

GOVERNMENT OF KARNATAKA

DEPARTMENT OF SCHOOL EDUCATION (PRE-UNIVERSITY)

REVISED QUESTION BANK-2024-25



CLASS: I PUC

SUBJECT: BIOLOGY (36)

DISCLAIMER

The question bank is prepared for the benefit of students and teachers. The committee that worked for the preparation of question bank has made all efforts to make the question bank comprehensive and foolproof.

However, if any mistakes or errors are found in the question bank, please mail at questionbank.pue@gmail.com and [academic\)pue@gmail.com](mailto:academic)pue@gmail.com). There is no guarantee that only the questions from this question bank would appear in the examination conducted by the department.

COPYRIGHTS



The copyrights of the question bank lies with the Director, Department of Pre-University Education. The question bank is prepared for academic purpose only. No part of the question bank is allowed to be used for commercial gains.

MEMBERS OF THE QUESTION BANK PREPARATION COMMITTEE
I PUC
BIOLOGY (36)

- 1. Dr. DEVARAJU. R** **COORDINATOR**
Lecturer in Biology
GPU College
KR Puram, Bangalore South
Phone - 9986378365
reachindev@yahoo.com
- 2. Dr. SAMPATH KUMARA K.K** **REVIEWER**
Lecturer in Biology
GPU College (Boys)
PB Road, PJ Extension
Davanagere (Dist)
Phone - 9481819845
kumarakkasampath@gmail.com
- 3. MRS. SMITHA JOSHMA FERNANDES** **MEMBER**
Lecturer in Biology
GPU College, Sanoor
Karkala, Udupi (Dist)
Phone - 9886266907
srdsouza11@gmail.com
- 4. Dr. NAGABHUSHAN** **MEMBER**
Lecturer in Biology
GPU College (Boys)
Krishnarajpet
Mandya (Dist)
Phone - 9964227570
mnagabhushan86@gmail.com
- 5. MRS. VIMALA. R** **MEMBER**
Lecturer in Biology
GPU College, Yelahanka
Bangalore North
Phone - 9880263970
vimmygpucylk.19@gmail.com

CHAPTER 1
THE LIVING WORLD

PART – A

I. Select the correct alternative from the choices given: 1 Mark Each

1. The number of species that are known and described range between _____
 - a) 1.7 – 1.8 zillion
 - b) 1.7 – 1.8 trillion
 - c) 1.7 – 1.8 million
 - d) 1.7 – 1.8 billion
2. Binomial nomenclature was proposed by
 - a) Carolus Linnaeus
 - b) John Ray
 - c) Aristotle
 - d) Theosphratus
3. Taxonomy is the branch of biology that deals with study of
 - a) Genes
 - b) Inheritance
 - c) Classification of organisms
 - d) Ecosystems
4. ICBN stands for
 - a) International Code of Botanical Nomenclature
 - b) Indian Code of Biological Names
 - c) International Code of Biological Names
 - d) Indian Code of Botanical Nomenclature
5. ICZN stands for
 - a) International Code of Zoological Names
 - b) International Code of Zoological Nomenclature
 - c) Indian Code of Zoological Names
 - d) Indian Code of Zoological Nomenclature
6. In Binomial Nomenclature, the name of the author appears
 - a) Before the genus
 - b) In between the specific epithet
 - c) Before the specific epithet
 - d) After the specific epithet
7. Identify the incorrect statement:
 - a) Biological names are generally in Latin and written in italics. They are Latinised or derived from Latin irrespective of their origin.
 - b) The first word in a biological name represents the genus while the second component denotes the specific epithet.
 - c) Both the words in a biological name, when handwritten, are separately underlined, or printed in italics to indicate their vernacular origin.
 - d) The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter.

8. Which one of the following is contrary to the rules of nomenclature?
- First word in a biological name represents the genus name and the second is a specific epithet.
 - Biological names can be written in any language.
 - When written by hand, the names are to be underlined.
 - Names are written in Latin and are italicized.
9. The process by which organisms are grouped into categories based on easily observable characters is _____
- Identification
 - Nomenclature
 - Classification
 - Biodiversity
10. *Systema Naturae* was written by _____
- Carolus Linnaeus
 - John Ray
 - Aristotle
 - Theospratus
11. A group of plants and animals with similar traits of any rank is
- Taxon
 - Species
 - Genus
 - Order
12. Which is less general in characters as compared to genus?
- Family
 - Division
 - Class
 - Species
13. Which of the following taxonomic categories is the highest and most inclusive?
- Genus
 - Order
 - Kingdom
 - Phylum
14. What is the basic unit of classification in the Linnaean system of taxonomy?
- Family
 - Species
 - Order
 - Class
15. What is the correct sequence?
- Genus → species → order → kingdom
 - Species → order → phylum → kingdom
 - Species → genus → order → phylum
 - Kingdom → phylum → class → order
16. This animal is correctly matched with its particular taxonomic category
- Housefly – *Musca*, order
 - Humans – primata, family
 - Mango – Anacardiaceae, class
 - Wheat – *Triticum*, genus
17. The scientific name of mango is
- Mangifera indica*
 - Mangifera Indica*
 - Mangifera indica
 - Mangifera Indica
18. Opt for the appropriate way of writing biological name from below
- Panthera leo*
 - solanum nigrum*
 - Solanum tuberosum
 - Mangifera Indica*
19. Consider the following statements
- Statement I:** Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level.

Statement II: Lower the taxa, more are the characteristics that the members within the taxon share.

- a) Both Statement I and Statement II are true.
- b) Statement I is true and Statement II is false
- c) Statement I is false and Statement II is true.
- d) Both Statement I and Statement II are false.

20. Match Column I and II for housefly classification and select the correct option using codes provided below:

Column I	Column II
A) Family	i. Diptera
B) Order	ii. Arthropoda
C) Class	iii. Muscidae
D) Phylum	iv. Insecta

- a) A-i, B-ii, C-i, D-iii
- b) A-iv, B-iii, C-ii, D-i
- c) A-iii, B-ii, C-iv, D-i
- d) A-iii, B-i, C-iv, D-ii

21. *Felis* is a _____

- a) Species
- b) Sub-species
- c) Genus
- d) Class

22. As we go higher from species to the kingdom, the number of common characteristics or similar traits goes on

- a) Decreasing
- b) Increasing
- c) Remains constant
- d) No change

23. Two organisms are from the same phylum, but different family. They may belong to the same

- a) Genus
- b) Species
- c) Division
- d) Order

24. Compared to genus, which of the following is less general in characters?

- a) Family
- b) Species
- c) Division
- d) Class

25. For wheat, which of the following combinations is correct?

- a) Genus *Triticum*, family Poaceae, order Poales, Class Monocotyledonae
- b) Genus *Triticum*, family Poaceae, order Poales, Class Dicotyledonae
- c) Genus *Triticum*, family Poaceae, order Sapindales, Class Monocotyledonae
- d) Genus *Triticum*, family Anacardiaceae, order Poales, Class Monocotyledonae

26. Taxonomic hierarchy refer to

- a) Classification of species based on the fossil record
- b) A list of botanists or zoologists who have worked on the taxonomy of a species

- c) A group of senior taxonomists who decide the nomenclature of animals and plants
 d) Stepwise arrangement of all categories for classification of animals and plants
27. One of the first acts in taxonomy is
 a) Identification b) Description c) Naming d) Classification
28. The common characteristics between brinjal and potato will be maximum at the level of their
 a) Family b) Genus c) Division d) Order
29. A taxon is
 a) A type of living organisms b) A group of related species
 c) A group of related families d) A taxonomic group of any ranking
30. Plant families Convolvulaceae, Solanaceae are included in the order _____
 a) Canidae b) Polymoniales c) Sapindales d) Poales

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket: 1 Mark Each

(*Systema Naturae*, *Solanum nigrum*, Taxonomy, Category, Systema, Rank, Order, Nomenclature, Taxa, Biodiversity)

1. The number and types of organisms present on earth is referred to as _____
2. _____ refers to naming of the organisms.
3. The scientific term for the categories used to study organisms is _____
4. The process of classification of all living organisms based on certain characteristics is _____
5. The Latin word which refers to the systematic arrangement of organisms is _____
6. Linnaeus used _____ as the title of his publication.
7. In taxonomic categories, groups represent _____
8. In taxonomic categories, category denotes _____
9. Assemblage of families which exhibit a few similar characters is _____
10. An example for binomial nomenclature is _____

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable: 2 Marks Each

1. What is Binomial nomenclature? Give an example.
2. List the processes that are basic to taxonomy.
3. What forms the basis of modern taxonomic studies?
4. The earliest classifications are based the 'uses' of various organisms. Why?

5. Write the scientific name of a) Potato b) Mango
6. Write the scientific name of a) Lion b) Human being
7. Write the scientific name of a) Leopard b) Tiger
8. Give four examples for organisms belonging to order Primata.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Why are living organisms classified?
2. What is binomial nomenclature? Write any two universal rules of binomial nomenclature.
3. Write a note on systematics.
4. Write the taxonomic categories of Man.
5. Write the taxonomic categories of Housefly.
6. Write the taxonomic categories of Mango.
7. Write the taxonomic categories of Wheat.
8. Write the taxonomic categories showing hierarchical arrangement in ascending order.

PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. What is binomial nomenclature? Write the universal rules of binomial nomenclature.
2. Write a brief note on taxonomic categories.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Given is a chart of organisms with their taxonomic categories. Identify A, B, C, D and E.

