxicity, uric acid is the least toxic nitrogenous waste. It is insoluble in water.
Example - Mammals, many terrestrial amphibians and marine fishes.	Example - Many desert animals, reptiles, birds, insects.

11. Differentiate protonephridia from metanephridia.

Protonephridia	Metanephridia
It consists tubular excretory structures with specialized cells in the form of flame cells.	It consists excretory glands with a ciliated funnel like opening into the body cavity and connected to a duct which opens outside the body.
Helps in osmoregulation.	Helps in excretion and osmoregulation.
It is primitive in nature.	It is advanced than protonephridia.
Example : Flat worms.	Example : Annelids, Arthropods.

12. What is the nitrogenous waste produced by amphibian larvae and by the adult animal?

- + Amphibian larvae are aquatic, they excrete ammonia.
- + Amphibian adult excretes urea.

13. How is urea formed in the human body?

- + The nitrogen in the amino acid becomes converted to ammonia, and this is further converted by the liver into urea, by means of ornithine cycle which is less toxic than

ammonia to the body.

14. Differentiate cortical from medullary nephrons

Cortical Nephrons	Medullary Nephrons
In majority of nephrons, the loop of Henle is too short and extends only very little into the medulla and are called cortical nephrons.	Some nephrons have very long loop of Henle that run deep into the medulla and are called juxta medullary nephrons (JMN)

15. What vessels carry blood to the kidneys? Is this blood arterial or venous?

- + Renal arterial vessel branches out from the dorsal aorta and supplies oxygenated blood to the kidney.
- + This is arterial blood.

16. Which vessels drain filtered blood from the kidneys?

- + The renal veins are that drain the kidney.
- + They connect the kidney to the inferior vena cava.
- + They carry the blood filtered by the kidney.

17. What is tubular secretion? Name the substances secreted through the renal tubules

- + Tubular secretion is the passage of waste material from the blood to the filtrate in the nephron.
- + Substances secreted through the renal tubules: - H^+ , K^+ , NH_4^+ , uric acid, bicarbonate, creatinine and organic acids.

18. Name the three main hormones are involved in the regulation of the renal function?

- + Anti-Diuretic Hormone
- + Aldosterone
- + Atrial Natriuretic Hormone

19. What is the effect of aldosterone on kidneys and where is it produced?

- + That causes reabsorption of Na^+ , K^+ excretion and absorption

of water from the distal convoluted tubule and collecting duct. This increases the glomerular blood pressure and glomerular filtration rate.

- + aldosterone is secreted by adrenal cortex

20. Explain the heart's role in secreting a hormone that regulates renal function? What hormone is this?

- + Atrial natriuretic peptide is a polypeptide hormone released by atrial myocytes (muscle cells) from the granules of the atria of the heart in response to high blood pressure, hypervolemia and exercise.
- + It is involved in the homeostatic control of body water and sodium.

ADDITIONAL

2 & 3 Marks

1. What is osmoconformers?

- + Osmoconformers are able to change their internal osmotic concentration with change in external environment.
- + Example - marine molluscs and sharks.

2. What is Osmoregulators?

- + Osmoregulators maintain their internal osmotic concentration irrespective of their external osmotic environment.
- + Example - Otters

3. Define stenohaline animals.

- + The stenohaline animals can tolerate only narrow fluctuations in the salt concentration
- + Example - Gold fish

4. Define euryhaline animals.

- + The euryhaline animals are able to tolerate wide fluctuations in the salt concentrations
- + Example - Artemia, Tilapia and salmons.

5. What is ammonoteles?

- + Animals that excrete most of its nitrogen in the form of ammonia are called ammonoteles.
- + Example - fishes, aquatic amphibians and aquatic insects.

6. What is uricoteles?

- + Animals which excrete uric acid crystals, with a minimum loss of water and are called uricoteles.
- + Example - Reptiles, birds, land snails and insects.

7. What is ureoteles?

- + Animals which excrete urea are called ureoteles.
- + Example - Mammals and terrestrial amphibians mainly

8. What are calyces?

- + Inner to the hilum of kidney is a broad funnel shaped space called the renal pelvis with projection called calyces.

9. What are filtration slits?

- + The podocytes end in foot processes which cling to the basement membrane of the glomerulus.
- + The openings between the foot processes are called filtration slits.

10. What are podocytes?

- + The external parietal layer of the Bowman's capsule is made up of simple squamous epithelium and the visceral layer is made of epithelial cells called podocytes.

11. What is cortical nephron?

- + In majority of nephrons, the loop of Henle is too short and extends only very little into the medulla and are called cortical nephrons.

12. What is juxta medullary nephrons?

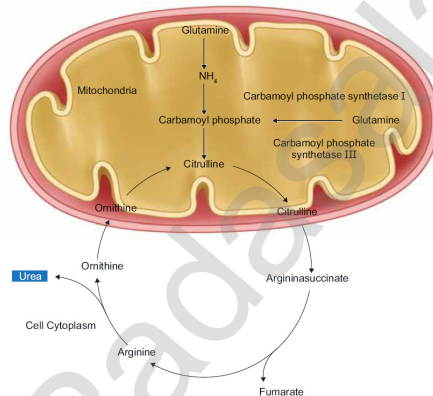
- + Some nephrons have very long loop of Henle that run deep into the medulla and are called juxta medullary nephrons.

13. What are vasa recta?

- + The efferent arteriole serving the juxta medullary nephron forms bundles of long straight vessel called vasa recta and runs parallel to the loop of Henle.

14. Define Ornithine cycle or urea cycle.

- + The nitrogenous waste formed as a result of breakdown of amino acids is converted to urea in the liver by the Ornithine cycle or urea cycle.

15. Draw the flow chart of ornithine cycle.**16. What is counter current multiplier?**

- + Interaction between flow of filtrate through the limbs of Henle's and JMN is called counter current multiplier.

17. What is counter current exchanger?

- + The flow of blood through the ascending and descending vasa recta blood vessels.

18. What is aquaporins?

- + Aquaporins are water-permeable channels that allow water to move across the epithelial cells in relation to the osmotic difference from the lumen to the interstitial fluid.

19. What is Micturition?

- + The process of release of urine from the bladder is called micturition or urination.

20. What is diabetes insipidus?

- + Defects in ADH receptors or inability to secrete ADH leads to a condition called diabetes insipidus, characterized by excessive thirst and excretion of large quantities of dilute urine resulting in dehydration and fall in blood pressure.