Common Name	Biological Name	A	Family	Order	Class	Phylum / Division
Man	<i>Homo sapiens</i>	<i>Homo</i>	B	Primata	Mammalia	Chordata
C	<i>Musca domestica</i>	<i>Musca</i>	Muscidae	Diptera	Insecta	Arthropoda
Mango	<i>Mangifera indica</i>	<i>Mangifera</i>	Anacardiaceae	D	Dicotyledonae	Angiospermae
Wheat	E	<i>Triticum</i>	Poaceae	Poales	Monocotyledonae	Angiospermae

CHAPTER 2
BIOLOGICAL CLASSIFICATION
PART – A

I. Select the correct alternative from the choices given: 1 Mark Each

1. Linnaeus used which kingdom of classification?
a) Two kingdom b) Three Kingdom c) Four Kingdom d) Five Kingdom
2. The five kingdom classification was proposed by
a) Aristotle b) Linnaeus c) R.H.Whittaker d) T.O.Diener
3. What is the main basis of classification in the five-kingdom system?
a) Structure of the nucleus b) Structure of cell wall
c) Asexual Reproduction d) Mode of Nutrition
4. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the ones categorized as
a) Heterotrophic bacteria b) Chemosynthetic autotrophs
c) Archaeobacteria d) Cyanobacteria
5. Because of the _____ archaeobacteria can endure harsh environments.
a) They are the oldest living organisms on Earth
b) They have complicated metabolic processes in their bodies
c) Rigid cell walls d) Double membrane nuclei.
6. Methanogens are found in the _____ of a ruminant.
a) Mouth b) Guts c) Cow's respiratory system d) Cow's ribs
7. Choose the incorrect statement
a) Methanogens are archaeobacteria that produce methane in marshy areas.
b) *Nostoc* is a filamentous blue green alga which fixes atmospheric nitrogen.
c) Chemosynthetic autotrophic bacteria synthesize cellulose from glucose
d) Mycoplasma lacks a cell wall and can survive without oxygen
8. Which of the following organisms can be found in extreme saline conditions?
a) Eubacteria b) Archaeobacteria c) Cyanobacteria d) Mycobacteria
9. Which of the following statements regarding cyanobacteria is false?
a) Also referred as blue green algae. b) Are chemosynthetic autotrophs.
c) Have chlorophyll a similar to green plants. d) Form blooms in polluted water bodies.
10. Which statement regarding Mycoplasma is false?
a) Has a stiff cell wall b) Smallest living cell known

- c) Can survive without oxygen d) Pathogenic in animals and plants.
11. In which of the following kingdom are Archaea and Nitrogen-fixing organisms classified?
 a) Animalia b) Plantae c) Monera d) Fungi
12. Blue-green algae belong to ____
 a) Protista b) Monera c) Fungi d) Plantae
13. All Prokaryotes are placed under ____
 a) Monera b) Protista c) Fungi d) Mycota
14. All single celled eukaryotes are placed under ____
 a) Monera b) Protista c) Fungi d) Archaea
15. Protists reproduce asexually and sexually by a process involving ____
 a) Cell fission and zygote formation b) Cell fusion and zygote formation
 c) Cell lysis and zygote formation d) Cell addition and zygote formation
16. Identify the incorrect statement
 a) Diatoms are microscopic and float in water passively
 b) Diatoms are chief producers in oceans
 c) Diatomaceous earth is formed by the cell walls of diatoms
 d) Walls of diatoms are easily destructible
17. Which of the following groups of protists resemble animals?
 a) Chrysophytes b) Protozoa c) Dinoflagellates d) Slime moulds
18. Diatoms belong to the following classifications: _____
 a) Chrysophytes b) Protozoans c) Dianoflagelletes d) Euglenoids
19. African sleeping sickness is caused by _____.
 a) *Trypanozoma* b) *Plasmodium* c) *Euglena* d) *Paramoecium*
20. The protozoan that has a gullet that opens to the outside of the cell surface is ____
 a) Amoeboid b) Flagellated c) Ciliated d) Sporozoan
21. The most notorious sporozoan that has a staggering effect on human population is ____
 a) *Entmoeba* b) *Trypanosoma* c) *Paramoecium* d) *Plasmodium*
22. The imperfect fungi that are decomposers of litter and help in mineral cycling belong to
 a) Basidiomycetes b) Deuteromycetes c) Ascomycetes d) Phycomycetes
23. Identify the incorrect statement
 a) *Neurospora* is used in the study of biochemical genetics
 b) *Penicillium* is a source of antibiotics
 c) Yeast is unicellular and used to make bread and beer

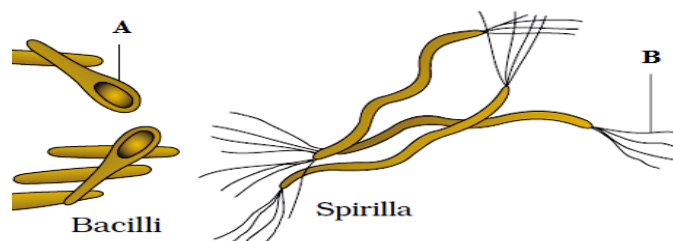
7. The colonies of cyanobacteria are generally surrounded by _____ sheath.
8. _____ often form blooms in polluted water bodies.
9. *Nostoc* and *Anabaena* can fix atmospheric nitrogen in specialised cells called _____
10. Chrysophytes include _____
11. The chief producers in the oceans are _____.
12. Red tides are caused by _____
13. Under suitable conditions, slime moulds form an aggregation called _____.
14. Wheat rust is caused by _____
15. The abnormally folded proteins causing neurological diseases are _____

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Two kingdom classification used for a long time was found inadequate. Substantiate.
2. List the main criteria for the five kingdom classification.
3. Classify bacteria based on their shape.
4. Dung of cows and buffaloes are used for biogas production. Why?
5. Write a note on chemosynthetic autotrophic bacteria.
6. List the economic importance of heterotrophic bacteria.
7. List the uses of heterotrophic bacteria.
8. Differentiate between chemosynthetic and photosynthetic forms of eubacteria.
9. Mention any four diseases caused by bacteria.
10. Draw a neat labelled diagram of a dividing bacterium.
11. How do Protists reproduce?
12. Mention the economic importance of diatoms.
13. Mention the four major groups of Protozoans.
14. List the four classes of kingdom Fungi.
15. Observe the picture of bacteria of different shapes is given below. Identify A and B



16. Observe the filamentous blue green algae *Nostoc*. Identify A and B



17. Name the fruiting bodies of a) Ascomycetes b) Basidiomycetes.
18. List any four importances of fungi in our life.
19. What do the following terms mean a) Coenocytic hyphae b) Dikaryophase
20. Name the a) asexual motile spores of Phycomycetes b) asexual spores in Ascomycetes
21. Give two examples of fungal symbiotic associations.
22. What is the basis for the division of kingdom fungi into various classes?
23. Identify the fungus that causes a) Wheat rust b) Bread mould
24. Draw a labelled diagram of Bacteriophage.
25. Mention any two living and nonliving characters of viruses.
26. List four diseases caused by viruses in animals.
27. Classify the viruses with respect to the nature of genetic material.
28. Write any two differences between Viruses and viroids.
29. List two neurological diseases caused by prions.
30. Write the algal and fungal components of lichens.
31. Differentiate between phycobiont and mycobiont.
32. When observed under the microscope, the organism appeared unicellular, with well defined nucleus, Biflagellate with one flagellum longitudinally and the other transversely. Identify the organism and mention the kingdom to which it belongs.
33. What do the terms algal blooms and red tides signify?

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Bacteria occur almost everywhere. Substantiate.
2. Classify Archaeobacteria.
3. Write a note on Archaeobacteria.
4. Write a note on cyanobacteria.
5. How do bacteria reproduce?

6. What is diatomaceous earth? List its uses.
7. Write a note on amoeboid protozoans.
8. Write a note on flagellated protozoans.
9. Write a note on ciliated protozoans.
10. Write a note on sporozoans.
11. Give a comparative account of the kingdoms Monera and Protista with respect to cell type, cell wall, body organization.
12. Describe the structure of fungal body.
13. Fungi are heterotrophic. Justify.
14. Explain the sexual cycle of fungi.
15. List six symptoms of viral diseases in plants.
16. Explain the structure of a virus.
17. Write a note on viroids.
18. Write a note on prions.
19. Write a note on Lichens.
20. Identify the following:
 - a) Pollution indicators
 - b) Low molecular weight free infectious RNA
 - c) Abnormally folded protein causing neurological diseases.
21. Name a disease caused by the following: a) Viroids b) Viruses c) Prions.
22. Cyanobacteria and heterotrophic bacteria though vastly different have been clubbed together in eubacteria of kingdom Monera according to five kingdom classification. Is the grouping of the two types of taxa in the same kingdom justified?

PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

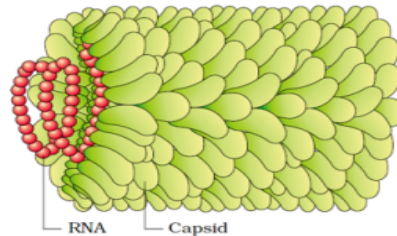
1. Explain the salient features of kingdom Monera.
2. Write a note on Eubacteria.
3. Explain the modes of Nutrition in Bacteria.
4. Write the salient features of kingdom Protista.
5. Write a note on Chrysophytes.
6. Write a note on Dinoflagellates.
7. Write a note on Euglenoids.

8. Write a note on Slime moulds.
9. Write a note on Protozoans.
10. List the economic importance of fungi.
11. Explain the various modes of reproduction seen in fungi.
12. Write a note on Phycomycetes.
13. Write a note on Ascomycetes.
14. Write a note on Basidiomycetes.
15. Write a note on Deutromycetes.
16. Write a note on viruses.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Observe the image and answer the questions given below.



- a) Identify the virus. (1)
 - b) What is a capsid? (1)
 - c) What is the function of the capsid? (1)
 - d) What are the subunits of capsid called? (1)
 - e) How are the subunits arranged? (1)
2. Identify the kingdom:
 - a) Prokaryotic, non cellulosic cell wall, cellular grade body organisation, autotrophic and heterotrophic mode of nutrition.
 - b) Eukaryotic, cell wall present in some, cellular grade body organisation, autotrophic and heterotrophic mode of nutrition.
 - c) Eukaryotic, chitinous cell wall, multicellular or loose tissue grade body organisation, heterotrophic mode of nutrition.
 - d) Eukaryotic, cellulosic cell wall, tissue or organ grade body organisation, autotrophic mode of nutrition.

- e) Eukaryotic, cell wall absent, tissue or organ or organ system grade of body organisation, heterotrophic mode of nutrition.
3. a) Identify the class of fungi based on the examples given. (4)
- i. *Alternaria, Colletotrichum, Trichoderma*
- ii. *Agaricus, Ustilago, Puccinia*
- iii. *Aspergillus, Claviceps, Neurospora*
- iv. *Mucor, Rhizopus, Albugo*
- b) Deuteromycetes are known as imperfect fungi. Why? (1)
4. Identify the following:
- a) Causes wheat rust disease.
- b) Found on bread mould.
- c) Extensively used in biochemical and genetic work.
- d) Parasitic fungi on mustard
- e) Used to make bread and beer.
5. a) Identify the classes of fungi based on the characters:
- i. Mycelium is aseptate and coenocytic. Asexual spores are endogenously produced.
- ii. Mycelium is branched and septate. Asexual spores are exogenously produced.
- iii. Mycelium is branched and septate. Asexual spores are generally not found.
- iv. Mycelium is branched and septate. Only asexual or vegetative phases are known.
- b) Name the class of coprophilous fungus.
6. Identify the type of Protist based on the characters given below:
- a) Microscopic planktons found both in fresh water as well as marine water, cell wall embedded with silica.
- b) Marine, photosynthetic, two flagella, cell wall with stiff cellulose plates on outer surface.
- c) Found in stagnant water, two flagella, protein rich pellicle, photosynthetic.
- d) Saprophytic, forms plasmodium, spores are extremely resistant.
- e) Predators or parasites, primitive relatives of animals.

CHAPTER 3
PLANT KINGDOM
PART – A

I. Select the correct alternative from the choices given: 1 Mark Each

1. Which of the plant groups needs both land and water to complete their life cycle?
a) Tracheophyta b) Pteridophyta c)Thallophyta d)Bryophyta
2. A plant that has seeds but no flowers and fruits
a) Bryophytes b) Gymnosperms c) Mosses d) Pteridophytes
3. Most primitive vascular plants?
a) Mosses b) Cycads c) Kelps d) Ferns
4. Plants that possess spores and embryo but lack vascular tissues and seeds?
a) Rhodophyta b) Bryophyta c) Pteridophyta d) Phaeophyta
5. Pteridophytes differ from mosses in
a) Independent gametophyte b) Dependent gametophyte
c) Flagellate antherozoids d) Independent and dominant sporophyte
6. Plants having vascular tissue without seeds
a) Angiosperm b) Pteridophytes c) Bryophytes d) Gymnosperms
7. A colonial alga is
a) *Volvox* b) *Chlorella* c) *Ulothrix* d) *Spirogyra*
8. Conifers can tolerate extreme environments because of
a) Presence of vessels b) Thick cuticle c) Superficial stomata d) Broad hardy leaves
9. First plants to inhabit the land
a) Angiosperms b) Bryophytes c) Gymnosperms d) Pteridophytes
10. Agar is commercially obtained from
a) Blue-green algae b) Red algae c) Brown algae d) Green algae
11. Which one is responsible for the formation of peat?
a) *Riccia* b) *Sphagnum* c) *Marchantia* d) *Funaria*
12. Isogamous condition with non-flagellated gametes is found in
a) *Chlamydomonas* b) *Volvox* c) *Spirogyra* d) *Fucus*
13. The transport of male gametes in bryophytes and pteridophytes occurs through
a) Wind b) Water c) Birds d) Insects
14. Numerical Taxonomy is based on _____
a) Chemical constituents b) Observable characteristics

6. List any four characters of rhodophyceae.
7. Name any two commercially used hydrocolloids isolated from algae.
8. Differentiate between isogamous and anisogamous condition.
9. Write any two economic importances of bryophytes.
10. What are the two stages in the gametophytic phase of mosses?
11. Mention the four classes of pteridophytes.
12. Differentiate between thallus of bryophytes and prothallus of pteridophytes.
13. How are leaves in gymnosperms adapted to withstand extremes of climatic factors?
14. What are male gametophytes in gymnosperms called as? Where do they develop?
15. Explain the heterosporous nature of gymnosperms.
16. Which are the two classes of angiosperms?
17. Differentiate between Rhodophyceae and Phaeophyceae.
18. Differentiate between Chlorophyceae and Rhodophyceae.
19. Differentiate between Chlorophyceae and Phaeophyceae.
20. Differentiate between Liverworts and moss.
21. Differentiate between homosporous and heterosporous pteridophyte.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Mention the three classification system of angiosperms.
2. Write a note on reproduction in algae.
3. How are algae classified based on the fusion of gametes?
4. Write a note on different classes of algae with reference to their flagellar number and position of insertions.
5. Write any six important characteristics of Chlorophyceae.
6. Write the characteristic features of brown algae?
7. “Mosses are ecologically important group of plants”. Justify.
8. Draw a neat labelled diagram showing different parts of a moss plant *Funaria*.
9. How does sexual reproduction take place in pteridophytes?
10. What is heterospory? Briefly comment on its significance. Give two examples.
11. Identify the following:
 - a) Used as fuel and as packing material for trans-shipment of living material.
 - b) Used to grow microbes and in preparations of ice creams and jellies.

c) Develops directly from a spore in the life cycle of a moss.

PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. “Algae are useful to man in a variety of ways”. Justify the statement with suitable examples.
2. Describe the salient features of algae.
3. Enumerate the characteristics of bryophytes.
4. Write a note on the life cycle of moss.
5. Describe the salient features of pteridophytes.
6. Explain the salient features of gymnosperms.
7. Write a note on economic importance of algae.
8. Write a note on cell wall, flagellar number and position of insertions of different classes of algae.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Observe the chart showing divisions of algae and their characteristics given below. Identify A, B, C, D, and E.

Classes	Common Name	Major Pigments	Stored Food	Cell Wall
Chlorophyceae	A	Chlorophyll a,b	Starch	B
Pheophyceae	Brown Algae	C	Mannitol Laminarin	Cellulose and Algin
D	Red Algae	Chlorophyll a,d phycoerythrin	E	Cellulose Pectin and Polysulphate esters

2. Observe the pictures of different algae given below. Identify A, B, C, D, E.



CHAPTER 4
ANIMAL KINGDOM
PART – A

I. Select the correct alternative from the choices given: 1 Mark Each

1. Which one of the following kinds of animals is triploblastic?
a) Flat worms b) Sponges c) Ctenophores d) Corals
2. Which one of the following is not a character of chordates?
a) Ventral nerve cord b) Rod like notochord
c) Pharyngeal gill slits d) Bilateral symmetry
3. In case of Poriferans, the spongocoel is lined with flagellated cells called
a) Oscula b) Choanocytes c) Mesenchymal cells d) Ostia
4. In most simple type of canal system of Porifera, water flows through which one of the following ways?
a) Ostia → Spongocoel → Osculum → Exterior
b) Spongocoel → Ostia → Osculum → Exterior
c) Osculum → Spongocoel → Ostia → Exterior
d) Osculum → Ostia → Spongocoel → Exterior
5. Which of the following is a Coelenterate?
a) *Balanoglossus* b) *Physalia* c) *Sycon* d) *Branchiostoma*
6. Choose the correct pair.
a) Radial symmetry - Coelenterates b) Coelomates - Aschelminthes
c) Metamerism - Molluscs d) Triploblastic - Sponges
7. The dioecious animal is
a) Liver fluke b) *Aurelia* c) Tapeworm d) Earthworm
8. Identify the mismatch pair from the following.
a) Scales: Reptilia b) Comb plates: Mollusca
c) Choanocytes: Porifera d) Parapodia : Annelida
9. Flame cells of flatworms help in
a) Osmoregulation b) Digestion c) Reproduction d) Bioluminescence
10. Name the character of phylum Aschelminthes which differentiates it from all other phyla of kingdom animalia.
a) Parasitic mode b) Round in shape c) Pseudocoelomate d) Bilateral symmetry