21. What is renal failure? Mention its types.

- + Failure of the kidneys to excrete wastes may lead to accumulation of urea with marked reduction in the urine output.
- + Types, Acute and chronic renal failure.

22. What is Uremia?

- + Uremia is characterized by increase in urea and other non-protein nitrogenous substances like uric acid and creatinine in blood.

23. What is meant by Renal calculi?

- + Renal calculi, also called renal stone or nephrolithiasis, is the formation of hard stone like masses in the renal tubules of renal pelvis.
- + It is mainly due to the accumulation of soluble crystals of salts of sodium oxalates and certain phosphates.

24. What is meant by glomerulonephritis?

- + It is also called Bright's disease and is characterized by inflammation of the glomeruli of both kidneys and is usually due to post-streptococcal infection that occurs in children.
- + Symptoms are haematuria, proteinuria, salt and water retention, oligouria, hypertension and pulmonary oedema.

25. What is Haemodialysis?

- + Malfunctioning of the kidneys can lead to accumulation of urea and other toxic substances, leading to kidney failure.

- + In such patient's toxic urea can be removed from the blood by a process called haemodialysis.

26. What is meant by kidney transplantation?

- + Kidney Transplantation is the ultimate method for correction of a acute renal failures.
- + This involves transfer of healthy kidney from one person (donor) to another person with kidney failure.

◆◆

9

LOCOMOTION
AND MOVEMENT

EVALUATION

2 & 3 Marks

1. **Name the different types of movement.**
 - + Amoeboid movement
 - + Ciliary movement
 - + Flagellar movement
 - + Muscular movement.
2. **Name the filaments present in the sarcomere**
 - + Thick filaments and Thin filaments
3. **Name the contractile proteins present in the skeletal muscle**
 - + Actin, Myosin, Tropomyosin and Troponin.
4. **When describing a skeletal muscle, what does “striated” mean?**
 - + Striated means striped.
 - + Along the length of each myofibril there are a repeated series of dark and light bands.
 - + The dark A-bands (Anisotropic bands) and the light I-bands (Isotropic bands) are perfectly aligned with one another.
 - + This type of arrangement gives the cell a striated appearance. Hence it is called striated.
5. **How does an isotonic contraction take place?**
 - + In isotonic contraction, the length of the muscle changes but the tension remains constant.
 - + The force produced is unchanged.
 - + Example - lifting dumbbells and weightlifting.
6. **How does an isometric contraction take place?**
 - + In isometric contraction the length of the muscle does not

- + The force produced is changed.
- + Example - pushing against a wall, holding a heavy bag.

7. Name the bones of the skull.

- + They are a paired parietal, paired temporal and individual bones such as the frontal, sphenoid, occipital and ethmoid.

8. Which is the only jointless bone in human body?

- + Hyoid bone is the only jointless bone in human body.
- + A single U-shaped hyoid bone is present at the base of the buccal cavity.

9. List the three main parts of the axial skeleton

- + It consists of the skull, vertebral column, Sternum and Ribs.

10. How is tetany caused?

- + Tetany is caused due to deficiency of parathyroid hormone resulting in reduced calcium levels in the body.

11. How is rigor mortis happened?

- + Several hours after death all the muscles of the body attain a state of contracture called Rigor mortis.
- + This is due to complete depletion of ATP in muscle fibres.

12. What are the different types of rib bones that form the rib cage?

- + There are 12 pairs of ribs.
- + The first seven pairs of ribs are called 'true ribs' or vertebro-sternal ribs.
- + The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but joined with the cartilaginous part of the seventh rib are called 'false ribs' or vertebro-chondral ribs.
- + The last 11th and 12th pairs of ribs are not connected ventrally are called as 'floating ribs' or vertebral ribs.

13. What are the bones that make the pelvic girdle?

- + It is composed of two hip bones called coxal bones that secure the lower limbs to the axial skeleton.

- + Together with the sacrum and coccyx, the hip bones form the basin-like bony pelvis.

14. List the disorders of the muscular system.

- + Myasthenia gravis, Tetany, Atrophy, Muscle fatigue, Muscle pull and Muscular dystrophy.

ADDITIONAL

2 & 3 Marks

1. What is locomotion?

- + Movement of organism from one place to another in search of food, shelter, mate and to escape from predators is called locomotion.

2. How are muscles classified?

- + The muscles are classified into three types, namely skeletal, visceral and cardiac muscles.

3. Define tendon.

- + Skeletal muscle is attached to the bone by a bundle of collagen fibres known as tendon.

4. What is glycosomes?

- + Glycosomes are the granules of stored glycogen that provide glucose during the period of muscle fibre activity.

5. What is meromyosin?

- + Each myosin molecule is made up of a monomer called meromyosin.
- + The meromyosin has two regions, a globular head with a short arm and a tail.

6. What is myology?

- + The study of muscle is called myology.

7. What is myoglobin?

- + Myoglobin is a red- coloured respiratory pigment of the muscle fibre.

- + It is similar to haemoglobin and contains iron group that has affinity towards oxygen and serves as the reservoir of oxygen.

8. What is sarcomere?

- + The myofibrils contain the contractile element, the sarcomere which is the functional unit of the skeletal muscle. A Sarcomere is the region of a myofibril between two successive Z-discs. It contains an A-band with a half I-band at each end.

9. What is neuromuscular junction?

- + The junction between the motor neuron and the sarcolemma of the muscle fibre is called the neuromuscular junction or motor end plate.

10. List out two primary types of muscle contraction.

- + There are two primary types of muscle contractions.
- + They are isotonic contraction and isometric contraction.

11. What is oxidative fibres or red muscle fibres?

- + Fibres that contain numerous mitochondria and have a high capacity for oxidative phosphorylation are classified as oxidative fibres.
- + Such fibres depend on blood flow to deliver oxygen and nutrients to the muscles.

12. What is glycolytic fibres or white muscle fibres?

- + Fibres that contain few mitochondria but possess a high concentration of glycolytic enzymes and large stores of glycogen are called glycolytic fibres.

13. What is Hydrostatic skeleton?

- + Hydrostatic skeleton, which is found in soft-bodied invertebrates. It is a fluid filled-cavity encircled by muscles.
- + Example - Earth worm

14. What is Exoskeleton?

- + Exoskeleton, which is found in invertebrates. It is a rigid hard case present outside the body of animals

15. What is Endoskeleton?

- + Endoskeleton, which is found inside the body of vertebrates. It is composed of bones and cartilages, surrounded by muscles.
- + Example - Human being

16. What is brain box?

- + The cranial bones form the hard-protective outer covering of the brain and called the brain box.