11. Locomotor organ of annelid is
 a) Sucker b) Parapodia c) Setae d) Cilia
12. Which of the following features is not present in the phylum Arthropoda?
 a) Parapodia b) Jointed appendages
 c) Chitinous exoskeleton d) Metameric segmentation
13. An animal which can be included in phylum Arthropoda is
 a) Jelly fish b) Silver fish c) Cuttle fish d) Star fish
14. In which of the following phyla the adult shows radial symmetry, while the larva exhibits bilateral symmetry?
 a) Echinodermata b) Coelenterata c) Arthropoda d) Protozoa
15. Water vascular system is characteristic of
 a) Ctenophora b) Annelida c) Echinodermata d) Arthropoda
16. The limbless amphibian is
 a) *Ichthyophis* b) *Hyla* c) *Rana* d) *Salamander*
17. Which of the following group of animals is homeothermic?
 a) Reptiles b) Amphibians c) Birds d) Fishes
18. Which one of the following is a flightless bird?
 a) *Struthio* b) *Psittacula* c) *Neophron* d) *Pavo*
19. Which of the following is not a mammalian character?
 a) Presence of milk producing glands b) They have two pairs of limbs
 c) Presence of external ears called pinnae d) Homodont type of dentition
20. An egg laying mammal is
 a) *Didelphys* b) *Macaca* c) *Ornithorhynchus* d) *Macropus*
21. Radula is the rasping organ for feeding found in
 a) Echinoderms b) Molluscs c) Annelids d) Ctenophores
22. **Statement I:** Polyp and medusa are the two basic body forms in cnidaria.
Statement II: Polyps produce medusa sexually and medusa form polyps asexually.
 a) Statement I is correct but statement II is incorrect.
 b) Statement I is incorrect but statement II is correct.
 c) Both statements I and statement II are correct.
 d) Both statement I and statement II are incorrect.
23. Which of the following is not a respiratory organ in arthropods?
 a) Gills b) Book gills c) Lungs d) Book lungs

24. Identify the correct statement:

- a) Heart is ventral in chordates, whereas dorsal in non-chordates.
- b) Heart is dorsal in chordates, whereas ventral in non-chordates.
- c) Heart is dorsal in both chordates and non-chordates.
- d) Heart is ventral in both chordates and non-chordates.

25. *Exocoetus* is commonly called as

- a) Silver fish
- b) Flying fish
- c) Electric fish
- d) Fighting fish

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket: 1 Mark Each

(Water vascular system, Platypus, Hemichordata, Cloaca, Pseudocoelomates, Choanocytes, Radula, Malpighian tubules, Bioluminescence, Mesogloea, Echinodermata, Poikilotherms, Homoiotherms, Crocodiles, Calcium carbonate, Platyhelminthes)

1. In diploblastic animals, _____ is an undifferentiated layer present between ectoderm and endoderm.
2. The animals in which mesoderm is scattered in between ectoderm and endoderm are called _____ .
3. _____ cells line the spongocoel and canals in sponges.
4. The skeleton in corals is composed of _____ .
5. _____ is the property of living organisms to emit light.
6. In arthropods, excretion is takes place through _____ .
7. _____ is the rasping organ for feeding found in molluscs.
8. Liver fluke belongs to the phylum _____ .
9. The distinctive feature of echinoderms is the presence of _____ which helps in locomotion, capture and transport of food and respiration.
10. Cold-blooded animals are called as _____ .
11. In amphibians, _____ is the common opening for alimentary, urinary and reproductive tracts.
12. In reptiles, heart is usually three chambered, but four chambered in _____ .
13. Warm-blooded animals are called as _____ .
14. _____ is an oviparous mammal.
15. *Balanoglossus* is an example for _____ .

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Differentiate between open and closed circulatory system.
2. Mention the various respiratory organs found in the animals of the kingdom Arthropoda.
3. All vertebrates are chordates but all chordates are not vertebrates. Justify the statement.
4. Define canal system. Mention its components.
5. What are hermaphrodites? Give an example.
6. What is bioluminescence? Give an example for the animal which exhibits this property.
7. Differentiate between coelomates and acoelomates.
8. Differentiate between radial symmetry and bilateral symmetry.
9. Explain any two levels of organization in animals.
10. Differentiate between complete and incomplete digestive systems.
11. What is metamerism? Name an organism exhibiting this character.
12. Differentiate between external and internal fertilization.
13. Differentiate between direct and indirect development.
14. Mention the two basic body forms of Cnidarians.
15. Mention any two functions of flame cells.
16. Give any two parasitic adaptations of flatworms.
17. Differentiate exoskeleton and endoskeleton.
18. a) Name the largest animal phylum.
b) Mention the phylum in which some animals have gills as the organ of respiration and excretion.
19. Mention any two common characters of Annelid and Arthropoda.
20. Explain the functions of cloaca in Amphibia.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Diagrammatically represent the difference between diploblastic and triploblastic organization.
2. Mention any three economically important insects of the phylum Arthropoda.
3. Mention any three vector mosquitoes of the phylum Arthropoda.

4. Define the three groups of animals based on the body cavity.
5. Mention the functions of i) Choanocytes ii) Nematocytes iii) Statocysts
6. Mention any three functions of Cnidoblasts.
7. What is metagenesis? Mention the forms with an example.
8. Mention the functions of the following:
 - a) Nephridia b) Malpighian tubules c) Comb plates
9. Differentiate between poikilothermous and homoiothermous animals with an example for each.
10. Differentiate oviparous and viviparous animals. Give example for each in mammals.

PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Mention the general characters of the phylum porifera.
2. Enumerate the general characteristics of the phylum coelenterate.
3. Assign the following animals in to their respective phyla
 - a) *Planaria* b) *Gorgonia* c) *Hirudinaria* d) *Cucumaria* e) *Ascidia*
4. List out the salient features of the phylum Arthropoda
5. Explain the general characteristics of the animals belong to the phylum Annelid.
6. Assign the following organs of animals into their respective phyla.
 - a) Malpighian tubules b) Radula c) Parapodia d) Comb plates e) Proboscis
7. Diagrammatically represent the difference between levels of coelom organization and mention the body layers.
8. Define the following terms:
 - a) Bioluminescence b) Metamerism c) Poikilotherms
 - d) Pseudocoelomates e) Bilateral symmetry
9. List out the general characters of the animals of the class reptilia.
10. Give the identifying features of the phylum Echinodermata.
11. Highlight the characteristics of the animals belongs to the class Amphibia.
12. a) Mention any two fundamental characters of the phylum chordate. (2)
 b) Mention the three subphyla of the phylum chordata with an example for each. (3)
13. Differentiate between chordates and non-chordates.
14. Differentiate between chondrichthyes and osteichthyes.

15. Though all members of animalia are multicellular, all of them do not exhibit the same pattern of organization of cells. Explain the different levels with suitable examples. What is the highest level of organization in plants?
16. Each group of animals is different in many respects. at the same time, with in the groups also animals exhibit differences in their characters. in view of this, mention the special character for each of the following.
- a) *Torpedo* b) *Pleurobrachia* c) *Crocodilus* d) *Ichthyophis*
 e) *Ornithorhynchus*

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Given below is the table representing name of the phylum, organism and the unique organ belongs the phylum. Complete the boxes in the table labelled as a, b, c, d and e with appropriate answer.

Arthropoda	Cockroach	a
b	Pleurobrachia	Comb plate
Mollusca	Apple snail	c
Porifera	d	Spongocoel
e	Neries	Parapodia

2. Given below is the table representing name of the phylum, organism and the unique organ belongs the phylum. Complete the boxes in the table labelled as a, b, c, d and e with appropriate answer

Arthropoda	Cockroach	a
b	<i>Pleurobrachia</i>	Comb plate
Mollusca	Apple snail	c
Porifera	d	Spongocoel
e	Neries	Parapodia

3. Given below is the table representing name of the phylum, organism belongs to it and its common/special name (name representing its character). Complete the boxes in the table labelled as a, b, c, d and e with appropriate answer.

a	<i>Ascaris</i>	Round worm
Annelida	b	Earth worm
Arthropoda	<i>Bombyx</i>	c
Platyhelminthes	d	Tape worm
e	<i>Ancylostoma</i>	Hook worm

4. Few key characters of animals are given below. Read them carefully and name the phylum they represent.
- i) Worm like segmented body, parapodia, monoecious.
 - ii) Exclusively marine, ciliated comb plates, bioluminescence.
 - iii) Jointed appendages, open circulation, malpighian tubules.
 - iv) Notochord, hollow nerve cord, paired pharyngeal gill slits.
 - v) Unsegmented body covered with calcareous shell, head-foot-visceral mass, rasping organ radula.

- d) Statement 1 is false but Statement 2 is true.
10. The leaf base forms sheath covering the stem in:
 a) Monocotyledons b) Dicotyledons c) Leguminous d) Both a & b
11. Whorled, opposite, alternate-all these terms refer to:
 a) Position of branching b) Arrangement of flowers
 c) Arrangement of leaves d) Branching of roots.
12. **Statement I:** Cymose type of inflorescence as limited growth of main axis & bare flowers in basipetal order.
Statement II: In Cymose the older flowers are at the tip while younger flower buds are at the base.
 a) Both Statement 1 and Statement 2 are true.
 b) Both Statement 1 and Statement 2 are false.
 c) Statement 1 is true but Statement 2 is false.
 d) Statement 1 is false but Statement 2 is true.
13. The accessory organs of the flower is/are :
 a) Calyx. b) Corolla c) Both a & b d) Neither a nor b
14. Canna flowers represent
 a) Symmetrical flower b) Asymmetrical flower
 c) Actinomorphic flower d) Zygomorphic flower
15. **Statement 1:** When a shoot tip transforms into a flower it is always solitary.
Statement 2: Types of inflorescence is based on whether the apex gets developed into a flower are continues to grow.
 a) Both Statement 1 and Statement 2 are true.
 b) Both Statement 1 and Statement 2 are false.
 c) Statement 1 is true but Statement 2 is false.
 d) Statement 1 is false but Statement 2 is true.
16. An example of Perigynous flowers is :
 a) Brinjal. b) Plum. c) Guava d) Cucumber
17. The mode of arrangement of sepals or petals in floral bud is known as:
 a) Phyllotaxy b) aestivation c) Placentation d) Polypetalous
18. Which of the following does not have overlapping of petals?
 a) Valvate b) Twisted c) Imbricate d) Vexillary
19. Variation in the length of filaments within a flower is observed in:

8. If the thalamus is cup shaped and gynoecium is present in it, other floral parts arise at rim, it is said to be _____
9. Belladonna, Ashwagandha are medicinal plants belonging to family _____
10. The wall of the fruit is called _____
11. The sterile stamen is known as _____

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Mention the characteristic features of stem.
2. Write any four functions of stem.
3. Write a note on different types of root systems in plants.
4. Mention any two functions of root.
5. Draw a neat labelled diagram showing parts of a leaf.
6. Mention the functions of veins in leaves.
7. Differentiate a simple leaf from compound leaf.
8. List the economically important plants of family Solanaceae
9. Differentiate between pinnately compound leaf and palmately compound leaf.
10. Differentiate between apocarpous and syncarpous ovary.
11. Differentiate between epipetalous and epiphyllous condition.
12. Mention two major types of inflorescence.
13. Name the accessory organs of the flower.
14. Differentiate between gamosepalous and polysepalous.
15. Differentiate between polyandrous and adelphy.
16. Name the two layers of seed coat.
17. Mention the four types of aestivation in plants.
18. How do you identify a racemose inflorescence from cymose inflorescence?
19. Differentiate between coleoptile and coleorhiza
20. a) Though fertilization is must for fruit set, still fruits develop without fertilization. What are such fruits called?
b) What is the fruit wall called?

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. List out any three functions of root system.
2. Mention the three regions of the taproot and their characteristic features.
3. Define the terms: a) Trimerous b) Bracteate c) Epipetalous
4. Define a) Monadelphous b) Diadelphous c) Polyadelphous
5. Mention the regions of root tip.
6. Explain the structure of a fruit.
7. Name the three wall layers of a fruit.
8. What is compound leaf? Mention the two types.
9. Distinguish between simple and compound leaves.
10. What is venation? Mention the types of venation.
11. Explain three different types of phyllotaxy in plants.
12. Describe the types of flowers based on the position of calyx, corolla and androecium in respect of the ovary on thalamus.
13. Mention the types of bundles or bunches, depending on the union of the stamen.
14. Name the different layers of pericarp in mango
15. Given the description of the flower write its floral formula
16. Bracteate, zygomorphic, calyx - 5 sepals gamosepalous, corolla - 5 petals polypetalous, androecium -10 stamens, gynoecium – monocarpellary, inferior ovary with axile placentation
17. Name the following:
 - a) Part of embryonal axis that develops into root
 - b) Part of pericarp of coconut that is hard
 - c) Part of maize grain that contains proteins

PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks each

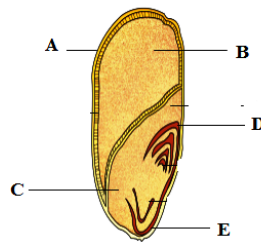
1. Draw a neat labelled diagram to show different parts of a flowering plant.
2. With the help of labelled diagram explain the different regions of root tip.
3. a) What is the pattern of arrangement of leaves on stem called? (1)
- b) Mention the three types of arrangement of leaves. (3)
- c) Mention the type of arrangement in which only one leaf arises at each node. (1)
4. With regard Pea flowers there are five petals.
 - a) Mention the aestivation. (1)

- b) Which is the largest petal? (1)
- c) Name the smallest petals. (1)
- d) Illustrate the arrangement and fusion of petals with the diagram. (2)
5. With the help of labelled diagram explain structure of a leaf.
6. What is aestivation? Explain any four types of aestivation with an example for each.
7. Define placentation. Explain the different types of placentation with an example for each.
8. Diagrammatically represent the various types of aestivation in flowering plants.
9. Diagrammatically represent the various types of placentation in flowering plants.
10. Draw a neat diagram V.S. of Monocotyledonous seed.
11. Explain the structure of a monocotyledonous seed with a labelled diagram.
12. Enumerate any five salient features of family Solanaceae.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

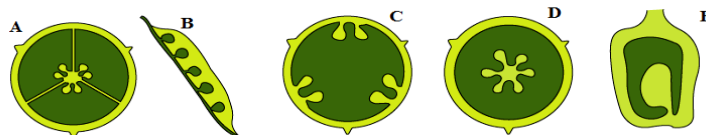
1. Answer the following questions with respect to diagram given below:



- a) Identify the outermost layer of the seed marked A (1)
- b) Name the part B that stores food. (1)
- c) Name the single cotyledon C (1)
- d) Name the sheaths D & E that enclose the plumule and radicle respectively. (2)
2. The given floral formula is that of Solanaceae. Draw the floral diagram.



3. Identify the labelled parts A, B, C, D & E representing different types of placentation citing an example for each



CHAPTER 6
ANATOMY OF FLOWERING PLANTS

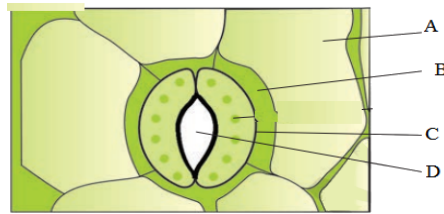
PART-A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. In plants, lateral roots arise from
a) Endodermis b) Epidermis c) Pericycle d) Hypodermis
2. Innermost layer of the cortex is
a) Pericycle b) Endodermis c) Pith d) Stele
3. In a monocot leaf stomata are present
a) Only on abaxial surface d) Only on adaxial surface
c) On both the surfaces d) More on abaxial surface
4. The stele consists of
a) Endodermis, pericycle, vascular bundle and pith c) Vascular bundles only
b) Pericycle, vascular bundle and pith d) Vascular bundle and pith
5. Find out the wrong statement about angiosperm roots.
a) Cuticle is absent in young stages. b) The apex is protected by root cap.
c) Vascular bundles are collateral.
d) Xylem is centripetal in growth in the young roots.
6. Some vascular bundles are described as open because these
a) Are surrounded by pericycle but no endodermis.
b) Are capable of producing secondary xylem and phloem.
c) Possess conjunctive tissue between xylem and phloem.
d) Are not surrounded by pericycle.
7. Which of the following is not a part of epidermal tissue system?
a) Trichomes b) Root hairs c) Guard cells d) Companion cells
8. Root hairs develop from the
a) Zone of elongation b) Root cap region c) Meristematic region d) Zone of maturation
9. Closed vascular bundles lack
a) Cambium b) Pith c) Ground tissue d) Conjunctive tissue
10. Casparian strip is made up of
a) Chitin b) Cellulose c) Pectin d) Suberin
11. Which among the following is incorrect about vascular bundles in monocot stem?

- a) More than one vascular bundle present. b) Vascular bundles are of open type.
 c) They are scattered. d) They are surrounded by sclerenchyma bundle sheath.
12. Which among the following statements is incorrect about monocotyledonous tissue system?
- a) Bulliform cells that help in the curling of leaves are absent in monocot leaf.
 b) Epidermis covers the entire plant and protects the plant from external damage.
 c) Vascular bundles in monocot stem are neither radial nor conjoint.
 d) In a monocot stem pericycle is absent.
13. Which among the following is incorrect about anatomy in a monocot leaf?
- a) Stomata is present both on abaxial and adaxial epidermis.
 b) Mesophyll is well differentiated into palisade and spongy parenchyma.
 c) Vascular bundles seen in veins and midrib, are surrounded by thick walled bundle sheath.
 d) Most of the cells are parenchyma cells.
14. Which among the following is not correct about monocot stem?
- a) In a monocot stem, the vascular bundles are scattered. c) Cambium is absent.
 b) More than one conjoint vascular bundle is present. d) Cortex is present.
15. The parenchymatous cells lie between the xylem and phloem in roots are called
- a) Conjunctive tissue b) Casparian strips c) Bundle cap d) Passage cells
16. **Statement I:** Endarch and exarch are the terms often used for describing the position of secondary xylem in the plant body.
Statement II: Exarch condition is the most common feature of the root system.
- In the light of the above statements, choose the correct answer from the options given below:
- a) Both Statement I and Statement II are correct.
 b) Both Statement I and Statement II are incorrect.
 c) Statement I is correct but Statement II is incorrect.
 d) Statement I is incorrect but Statement II is correct.
17. Which of the following tissue has maximum number of chloroplast?
- a) Palisade tissue b) Spongy tissue c) Transfusion tissue d) Epidermal tissue
18. Pith is very well developed in
- a) Monocot root and monocot stem b) Monocot root and dicot root
 c) Dicot root and monocot stem d) Monocot root and dicot stem