17. List out the five major regions of vertebral column.

- + Cervical, Thoracic, Lumbar, Sacrum and Coccyx.

18. Name the three ear ossicles.

- + Malleus, Incus and Stapes

19. What is Foramen magnum?

- + Foramen magnum is a large opening found at the posterior base of the skull.

20. What is Sternum?

- + Sternum is a flat bone on the mid ventral line of the thorax.
- + It provides space for the attachment of the thoracic ribs and abdominal muscles.

21. What are false ribs?

- + The 8th, 9th and 10th pairs of ribs do not articulate directly with the sternum but joined with the cartilaginous part of the seventh rib.
- + These are called 'false ribs' or vertebro-chondral ribs.

22. What are floating ribs?

- + The last 11th and 12th pairs of ribs are not connected ventrally.
- + Therefore, they are called as 'floating ribs' or vertebral ribs.

23. What is acromion?

- + The scapula is a large, thin, triangular bone situated in the dorsal surface of the ribcage between the second and seventh ribs. It has a slightly elevated ridge called the spine which

24. What is olecranon process?

- + Olecranon process is situated at the upper end of the ulna which forms the pointed portion of the elbow.

25. What is carpal tunnel?

- + The anterior surface of the wrist has tunnel-like appearance, due to the arrangement of carpals with the ligaments. This tunnel is termed as carpal tunnel.

26. What is metaphysis?

- + The region where the diaphysis and epiphyses meet is called the metaphysis.

27. What is tetany?

- + Rapid muscle spasms occur in the muscles due to deficiency of parathyroid hormone resulting in reduced calcium levels in the body.

28. What is Muscle fatigue?

- + Muscle fatigue is the inability of a muscle to contract after repeated muscle contractions. This is due to lack of ATP and accumulation of lactic acid by anaerobic breakdown of glucose

29. What is Myasthenia gravis?

- + An autoimmune disorder affecting the action of acetylcholine at neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscles.

30. What is Atrophy?

- + A decline or cessation of muscular activity results in the condition called atrophy which results in the reduction in the size of the muscle and makes the muscle to become weak, which occurs with lack of usage as in chronic bedridden patients.

31. What is Muscle pull?

- + Muscle pull is actually a muscle tear. A traumatic pulling of the fibres produces a tear known as sprain.

32. What is Muscular dystrophy?

- + The group of diseases collectively called the muscular dystrophy are associated with the progressive degeneration of skeletal muscle fibres, weakening the muscles and leading to death from lung or heart failure.

33. What is Arthritis?

- + Arthritis is an inflammatory (or) degenerative disease that damages the joints. There are several types of arthritis.

34. What is osteoarthritis?

- + The bone ends of the knees and other freely movable joints wear away as a person age. The joints of knees, hip, fingers and vertebral column are affected.

35. What is rheumatoid arthritis?

- + The synovial membranes become inflamed and there is an accumulation of fluid in the joints. The joints swell and become extremely painful. It can begin at any age but symptoms usually emerge before the age of fifty.

36. What is Gouty arthritis or gout?

- + Inflammation of joints due to accumulation of uric acid crystals or Inability to excrete it. It gets deposited in synovial joints.



10

NEURAL CONTROL AND COORDINATION

EVALUATION

2 & 3 Marks

- Why is the blind spot called so?**

 - + The optic nerves and the retinal blood vessels enter the eye slightly below the posterior pole, which is devoid of photo receptors; hence this region is called blind spot.
- Sam's optometrist tells him that his intraocular pressure is high. What is this condition called and which fluid does it involve?**

 - + This condition is called as 'Glaucoma'.
 - + Aqueous humour fluid involves to this condition.
- The action potential occurs in response to a threshold stimulus; but not at sub threshold stimuli. What is the name of the principle involved?**

 - + All - or - none principle is involved.
- Pleasant smell of food urged Ravi to rush into the kitchen. Name the parts of the brain involved in the identification of food and emotional responses to odour.**

 - + The hypothalamus contains a pair of small rounded mammillary bodies that are involved in olfactory reflexes and emotional responses to odour.
- Cornea transplant in humans is almost never rejected. State the reason.**

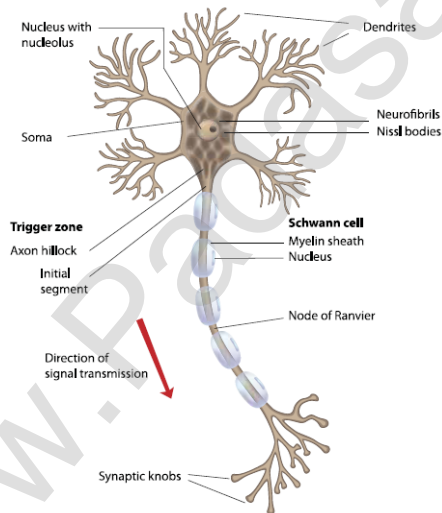
 - + Reasons : (1) It is a non-living layer (2) Its cells are least penetrable by bacteria (3) It has no blood supply (4) It is composed of enucleated cells.
- At the end of repolarization, the nerve membrane gets hyperpolarized. Why?**

 - + If repolarization becomes more negative than the resting potential -70 mV to about -90 mV, it is called Hyperpolarization.

7. Classify receptors based on type of stimuli.

Receptors	Stimulus	Effector organs
Mechano receptors	Pressure and vibration	Mechano receptors are present in the cochlea of the inner ear and the semi circular canal and utricle
Chemoreceptors	Chemicals	Taste buds in the tongue and nasal epithelium
Thermoreceptors Photoreceptors	Temperature Light	Skin Rod and cone cells of the retina in the eye

8. Label the parts of the neuron.



- + A. Nucleus B. Axoplasm
- + C. Dendrites D. Myelin Sheath
- + E. Axon F. Node of Ranvier

9. The choroid plexus secretes cerebrospinal fluid. List the function of it.

- + CSF provides buoyancy to the CNS structures.

kindly send me your Key Answers to our email id - padasalai.net@gmail.com

- + It nourishes the brain cells by transporting constant supply of food and oxygen.
- + It carries harmful metabolic wastes from the brain to the blood; and maintains a constant pressure inside the cranial vessels.

10. What is the ANS controlling centre? Name the parts that are supplied by the ANS.

- + Hypothalamus is the controlling centre of ANS.
- + Smooth muscle, glands and cardiac muscles the parts that are supplied by the ANS.

11. Why the limbic system is called the emotional brain? Name the parts of it.

- + Hippocampus plays an essential role in the formation of new memories about past experiences. So, it is called the emotional brain. Limbic system includes amygdala, hippocampus, thalamus, hypothalamus, basal ganglia and cingulate gyrus.

ADDITIONAL 2 & 3 Marks

1. What are the two division of human neural system?

- + The central neural system (CNS)
- + The peripheral neural system (PNS).

2. What are neurons?

- + The structural and functional units of the neural system are neurons that transmit nerve impulses.

3. What is neuroglia?

- + The non-nervous special cells called neuroglia form the supporting cells of the nervous tissue.
- + The central neural system lacks connective tissue, so the interneuron space is filled by neuroglia.

4. What is axon hillock?

- + An axon is a long fibre that arises from a cone shaped area

5. What are nodes of ranvier?

- + Schwann cells are not continuous along the axon, so there are gaps in the myelin sheath between adjacent schwann cells.
- + These gaps are called nodes of ranvier.

6. Name the channels in the axolemma

- + Leakage Channels
- + Ligand-gated Channels
- + Voltage-gated Channels

7. What is depolarization?

- + The axolemma becomes positively charged inside and negatively charged outside.
- + This reversal of electrical charge is called depolarization.

8. What is threshold potential?

- + During depolarization, when enough Na^+ ions enter the cell, the action potential reaches a certain level, called threshold potential [-55mV].

9. What is threshold stimulus?

- + The particular stimulus which is able to bring the membrane potential to threshold is called threshold stimulus.

10. What is spike potential?

- + Due to the rapid influx of Na^+ ions, the membrane potential shoots rapidly up to +45mV which is called the spike potential.

11. What is resting potential?

- + The electrical potential difference across the plasma membrane of a resting neuron is called the resting potential during which the interior of the cell is negative due to greater efflux of K^+ outside the cell than Na^+ influx into the cell.

12. What is repolarisation?

- + The reversal of membrane potential inside the axolemma to negative occurs due to the efflux of K^+ ions is called repolarisation.

13. What is hyperpolarization?

- + If repolarization becomes more negative than the resting potential -70 mV to about -90 mV is called hyperpolarization.

14. What are lazy gates?

- + During hyperpolarization, K^+ ion gates are more permeable to K^+ even after reaching the threshold level as it closes slowly is called lazy gates.

15. What is saltatory conduction?

- + The impulse jumps node to node, rather than travelling the entire length of the nerve fibre is called Saltatory Conduction.

16. What is synapse?

- + The junction between two neurons is called a Synapse through which a nerve impulse is transmitted.

17. What is synaptic cleft?

- + A small gap between the pre and postsynaptic membranes is called synaptic cleft.

18. Name the membrane covers the brain.

- + Duramater, Archnoid mater, piamater

19. What is corpus callosum?

- + The cerebral hemispheres is connected by a tract of nerve fibers called corpus callosum.

20. What are the lobes found in cerebrum. Mention their functions.

Structure	Functions
Frontal	Behaviour, Intelligence, Memory, Movement
Parietal	Language, Reading, Sensation
Temporal	Speech, Hearing, Memory
Occipital	Visual processing

21. What is pineal body?

- + Just behind the choroid plexus, the epithalamus forms a short stalk which ends in a rounded body called pineal body which

secretes the hormone, melatonin which regulates sleep and wake cycle.

22. What is mammillary bodies?

- + The hypothalamus contains a pair of small rounded body called mammillary bodies that are involved in olfactory reflexes and emotional responses to odour.

23. What are the main components of Limbic system?

- + The main components of limbic system are olfactory bulbs, cingulate gyrus, mammillary body, amygdala, hippocampus and hypothalamus.

24. Why is limbic system called emotional brain?

- + Because it plays a primary role in the regulation of pleasure, pain, anger, fear, sexual feeling and affection.

25. What are cerebral peduncles?

- + The lower portion of the midbrain consists of a pair of longitudinal bands of nervous tissue called cerebral peduncles which relay impulses back and forth between cerebrum, cerebellum, pons and medulla.

26. What are corpora quadrigemina?

- + The dorsal portion of the midbrain consists of four rounded bodies called corpora quadrigemina which acts as a reflex centre for vision and hearing.

27. Define gyri and sulci.

- + The surface of the cerebrum shows many convolutions (folds) and grooves.
- + The folds are called gyri (singular gyrus); the shallow grooves between the gyri are called sulci (singular sulcus).

28. What is foramen of monro?

- + Each lateral ventricle communicates with the narrow III ventricle in the diencephalon through an opening called interventricular foramen (foramen of Monro).

29. What is aqueduct of sylvius?

- + The ventricle III is continuous with the ventricle IV in the hind brain through a canal called aqueduct of Sylvius (cerebral aqueduct).

30. What is Choroid plexus?

- + Choroid plexus is a network of blood capillaries found in the roof of the ventricles and forms cerebro spinal fluid (CSF) from the blood.

31. What are the functions of CSF?

- + CSF provides buoyancy to the CNS structures.
- + It acts as a shock absorber for the brain and spinal cord.
- + it nourishes the brain cells by transporting constant supply of food and oxygen.
- + It carries harmful metabolic wastes from the brain to the blood.
- + It maintains a constant pressure inside the cranial vessels.

32. What is cauda equina?

- + The thick bundle of elongated nerve roots within the lower vertebral canal is called the cauda equina (horse's tail) because of its appearance.

33. What is Reflex arc?

- + The nervous elements involved in carrying out the reflex action constitute a reflex arc or in other words the pathway followed by a nerve impulse to produce a reflex action is called a reflex arc.

34. What is Exteroceptors?

- + Exteroceptors are located at or near the surface of the body.
- + These are sensitive to external stimuli and receive sensory inputs for hearing, vision, touch, taste and smell.