19. The diagram of a dicot stomata is given below, identify the correct option which represents the parts A, B, C and D.



- a) a – epidermal cell, b – stomatal aperture, c – guard cell, d – subsidiary cell
 b) a – subsidiary cell, b – guard cell, c – stomatal aperture, d – epidermal cell
 c) a – epidermal cell, b – subsidiary cell, c – guard cell, d – stomatal aperture
 d) a – subsidiary cell, b – epidermal cell, c – guard cell, d – stomatal aperture
20. **Statement I:** Trichomes are epidermal hairs on the stems with secretory function.
Statement II: Trichomes help in preventing water loss due to transpiration.
- a) Both Statement I and Statement II are correct.
 b) Both Statement I and Statement II are incorrect.
 c) Statement I is correct but Statement II is incorrect.
 d) Statement I is incorrect but Statement II is correct.
21. Which of the following statement is incorrect regarding cuticle?
- a) It is absent in both dicot and monocot roots.
 b) It prevents loss of water through transpiration. c) It is a waxy layer.
 d) In leaves, it is found only in upper epidermis and not in lower epidermis.
22. Which of the following suits for monocot stem?
- a) Open vascular bundles. b) Vascular bundles in a ring form
 c) Scattered vascular bundles. d) Vascular bundles are fewer in number.
23. Guard cells in monocot leaves are
- a) Kidney shaped b) Bean shaped c) Dumb-bell shaped d) Oval shaped
24. Guard cells in dicot leaves are
- a) Disc shaped b) Bean shaped c) Dumb-bell shaped d) Oval shaped
25. In dicot leaves, stomata are not involved in
- a) Regulation of transpiration b) Gaseous exchange
 c) Photosynthesis d) Curling of leaves

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

1 Mark Each

(Dumb-bell, Trichomes, Endodermis, Cuticle, Casparian strips, Abaxial, Dicot stem, Bulliform cells, Mesophyll, Stele, Subsidiary cells, Cambium, Conjunctive tissue, Conjoint, Suberin)

1. In plants, epidermis is covered with a waxy thick layer called _____ .
2. _____ are the epidermal hairs on the stem.
3. If xylem and phloem are jointly situated on same radius, the vascular bundle is called _____ .
4. Starch sheath is present in the endodermis of _____ .
5. In the endodermis of dicot roots, suberin deposition is called _____ .
6. In leaves, _____ is the tissue present between upper and lower epidermis.
7. Large, empty, colourless cells present in the adaxial epidermis of monocot leaves are called _____ .
8. In dicot stems, _____ is present between xylem and phloem.
9. Inner most layer of cortex is called _____ .
10. All tissues inner to the endodermis constitute the _____ .
11. Few epidermal cells in the vicinity of guard cells are known as _____ .
12. In grasses, the guard cells are _____ shaped.
13. In roots, the parenchymatous cells which lie between xylem and phloem is called _____ .
14. The chemical substances present in casparian strips is _____ .
15. In dorsiventral leaf, stomata are more on _____ epidermis.

PART - B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Differentiate between root hairs and epidermal hairs.
2. Mention the components of stomatal apparatus.
3. Give any two functions of stomata.
4. Differentiate between palisade parenchyma and spongy parenchyma.
5. Differentiate conjoint and radial vascular bundles.
6. Differentiate between open and closed vascular bundles.

7. What is cambium? What is its function?
8. Mention the components of a stele.
9. What are casparian strips? Name the chemical component present in casparian strips.
10. What is a starch sheath? Where is it located?
11. What are bulliform cells? What is their function?
12. What are dorsiventral leaves? Why are they called so?
13. What are isobilateral leaves? Why are they called so?
14. What is a conjunctive tissue? Where are they found?
15. Diagrammatically represent open and closed vascular bundles.
16. Mention the stelar conditions that differentiates monocot root from dicot root.
17. Differentiate between medullary rays and conjunctive tissue.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Draw a neat labelled diagram of stomata.
2. What is a pericycle? Mention any two functions of it.
3. Mention the functions of the following:
 - a) Cuticle
 - b) Spongy parenchyma
 - c) Bulliform cells
4. What are trichomes? Mention any two functions of it.
5. Briefly explain the anatomical differences between stele of dicot root with that of dicot stem.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Draw a neat labelled diagram of transverse section of dicot root.
2. Draw a neat labelled diagram of transverse section of monocot root.
3. Draw a neat labelled diagram of transverse section of dicot stem.
4. Draw a neat labelled diagram of transverse section of monocot stem.
5. Draw a neat labelled diagram of transverse section of dicot leaf.
6. Draw a neat labelled diagram of transverse section of monocot leaf.
7. Write any five anatomical differences between dicot stem and monocot stem.
8. Mention any five anatomical differences between dicot root and dicot stem.

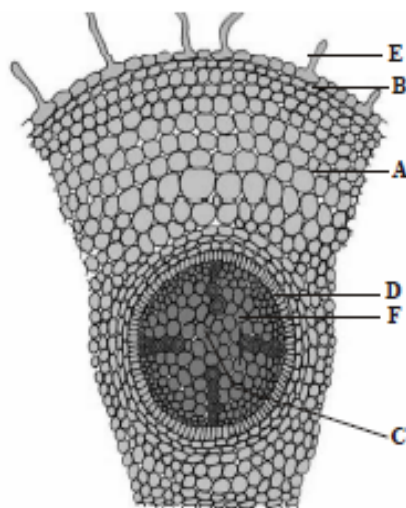
VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Complete the table given below, with reference to the internal structures/ cells, their location and functions of angiosperm plants.

Trichomes	Dicot stem	A
B	Dicot root	Initiation of lateral roots
Casparian strips	C	Impermeable to water
Bulliform cells	Monocot leaf	D
E	Dicot leaf	Gaseous exchange

2. Given below is the diagram of transverse section of a part of the angiosperm plant body. Carefully observe the diagram and answer the following.



- a) Identify the parts labelled as A, B, C, D, E and F. (3)
- b) Name the section of the plant and the part. (1)
- c) Mention the condition of the stele with respect to number and arrangement of vascular arrangement. (1)
3. Give reasons for the following:
- a) Stomata are found only on lower epidermis of the dicot leaf. (1)
- b) Vascular bundles are closed in monocot stem. (1)
- c) Mesophyll in monocot leaves are differentiated into palisade and spongy parenchyma. (1)
- d) Absence of cortex and stele in monocot stem. (1)
- e) Cuticle is absent in roots. (1)

CHAPTER 7
STRUCTURAL ORGANISATION IN ANIMALS

PART-A

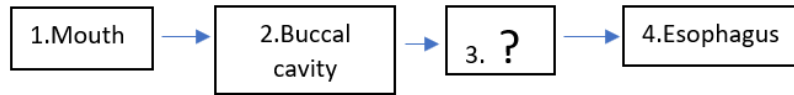
I. Select the correct alternative from the choices given below: 1 Mark Each

1. *Rana tigrina* is the most common species of _____ found in India.
a) Tiger b) Frog c) Fish d) Rat
2. Which of these statements is true about frog?
a) It lives both on land and in sea water b) They cannot survive in freshwater
c) *Rana tigrina* is a rare species d) They belong to class Amphibia
3. Frogs are _____
a) Homeothermic b) Warm-blooded c) Poikilothermic d) Heterothermic
4. Poikilotherms are animals whose body temperature
a) Varies with the environmental temperature
b) Constant irrespective of environmental temperature
c) Steady irrespective of environmental temperature d) Shows no variation
5. Which of these are the divisions of the body of a frog?
a) Head, trunk, abdomen b) Head, thorax, abdomen
c) Head, trunk d) Head, thorax, trunk
6. Which of these methods are utilized by frogs for protection?
a) Speed b) Spikes c) Mimicry d) Playing dead
7. **Statement 1:** Frogs have the ability to change colour to hide from their enemies.
Statement 2: This protective colouration is called mimicry
a) Both Statement 1 and Statement 2 are true.
b) Statement 1 is true and Statement 2 is false.
c) Statement 1 is false and Statement 2 is true.
d) Both Statement 1 and Statement 2 are false.
8. **Statement 1:** Frogs undergo winter sleep known as aestivation.
Statement 2: Frogs undergo summer sleep known as hibernation.
a) Both Statement 1 and Statement 2 are true.
b) Statement 1 is true and Statement 2 is false.
c) Statement 1 is false and Statement 2 is true.
d) Both Statement 1 and Statement 2 are false.

9. Which of these describes the skin of frog?
 a) Thick, leathery b) Smooth, slippery c) Hard, dry d) Thin membranous
10. Identify the correct statement with respect to frog.
 a) The colour of the dorsal side of the body is uniformly pale yellow.
 b) The ventral side is generally olive green with dark irregular spots.
 c) The skin is smooth and slippery due to the presence of mucus.
 d) The frog drinks water and also absorbs it through the skin.
11. **Statement 1:** The digits in forelimbs of a frog possess a web)
Statement 2: The webs found in the digits of forelimbs help in swimming.
 a) Both Statement 1 and Statement 2 are true.
 b) Statement 1 is true and Statement 2 is false.
 c) Statement 1 is false and Statement 2 is true.
 d) Both Statement 1 and Statement 2 are false.
12. The frog eyes are protected by _____ membrane while in water.
 a) Nostril b) Tympanum c) Nictitating d) Adhesive pad
13. How many digits does the forelimb and hind limb of frog have respectively?
 a) 3, 4 b) 5, 4 c) 4, 5 d) 4, 3
14. Presence of sound producing vocal sacs and a copulatory pad on the first digit of the forelimbs are found in _____
 a) Male frog b) Female frog c) Both male and female frog d) Tadpole
15. Where are the copulatory pads in male frog present?
 a) Second digit of the hind limbs b) First digit of the hind limbs
 c) First digit of the forelimbs d) Second digit of the forelimbs
16. Frog liver secretes bile which is stored in the _____
 a) Pancreas b) Intestine c) Stomach d) Gall bladder
17. Partially digested food called _____ is passed from stomach to small intestine.
 a) Bolus b) Chyme c) Chyle d) Bile
18. Which of these characteristics of frog is the reason for its short alimentary canal?
 a) Carnivorous b) Sexual dimorphism c) Amphibian d) Chordate
19. **Statement 1:** Frogs have a short alimentary canal
Statement 2: Frogs are herbivores.
 a) Both Statement 1 and Statement 2 are true.
 b) Statement 1 is true and Statement 2 is false.