35. What is Interoceptors?

- + Interoceptors are located in the visceral organs and blood

- + They are sensitive to internal stimuli.
- 36. What are the three layers of eye ball?**
 - + Fibrous sclera,
 - + Vascular choroid
 - + Sensory retina.
- 37. What is canal of schlemm?**
 - + At the junction of the sclera and the cornea, is a channel called 'canal of schlemm'.
 - + It drains out the excess of aqueous humor.
- 38. What is accommodation?**
 - + The ability of the eyes to focus objects at varying distances is called accommodation which is achieved by suspensory ligament, ciliary muscle and ciliary body.
- 39. What is macula lutea?**
 - + The yellow flat spot at the centre of the posterior region of the retina is called macula lutea.
 - + It is responsible for sharp detailed vision.
- 40. What is fovea centralis?**
 - + A small depression present in the centre of the yellow spot is called fovea centralis which contains only cones.
- 41. What is blind spot?**
 - + The optic nerves and the retinal blood vessels enter the eye slightly below the posterior pole, which is devoid of photo receptors; hence this region is called blind spot.
- 42. What is Myopia (near sightedness)?**
 - + The affected person can see the nearby objects but not the distant objects.
 - + This condition may result due to an elongated eyeball or thickened lens; so that the image of distant object is formed in front of the yellow spot.

- + This error can be corrected using concave lens that diverge the entering light rays and focuses it on the retina.

43. What is Hypermetropia (long sightedness)?

- + The affected person can see only the distant objects clearly but not the objects nearby.
- + This condition results due to a shortened eyeball and thin lens; so the image of closest object is converged behind the retina.
- + This defect can be overcome by using convex lens that converge the entering light rays on the retina.

44. What is Presbyopia?

- + Due to aging, the lens loses elasticity and the power of accommodation. Convex lenses are used to correct this defect.
- + Astigmatism is due to the rough (irregular) curvature of cornea or lens. Cylindrical glasses are used to correct this error

45. What are ceruminous glands?

- + There are very fine hairs and wax producing sebaceous glands called ceruminous glands in the external auditory meatus.

46. Name the three ossicles?

- + Malleus [hammer bone]
- + Incus [anvil bone]
- + Stapes [stirrup bone]

47. What are the three areas bony labyrinth?

- + Cochlea
- + Vestibule
- + Semicircular canals.

48. What is Reisner's membrane and Basilar membrane?

- + The chambers scala vestibuli and scala media are separated by a membrane called Reisner's membrane whereas the scala media and scala tympani are separated by a membrane called Basilar membrane.

49. What is stereocilia?

- + Protruding from the apical part of each hair cell is hair like structures known as stereocilia.

50. What is tectorial membrane?

- + During the conduction of sound wave, stereocilia makes a contact with the stiff gel membrane called tectorial membrane, a roof like structure overhanging the organ of corti throughout its length.

51. What are Proprioceptors?

- + Proprioceptors are also a kind of interoceptors.
- + They provide information about position and movements of the body.
- + These are located in the skeletal muscles, tendons, joints, ligaments and in connective tissue coverings of bones and muscles.

52. What is proprioception?

- + Balance is part of a sense called proprioception, which is the ability to sense the position, orientation and movement of the body.

53. What is Cataract?

- + Due to the changes in nature of protein, the lens becomes opaque. It can be corrected by surgical procedures.

54. What are the causes for conductive deafness?

- + The blockage of ear canal with earwax,
- + Rupture of eardrum
- + Middle ear infection with fluid accumulation
- + Restriction of ossicular movement.



CHEMICAL COORDINATION AND INTEGRATION

EVALUATION

2 & 3 Marks

1. Define Homeostasis.

- + Maintenance of constant internal environment of the body by the different coordinating system.

2. Write the role of oestrogen in ovulation.

- + It operates with L.H. to encourage the development of the small follicles in the ovaries.
- + It stops production of follicular stimulating hormone so that only one egg matures in a cycle.
- + It stimulates ovulation and the development of the corpus luteum.

3. Comment on Acini of thyroid gland.

- + In thyroid gland, the lobules consist of follicles called acini (acinus in singular).
- + Each acinus is lined with glandular, cuboidal or squamous epithelial cells.
- + The lumen of acinus is filled with colloid, a thick glycoprotein mixture consisting of thyroglobulin molecules.

4. Specify the symptoms of acromegaly

- + Over growth of hand bones, feet bones, jaw bones.
- + Malfunctioning of gonads
- + Enlargement of viscera, tongue, lungs, heart, liver, spleen and endocrine gland like thyroid, adrenal etc.

5. Write the symptoms of cretinism.

- + A cretin shows retarded skeletal growth.
- + Absence of sexual maturity.

kindly send me your key Answers to our email id - padasalai.net@gmail.com

- + Retarded mental ability.
- + Thick wrinkled skin.
- + Protruded enlarged tongue.
- + Bloated face.
- + Thick and short limbs.
- + Low BMR.
- + Slow pulse rate.
- + Subnormal body temperature.
- + Elevated blood cholesterol levels.

6. Differentiate hyperglycemia from hypoglycemia.

Hyperglycemia	Hypoglycemia
Caused due to decreased secretion of insulin hormone.	Caused due to increased secretion of insulin hormone.
Blood glucose level increases.	Blood glucose level lowers than normal fasting index.
Glucagon is hyperglycemic hormone.	Insulin is hypoglycemic hormone
Polyurea, polyphagia, polydipsia are the symptoms	Increased heartbeat, weakness, nervousness, headache, confusion, lack of co-ordination, slurred speech, serious brain defects like epilepsy and coma are the symptoms

7. Write the functions of CCK.

- + It acts on the gall bladder to release bile into duodenum and stimulates the secretion of pancreatic enzymes and its discharge.

8. Enumerate the role of kidney as an endocrine gland.

- + In kidneys, hormones such as renin, erythropoietin and calcitriol are secreted.

- + Renin is secreted by juxta glomerular cells (JGA), which increases blood pressure when angiotensin is formed in blood.
- + Erythropoietin is also secreted by the JGA cells of the kidney and stimulates erythropoiesis (formation of RBC) in bone marrow.
- + Calcitriol is secreted by proximal tubules of nephron.
- + It is an active form of vitamin D3 which promotes calcium and phosphorus absorption from intestine and accelerates bone formation.

9. Write the causes for diabetes mellitus and diabetes insipidus.

Causes for diabetes mellitus

- + It is caused due to reduced secretion of insulin. As the result, blood glucose level is elevated.
- + Type I diabetes caused by the lack of insulin secretion due to illness or viral infections.
- + Type II diabetes caused due to reduced sensitivity to insulin, often called as insulin resistance.

Causes for diabetes insipidus

- + Diabetes insipidus is caused due to hyposecretion of vasopressin (ADH) from neurohypophysis.