- c) Statement 1 is false and Statement 2 is true.
 d) Both Statement 1 and Statement 2 are false.

20. Identify '3' in the pathway of food ingested by frog.



- a) Larynx b) Pharynx c) Gizzard d) Crop
21. Frogs show _____ respiration in water.
 a) Cutaneous b) Buccal c) Pulmonary d) Buccal and Pulmonary
22. Identify the incorrect statement with respect to frog blood.
 a) Composed of plasma, erythrocytes, leucocytes and platelets.
 b) Erythrocytes are enucleated. c) RBC's contain haemoglobin.
 d) Blood is circulated by the pumping action of the muscular heart.
23. The mid brain of the frog is characterised by
 a) Cerebellum and medulla oblongata b) Pair of optic lobes
 b) Olfactory lobes, cerebral hemispheres and diencephalon d) Pair of olfactory lobes
24. How many pairs of cranial nerves arise from the brain of the frog?
 a) 5 b) 7 c) 10 d) 12
25. Testes in frog are adhered to the upper part of kidneys by a double fold of peritoneum called _____.
 a) Mesorchium b) Sinus venosus c) Bidder's canal d) Sensory papillae
26. Select the correct route for the passage of sperms in male frogs.
 a) Testes → Vasa efferentia → Kidney → Seminal vesicle → Urinogenital duct → Cloaca
 b) Testes → Vasa efferentia → Bidder's canal → Ureter → Cloaca
 c) Testes → Vasa efferentia → Kidney → Bidder's canal → Urinogenital duct → Cloaca
 d) Testes → Bidder's canal → Kidney → Vasa efferentia → Urinogenital duct → Cloaca
27. **Statement 1:** In frogs, external fertilisation takes place.
Statement 2: Frog development does not involve a larval stage.
 a) Both Statement 1 and Statement 2 are true.
 b) Statement 1 is true and Statement 2 is false.
 c) Statement 1 is false and Statement 2 is true.
 d) Both Statement 1 and Statement 2 are false.
28. **Statement 1:** Frogs help maintain ecological balance

Statement 2: They serve as an important link in the food chain and food web.

- a) Both Statement 1 and Statement 2 are true.
- b) Statement 1 is true and Statement 2 is false.
- c) Statement 1 is false and Statement 2 is true.
- d) Both Statement 1 and Statement 2 are false.

29. **Statement 1:** Frogs are beneficial to mankind.

Statement 2: They eat insects and harm the crops.

- a) Both Statement 1 and Statement 2 are true.
- b) Statement 1 is true and Statement 2 is false.
- c) Statement 1 is false and Statement 2 is true.
- d) Both Statement 1 and Statement 2 are false.

30. Identify the incorrect statement with respect to frog.

- a) Vasa efferentia enter the kidneys on their side and open into Bidder's canal.
- b) They excrete urea and thus are uricotelic animal
- c) Ear is an organ of hearing as well as balancing
- d) The ovaries are situated near the kidneys and there is no functional connection with kidneys.

31. Identify the incorrect statement with respect to excretory system in frog

- a) Kidneys are compact, bean shaped situated anteriorly in the body cavity
- b) Each kidney is composed of several structural and functional units called nephrons
- c) In males, ureters act as urinogenital duct which opens into cloaca
- d) In females, the ureters and oviduct open separately in the cloaca

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket:

1 Mark Each

(Sinus venosus, Camouflage, Poikilotherms, Hibernation, Foramen magnum, Mucus, Aestivation, Mimicry, *Rana tigrina*, Skin)

- 1. The most common species of frog found in India is _____
- 2. Cold blooded animals are called _____
- 3. The ability of the frogs to change the colour to hide from their enemies is known as _____
- 4. The protective colouration seen in frogs is called _____
- 5. Summer sleep in frogs is called _____
- 6. Winter sleep in frogs is called _____
- 7. The skin of the frog is smooth and slippery due to the presence of _____

8. During aestivation and hibernation in frogs, gaseous exchange takes place through _____.
9. A triangular structure that joins the right atrium in frog is _____
10. Medulla oblongata passes out through the _____ and continues into spinal cord.

PART – B

III. Answer the following questions in 40-80 words each, wherever applicable:

2 Marks Each

1. What are poikilotherms? Give an example.
2. Frogs exhibit sexual dimorphism. Substantiate.
3. How can a male frog be distinguished from a female frog?
4. Differentiate between blood and lymph in frogs.
5. List any four sense organs present in frog.
6. List the function of ear in a frog.
7. Write a note on the development in frogs.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. What happens in the duodenum of the frog?
2. Explain the different types of respiration in frogs.
3. Enumerate the frog blood.
4. Write a note on endocrine system of frog.
5. Explain the neural system or nervous system of frog.
6. Describe the hepatic portal system in frog.
7. Describe the renal portal system in frog.
8. Explain sensory system of frog.
9. Describe the female reproductive system of frog.
10. Describe the male reproductive system of frog.
11. Write three benefits of frogs.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks each

1. Enumerate morphological features of frog.
2. Draw a neat labelled diagram of digestive system of frog.
3. Explain the digestive system of a frog.

4. Describe the process of digestion in frog.
5. Explain the process of respiration in frog.
6. Explain circulation or vascular system in frog.
7. Describe the excretory system in frog.
8. Explain the nervous of system of frog.
9. Explain endocrine system and sensory system in frog.
10. Draw a neat labelled diagram of male reproductive system of frog.
11. Draw a neat labelled diagram of female reproductive system of frog.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. a) What is the other name for the brain box in frogs? (1)
- b) How do frogs maintain ecological balance? (1)
- c) Name the special venous connection between liver and intestine in frogs. (1)
- d) List the well organised sense organs in frog. (1)
- e) Why is the length of the intestine in frogs reduced? (1)

CHAPTER 8
CELL: THE UNIT OF LIFE
PART – A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. Which of the following is not a prokaryotic cell?
a) Bluegreen algae b) Mycoplasma c) PPLO d) *Chlamydomonas*
2. **Statement 1:** All prokaryotic cells have cell wall surrounding the cell membrane except mycoplasma.
Statement 2: Mycoplasmas are the smallest existing cells.
a) Both Statement 1 and Statement 2 are true.
b) Statement 1 is true and Statement 2 is false.
c) Statement 1 is false and Statement 2 is true.
d) Both Statement 1 and Statement 2 are false.
3. **Statement 1:** Polar molecules cannot pass through the nonpolar lipid layer.
Statement 2: Polar molecules require carrier proteins to facilitate their transport.
a) Both Statement 1 and Statement 2 are true.
b) Statement 1 is true and Statement 2 is false.
c) Statement 1 is false and Statement 2 is true.
d) Both Statement 1 and Statement 2 are false.
4. **Statement 1:** Active transport occurs against concentration gradient.
Statement 2: Active transport occurs without expenditure of energy.
a) Both Statement 1 and Statement 2 are true.
b) Statement 1 is true and Statement 2 is false.
c) Statement 1 is false and Statement 2 is true.
d) Both Statement 1 and Statement 2 are false.
5. Algae have a cell wall composed of
a) Cellulose, pectin, galactans, mannans
b) Cellulose, galactans, mannans, calcium carbonate
c) Hemicellulose, cellulose, pectin, mannans
d) Hemicellulose, cellulose, pectin, galactans
6. **Statement 1:** The middle lamella is chemically composed of calcium pectate that glues the neighbouring cells.
Statement 2: Middle lamella is not traversed by plasmodesmata.

- a) Both Statement 1 and Statement 2 are true.
 b) Statement 1 is true and Statement 2 is false.
 c) Statement 1 is false and Statement 2 is true.
 d) Both Statement 1 and Statement 2 are false.
7. **Statement 1:** The function of mitochondria, chloroplast and peroxisome are not coordinated.
Statement 2: Mitochondria, chloroplast and peroxisomes do not form endomembrane system.
- a) Both Statement 1 and Statement 2 are true.
 b) Statement 1 is true and Statement 2 is false.
 c) Statement 1 is false and Statement 2 is true.
 d) Both Statement 1 and Statement 2 are false.
8. **Statement 1:** Golgi apparatus is closely associated with ER.
Statement 2: Materials to be packaged in the form of vesicles from ER pass through cis face Golgi apparatus.
- a) Both Statement 1 and Statement 2 are true.
 b) Statement 1 is true and Statement 2 is false.
 c) Statement 1 is false and Statement 2 is true.
 d) Both Statement 1 and Statement 2 are false.
9. Nucleoplasm is site for:
 a) DNA synthesis b) rRNA synthesis. c) mRNA synthesis d) Histones
10. On death of a animal cell it starts to degrade while the plant cell do not degrade the cell organelle involved is
 a) Vacuoles b) Chloroplast c) Lysosomes d) Ribosomes.
11. Which of the following play a role in motility of bacterial cell?
 a) Flagella b) Pili c) Fimbriae d) Slime layer
12. *Omnis cellula-e-cellula* was hypothesis explained by
 a) Matthias Schleiden b) Theodore Schwann.
 c) Rudolf Virchow d) Robert Brown.
13. The type of ribosomes present in eukaryotic cell and its organelles is / are
 a) 80s type b) 70s type c) Both a and b d) 50s type.
14. Glycolipids and glycoproteins are synthesised at
 a) SER b) RER c) Golgi apparatus d) Mitochondria

15. The chromatin contains

- a) DNA only b) DNA & Histones c) DNA Histones & non-histone proteins
d) DNA, RNA, Histones & non-histone proteins

16. Which one of the following organelle in the figure correctly matches with its function?



- a) Rough endoplasmic reticulum, formation of glycoproteins
b) Golgi apparatus, protein synthesis
c) Golgi apparatus, formation of glycolipids
d) Rough endoplasmic reticulum, protein synthesis

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket:

1 Mark Each

(Cytoskeleton, Golgi apparatus, Tonoplast, Polysomes, Osmoregulation, Elaioplast, Satellite, Plasmodesmata, Fluid mosaic, Ribosomes)

1. Many ribosomes attached on to a mRNA is _____.
2. The cytoplasmic connections between neighbouring plant cell are _____.
3. The single large vacuole in plant cell is bound is bound by _____
4. _____ are the main function Contractile vacuoles in amoeba)
5. _____ is a plastid that stores oils and fats in a plant cell.
6. _____ is the only membrane less cell organelle in eukaryotic cell.
7. Network of proteinaceous microtubules that provide mechanical support mobility and maintenance of shape is _____.
8. The non staining secondary constriction on a chromosome is called _____.
9. _____ is regarded as packaging cell organelle.
10. Singer and Nicolson proposed the _____ model for cell membrane structure.