10. Name the layers of adrenal cortex and mention their secretions.

- + Zonaglomerulosa - an outer thin layer secretes mineralocorticoids.
- + Zonafasciculata - the middle widest layer secretes glucocorticoids such as cortisol, corticosterone and trace amounts of adrenal androgen and oestrogen.
- + Zonareticularis - an inner zone secretes the adrenal androgen, trace amount of oestrogen and glucocorticoids.

11. Pineal gland is an endocrine gland, write its role.

- + It maintains the normal sleep wake cycle.
- + It regulates the timing of sexual maturation of gonads.

- + It influences metabolism, pigmentation, menstrual cycle and defence mechanism of our body.

ADDITIONAL

2 & 3 Marks

1. Define hormone.

- + Hormones are chemical messengers released into the blood and circulated as chemical signals and acts specifically on certain organs or tissues called target organs or target tissues.

2. Define homeostasis.

- + Maintenance of constant internal environment of the body by the different coordinating system.

3. What are endocrine glands?

- + The endocrine glands, called ductless glands produce hormones and lack ducts; they release their hormone to the surrounding tissue fluid.

4. What are partial endocrine glands?

- + Organs such as pancreas, gastro intestinal tract epithelium, kidney, heart, gonads and placenta are also having endocrine tissues and are known as partial endocrine glands.

5. What are the two lobes in pituitary gland?

- + Anterior glandular adenohypophysis and posterior neural neurohypophysis.

6. What is infundibulum?

- + Pituitary gland is connected to the hypothalamic region of the brain by a stalk called infundibulum.

7. What is Rathke's pouch?

- + The anterior lobe originates from the embryonic invagination of pharyngeal epithelium called Rathke's pouch and the posterior lobe is originating from the base of the brain as an outgrowth of hypothalamus.

8. Name the three lobes in adenohipophysis of pituitary gland?

- + Pars intermedia
- + Pars distalis
- + Pars tuberalis.

9. Write the six hormones secreted by the anterior lobe of pituitary.

- + Growth hormone (GH)
- + Thyroid stimulating hormone (TSH)
- + Adrenocorticotrop hormone (ACTH)
- + Follicle stimulating hormone (FSH)
- + Luteinizing hormone (LH)
- + Luteotropic hormone (LTH)
- + Melanocyte stimulating hormone (MSH) (in lower animals only).

10. Name the two hormones secreted by the anterior lobe of pituitary.

- + Vasopressin and Oxytocin.

11. What are the functions of the Progesterone?

- + Progesterone prepares the uterus for implantation of the fertilized ovum.
- + It decreases the uterine contraction during pregnancy and stimulates the development of mammary glands and milk secretion.
- + It is responsible for premenstrual changes in the uterus and is essential for the formation of placenta.

12. What is MSH?

- + MSH = melanocyte stimulating hormone
- + In mammals, the role of pars intermedia is insignificant, but in other vertebrates it secretes melanocyte stimulating hormone (MSH).
- + MSH induces pigmentation in skin.

13. What is thyrocalcitonin?

The parafollicular cells or 'C' cells of thyroid gland secrete a

hormone called thyrocalcitonin.

14. What is Sporadic goitre?

- + Sporadic goitre is a genetic disease and is not caused by iodine or thyroxine deficiency.

15. What are the functions of thyrocalcitonin (TCT)?

- + TCT is a polypeptide hormone, which regulates the blood calcium and phosphate levels.
- + It reduces the blood calcium level and opposes the effects of parathyroid hormone.

16. Name the four hormones secreted by the thymus gland?

- + Thymulin, thymosin, thymopietin and thymic humoral factor (THF).

17. Laughing is good for health, why?

- + Laughing is good for health, because it reduces the stress hormone (adrenalin) secretion and makes us to relax.

18. Name the three hormones secreted by the islets of Langerhans?

- + The alpha cells secrete glucagon, the beta cells secrete insulin and delta cells secrete somatostatin.

19. What is Dwarfism? Mention its symptoms.

- + Dwarfism is due to hyposecretion of growth hormone (GH) in children, skeletal growth and sexual maturity is arrested.
- + They attain a maximum height of 4 feet only.

20. What is Gigantism? Mention its symptoms.

- + Gigantism is due to hypersecretion of growth hormone (GH) in children.
- + Overgrowth of skeletal structure occurs (up to 8 feet) and the visceral growth is not appropriate with that of limbs.

21. What is Acromegaly? Mention its symptoms.

- + Acromegaly is due to excessive secretion of growth hormone in adults.

- + Over growth of hand bones, feet bones, jaw bones, malfunctioning of gonads, enlargement of viscera, tongue, lungs, heart, liver, spleen and endocrine gland like thyroid, adrenal etc., are the symptoms of acromegaly.

22. What is Gull's disease or myxedema? Mention its symptoms.

- + Hyposecretion of thyroid in adults causes myxedema.
- + It is otherwise called Gull's disease.
- + This disease is characterised by decreased mental activity, memory loss, slowness of movement, speech, and general weakness of body, dry coarse skin, scarce hair, puffy appearance, disturbed sexual function, low BMR, poor appetite, and subnormal body temperature.

23. What is Grave's disease? Mention its symptoms.

- + Grave's disease also called as thyrotoxicosis or exophthalmic goitre.
- + This disease is caused due to hyper secretion of thyroid.
- + It is characterised by enlargement of thyroid gland, increased BMR (50% - 100%), elevated respiratory and excretory rates, increased heartbeat, high BP, increased body temperature, protrusion of eyeball and weakness of eye muscles and weight loss.

24. What is Simple goitre? Mention its symptoms.

- + Simple goitre is also known as Endemic goitre.
- + It is caused due to hyposecretion of thyroxine.
- + The symptoms include enlargement of thyroid gland, fall in serum thyroxine level, increased TSH secretion.

25. What is Cushing's syndrome? Mention its symptoms.

- + Cushing's syndrome is caused due to excess secretion of cortisol.
- + Obesity of the face and trunk, redness of face, hand, feet, thin skin, excessive hair growth, loss of minerals from bone (osteoporosis) systolic hypertension are features of Cushing's syndrome.

26. What is Diabetes mellitus?

- + Hyperglycaemia is otherwise known as Diabetes mellitus.
- + It is caused due to reduced secretion of insulin.
- + As the result, blood glucose level is elevated.

27. Write the symptoms of Diabetes mellitus.

- + Polyurea (excessive urination),
- + Polyphagia (excessive intake of food),
- + Polydipsia (excessive consumption liquids due to thirst)

28. What is Diabetes insipidus? Mention its symptoms.

- + Diabetes insipidus is caused due to hyposecretion of vasopressin (ADH) from neurohypophysis.
- + The symptom includes frequent urination (polyurea) and excessive consumption of liquids due to thirst (polydipsia).



12

TRENDS IN ECONOMIC ZOOLOGY

EVALUATION

2 & 3 Marks

- 1. Name the three castes in a honey bee colony**
 - + Queen, Drones and Workers.
- 2. Name the following**
 - + i. Queen bee - The largest bee in the colony
 - + ii. Nuptial flight - The kind of flight which the new virgin queen takes along with the drones out of the hive
- 3. What happens to the drones after mating flight?**
 - + The drones die after mating flight.
- 4. What are the nutritive values of fishes?**
 - + Providing high quality protein and a wide variety of vitamins A and D, phosphorus, magnesium, selenium and iodine in marine fish.
- 5. List any three common uses of shellac.**
 - + Used in electric industry, as it is a good insulator.
 - + Used in preparations of shoe and leather polishes and as a protective coating of wood.
 - + Used as a filling material for gold ornaments
- 6. Name any two trees on which lac insect grows.**
 - + Acacia catechu - Karanagalli
 - + Acacia nilotica - Karuvelai
 - + Schleicheraleosa - Kumbadiri
- 7. What is seed lac?**
 - + The lac present on the twig is scraped and collected. After grinding, the unnecessary materials like dusts and fine

kindly send me your key Answers to our email id - padasalai.net@gmail.com

particles are removed.

- + The resultant lac is called 'seed lac'.

8. Define cross breeding.

- + Breeding between a superior male of one breed with a superior female of another breed.
- + The cross bred progeny has superior traits.

9. Write the peculiar characters of duck.

- + The body is fully covered with oily feathers.
- + They have a layer of fat under their skin which prevents it from getting wet.
- + They lay eggs at night or in the morning.
- + The ducks feed on rice bran, kitchen wastes, waste fish and snails.

10. Write the advantages of vermicomposting.

- + Vermicompost is rich in essential plant nutrients.
- + It improves soil structure texture, aeration, and water holding capacity and prevents soil erosion
- + It is a rich in nutrients and an eco-friendly amendment to soil for farming and terrace gardening.
- + It enhances seed germination and ensures good plant growth

11. What are the main duties of a worker bee?

- + During the first half of her life, she becomes a nurse bee attending to indoor duties such as secretion of royal jelly, prepares bee-bread to feed the larvae, feeds the queen, takes care of the queen and drones, secretes bees wax, builds combs, cleans and fans the bee hive.
- + In the second half her life lasting for three weeks, she searches and gathers the pollen, nectar, propolis and water.

12. Give the economic importance of Silkworm

- + It is an economically importance insect being a commercial primary producer of silk.

13. Give the economic importance of prawn fishery

- + It is a tasty protein food.
- + Economic development can be achieved through prawn culture.
- + Prawn takes part in earning foreign currency.
- + It is much profitable to cultivate prawn in fresh water at a comparatively lower cost.

14. Give the economic importance of lac insect

- + Lac is largely used as a sealing wax and adhesive for optical instruments. It is used in electric industry, as it is a good insulator.
- + It is used in preparations of shoe and leather polishes and as a protective coating of wood.
- + It is used in laminating paper board, photographs, engraved materials and plastic molded articles.
- + Used as a filling material for gold ornaments.

15. What are the advantages of artificial insemination?

- + It increases the rate of conception
- + It avoids genital diseases
- + Semen can be collected from injured bulls which have desirable traits.
- + Superior animals located apart can be bred successfully.

ADDITIONAL

2 & 3 Marks

1. Classify animals based on the economic importance.

- + Animals for food and food products
- + Economically beneficial animals
- + Animals of aesthetic importance
- + Animals for scientific research.

2. What is Vermiculture?

- + Vermiculture is the process of using earthworms to decompose

organic food waste, into a nutrient-rich material capable of supplying necessary nutrients which helps to sustain plant growth.

3. What is vermitech?

+ Applications of earthworm in technology of composting and bioremediation of soils and other activities is called Vermitech

4. Why earthworm is called as biological indicators of soil fertility?

+ Earthworms play a vital role in maintaining soil fertility; hence these worms are called as “farmer’s friends”.
+ These are also called as “biological indicators of soil fertility”.
+ The reason is that they support bacteria, fungi, protozoans and a host of other organisms which are essential for sustaining a healthy soil.

5. What is vermicast?

+ The breakdown of organic matter by the activity of the earthworms and its elimination from its body is called vermicast.

6. What is Vermicomposting?

+ Vermicompost is the compost produced by the action of earthworms in association with all other organisms in the compost unit.

7. What is Vermiwash?

+ Vermiwash is a liquid collected after the passage of water through a column of vermibed.

8. What is Sericulture?

+ Sericulture is an agro –based industry, the term which denotes commercial production of silk through silkworm rearing.

9. Name the types of Silkworm

+ Mulberry Silk, Muga Silk, Tassar Silk and Eri Silk.

10. What is Moriculture?

+ Mulberry leaves are widely used as food for silkworm Bombyx

mori and the cultivation of mulberry is called as Moriculture.

11. What is stifling?

- + The process of killing the cocoons is called stifling.

12. What is reeling?

- + The process of removing the threads from the killed cocoon is called reeling.

13. What are the diseases of silkworm?

- + Pebrine - Nosema bombycis, - protozoan.
- + Flacherie - Streptococcus and Staphylococcus - bacteria
- + Grasserie - Bombyx mori nuclear polyhedrosis virus - viral disease.

14. Mention the uses of silk.

- + Silk fibers are utilized in preparing silk clothes.
- + Silk is used in industries and for military purposes.
- + It is used in the manufacture of fishing fibers, parachutes, cartridge bags, etc.,

15. What is apiculture or bee keeping?

- + Care and management of honey bees on a commercial scale for the production of honey is called apiculture or bee Keeping.

16. What are the types of Honey bee?

- + Apis dorsata (Rock bee),
- + Apis florea (Little bee),
- + Apis indica (Indian bee),
- + Apis mellifera (European bee)
- + Apis adamsoni (African bee).

17. What is nuptial flight?

- + During the breeding season in winter, a unique flight takes place by the queen bee followed by several drones, this flight is called “nuptial flight”.

18. What are the two types of beehives?

- + Langstroth and Newton.

19. What is called propolis?

- + The resinous chemical substance present in the wax is called propolis which is derived from pollen grains.

20. What is called swarming?

- + The mass emergence of larvae from the egg in search of a host plant is called 'swarming'.

21. What are the uses of honey?

- + It is an aromatic sweet material derived from nectar of plants.
- + It is a natural food; the smell and taste depend upon the pollen taken by the honey bee.
- + It is used as an antiseptic, laxative and as a sedative.

22. What are the uses of bee wax?

- + It is used for making candles, water proofing materials, polishes for floors, furniture, appliances, leather and taps.
- + It is also used for the production of comb foundation sheets in bee keeping and used in pharmaceutical industries.

23. What is called harvesting?

- + The collection of lacs from the host plant is known as harvesting.
- + Harvesting may be done before swarming (immature) or after swarming (mature).

24. What is called stick lac?

- + Lac cut from the host plant is called 'Stick lac'.

25. What is called seed lac?

- + The lac present on the twig is scraped and collected.
- + After grinding, the unnecessary materials like dusts and fine particles are removed.
- + The resultant lac is called 'seed lac'.

26. What is aquaponics?

- + Aquaponics is a technique which is a combination of aquaculture (growing fish) and hydroponics (growing plants in non-soil media and nutrient-laden water).

27. What are hydroponics?

- + Growing plants in non-soil media and nutrient-laden water is called hydroponics.

28. What is aquaculture?

- + Aquaculture is a branch of science that deals with the farming of aquatic organisms such as fish, molluscs, crustaceans and aquatic plants.

29. What are three categories of aquaculture?

- + Freshwater aquaculture
- + Brackish water aquaculture
- + Marine water aquaculture.

30. What is pisciculture?

- + Culturing of fishes is called fish culture or pisciculture.

31. What is brackish water?

- + Culturing of animals in the water having salinity range 0.5 - 30 ppt are called as brackish water culture.
- + Example - Milk fish (Chanos chanos), Sea bass ('Koduva'), Grey mullet ('Madavai'), Pearl spots ('Kari'meen') etc.

32. What is Mariculture?

- + Culturing of animals in the water salinity ranges from 30 - 35‰ is called Mariculture.
- + Example - Chanos sp., Mugil cephalus.

33. What is Metahaline culture?

- + Culturing of animals in the salinity ranges from 36 - 40‰ is called Metahaline culture.
- + Example - Brine shrimp (Artemia salina).

34. What is Artemia?

- + Artemia is commonly known as the brine shrimp.
- + It is a crustacean and lives in high saline waters because of its high osmoregulatory capacity.

35. What are the different types of ponds?

- + Breeding pond, Nursery pond, Rearing pond, Stocking pond.

36. What is artificial fertilization?

- + Artificial fertilization involves removal of ova and sperm from female and male by artificial mechanical process and the eggs are fertilized.

37. What is hapa?

- + The fertilized eggs are removed from the spawning place and kept into hatching pit called hapa.

38. What is polyculture?

- + Few selected fishes belonging to different species are stocked together in proper proportion in a pond. This mixed farming is termed composite fish farming or polyculture.

39. What are the advantages of composite fish farming?

- + All available niches are fully utilized.
- + Compatible species do not harm each other.
- + No competition among different species is found.
- + Catla catla, Labeo rohita and Cirrhinus mrigala (surface feeder) are the commonly used fish species for composite fish farming.

40. What is Isinglass?

- + Isinglass is a high-grade collagen produced from dried air bladder or swim bladder of certain fishes viz. catfish and carps.

41. What is Lingha pearl?

- + These pearl beds produce best quality of pearls called as "Lingha Pearl".

42. What is animal Husbandry?

- + Animal husbandry is the practice of breeding and raising livestock cattles like cows, buffaloes, and goats and birds etc., that are useful to human beings.

43. What is Inbreeding?

- + Breeding between animals of the same breed for 4-6 generations is called inbreeding. Inbreeding increases homozygosity and exposes the harmful recessive genes.

44. What is Outbreeding?

- + The breeding between unrelated animals is called outbreeding.

45. What is Out crossing?

- + It is the breeding between unrelated animals of the same breed but having no common ancestry.
- + The offspring of such a cross is called outcross.
- + This method is suitable for breeding animals below average in productivity.

46. What is Interspecific hybridization?

- + In this method of breeding mating is between male and female of two different species.
- + The progeny obtained from such crosses are different from their parents, and may possess the desirable traits of the parents.

47. What is Artificial insemination?

- + Artificial insemination is a technique in which the semen collected from the male is injected to the reproductive tract of the selected female.

48. What is MOET?

- + Multiple ovulation embryo transfer technology.
- + It is another method of propagation of animals with desirable traits.
- + This method is applied when the success rate of crossing is

49. How will you identify healthy cattle?

- + A healthy animal eats, drinks and sleeps well regularly.
- + Healthy cattle appear bright, alert and active in their movement with a shiny coat.

50. List out common diseases of cattle.

- + The main diseases of dairy cattle are rinderpest, foot and mouth disease, cow pox, hemorrhagic fever, anthrax.

51. What are the uses of dairy products?

- + Milk is a rich source of vitamin A, B2, B1, and deficient in Vitamin C.
- + Due to its high nutrition value, it serves as a complete food for infants.
- + Dairy products such as yoghurt, cheese, butter, ice cream, condensed milk, curd, and milk powder processed from milk make dairy, a highly farming attraction.

52. What is Brooding? Mention its types.

- + Caring and management of young chicks for 4 – 6 weeks immediately after hatching is called brooding.
- + It can also be categorized into two types namely natural and artificial brooding.

53. List out Poultry diseases.

- + Ranikhet, Coccidiosis, Fowl pox

54. What are the advantages of duck farming?

- + They can be reared in small backyards where water is available and needs less care and management as they are very hardy.
- + They can adapt themselves to all types of environmental.

55. What is Poultry Farming?

- + The word poultry refers to the rearing and propagation of avian species such as chicken, ducks, turkeys, geese, quail and guinea fowls.
- + The most common and commercially farmed birds are chicken and ducks.

56. What are the benefits of Poultry farming?

- + It does not require high capital for construction and maintenance of the poultry farming.
- + It does not require a big space.
- + It ensures high return of investment within a very short period of time.
- + It provides fresh and nutritious food and has a huge global demand.
- + It provides employment opportunities for the people.



NOTES

www.Padasalai.Net

kindly send me your key Answers to our email id - padasalai.net@gmail.com

NOTES

www.Padasalai.Net

kindly send me your key Answers to our email id - padasalai.net@gmail.com