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. State the points of cell theory.
2. List four types of organisms that represent prokaryotic cell.
3. Differentiate between Gram positive and Gram-negative bacteria.
4. What are inclusion bodies? Give an example.
5. What are mesosomes? Mention any one function.
6. Mention any four functions of cell wall.
7. Cell wall helps in cell to cell interaction and provides protection. Substantiate.
8. What are plasmids? Mention any one special character conferred by plasmids.
9. List the types of ribosomes found in prokaryotes and eukaryotes.
10. Name two types endoplasmic reticulum with any one function of each.
11. Differentiate smooth endoplasmic reticulum from rough endoplasmic reticulum.
12. Mention the units of eukaryotic and prokaryotic ribosomes.
13. Name the four endomembrane organelles.
14. Classify chromosomes on the basis of position of centromere.
15. What is active transport? Give an example.
16. Lysosomes are regarded as suicidal bag. Give reason.
17. Name the 2 types of vacuoles present in protists.

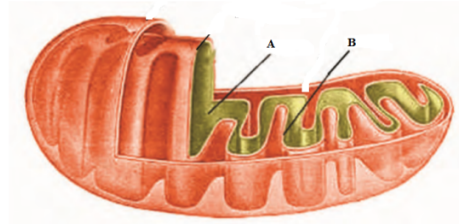
PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Name the three layers of the cell envelop of a bacterial cell
2. Name the three components of bacterial flagellum.
3. List out the functions of plasma membrane.
4. List out the differences between plant cell and animal cell.
5. Cell wall is non living rigid structure made of three layers. Mention the wall layers and its chemical composition.
6. Draw a neat labelled diagram of Mitochondria.
7. What is endomembrane system? Mention the cell organelles that form the components.
8. Classify the types of plastids based on type of pigments.
9. Explain the three types of plastids.
10. List the three different types of Leucoplasts & mention the type of reserve food material they store.
11. Draw a neat labelled diagram of chloroplast.

12. a) Identify the labelled parts A, B in the given diagram. (2)



- b) Why mitochondria are regarded as ‘power houses’ of the cell? (1)
13. Compare the prokaryotic and eukaryotic flagella.
14. What is cytoskeleton? Write any two functions.
15. Draw a neat labelled diagram of nucleus.
16. Mention the functions of the following:
- a) Endoplasmic reticulum b) Ribosomes c) Mitochondria
17. Which organelle is called Packaging apparatus & why?
18. Draw a labelled diagram depicting internal structure of cilia.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Mark Each

1. Describe the structure of prokaryotic cell.
2. Write any five differences between prokaryotic cell and eukaryotic cell.
3. Draw a neat labelled diagram of plant cell.
4. Draw a neat labelled diagram of animal cell.
5. Distinguish plant cell from animal cell.
6. Explain Fluid Mosaic Model of plasma membrane.
7. Explain the structure of mitochondria with a neat labelled diagram.
8. Describe the structure of chloroplast with a neat labelled diagram.
9. Describe the structure of sectional view of cilia with the help of a diagram.
10. Explain the structure of nucleus with a neat labelled diagram.
11. Describe the structure of chromosome.
12. Identify the following:
 - a) Prokaryotic, Photosynthetic, Organism.

- b) Outer most cell envelope of a bacterial cell.
- c) Cell organelle absent in plant cells.
- d) Site of synthesis of steroidal hormones.
- e) Membrane that facilitates transport of materials against concentration gradient.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Name the organelles in which following structures are found:
a) Cisternae b) Cristae c) Thylakoids d) Nucleolus e) Tonoplast
2. Name the following:
a) Power house of the cell
b) Site of steroidal hormone synthesis
c) Reservoir of hydrolytic enzymes
d) Packaging units of cell
e) Locomotory structures of cell
3. An organelle containing chlorophyll is autonomous is involved in photosynthesis. Explain its architecture.
4. The micro tubules in flagella of a eukaryotic cell are arranged in a particular fashion. Illustrate with a diagram.

CHAPTER 9
BIOMOLECULES
PART - A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. To perform the chemical analysis of a living tissue, which of the following is used
a) Glacial acetic acid b) Ethanol c) Trichloro acetic acid d) Chloroform
2. **Statement I:** Bio-molecules includes all carbon compounds in the living tissue
Statement II: Bio-molecules includes all organic & in-organic constituents
Choose the correct statement
a) Both Statement 1 and Statement 2 are true.
b) Statement 1 is true and Statement 2 is false.
c) Statement 1 is false and Statement 2 is true.
d) Both Statement 1 and Statement 2 are false.
3. Which of the following elements has highest % weight in human body
a) H b) C c) O d) N
4. The 'ash' obtained from completely burnt organic matter contains
a) Carbon b) Hydrogen c) Oxygen d) Calcium
5. An amino acid is regarded as zwitter ion because
a) It has ionizable amino group into positive charge
b) It has ionizable carboxylic acid group into negative charge
c) Both a & b d) Ionizable R functional group
6. Which of the following is a neutral amino acid
a) Glutamic acid b) Lysine c) Aspartic acid d) Valine
7. Fatty acid and glycerol reacts to form lipids the chemical reaction involved is called?
a) Neutralization b) Reduction c) Oxidation d) Esterification
8. The components of a nucleoside are
a) Nitrogen base + Sugar b) Nitrogen base + Phosphate
c) Nitrogen base + Sugar + Phosphate d) Nitrogen + Sugar + Phosphate
9. Uridylic acid present in RNA has following components
a) Ribose sugar + Cytosine b) Deoxyribose sugar + Cytosine
c) Ribose sugar + Cytosine + Phosphate d) Deoxyribose sugar + Cytosine + Phosphate
10. Adenosine is a /an
a) Amino acid b) Purine c) Nucleoside d) Nucleotide

11. Thymine is a

- a) Purine present in DNA only b) Pyrimidine present in DNA only
c) Purine present in both DNA and RNA
d) Pyrimidine present in both DNA and RNA

12. Match the following

<i>Column 1</i>	<i>Column 2</i>
1. Alkaloids	i. Curcumin
2. Essential Oils	ii. Morphine
3. Drugs	iii. Rubber
4. Polymeric substances	iv. Lemon grass oil

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

13. Which of the following organic compound is not a biomacromolecule?

- a) Proteins b) Nucleic acids c) Polysaccharides d) Lipids

14. The most abundant protein in the whole biosphere is

- a) Collagen b) Chitin c) RuBisCO d) Insulin

15. Match the following

Proteins	Functions
1. Trypsin	i. Intercellular ground substances
2. Insulin	ii. Enables glucose transport into cells
3. GLUT-4	iii. Hormone for conversion of glucose into glycogen
4. Collagen	iv. Proteolytic Enzyme

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

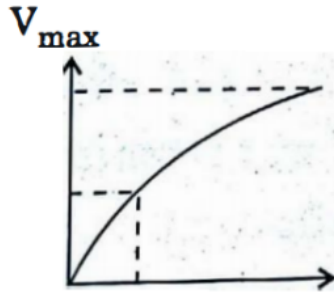
16. Which of the following is not a homo-polysaccharide?

- a) Cellulose b) Starch c) Inulin d) Glucosamine

17. Find out the wrongly matched pair:

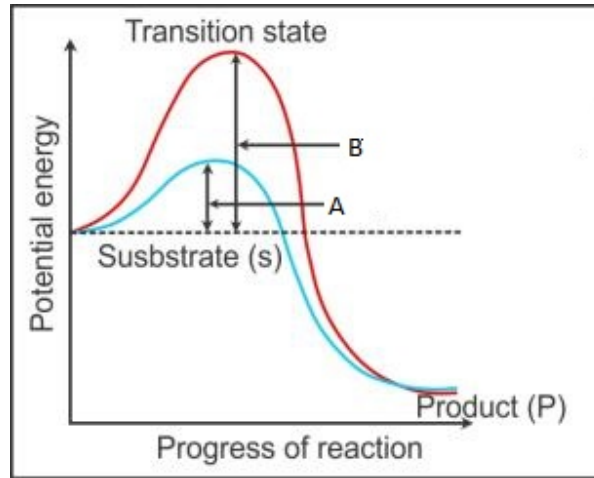
- a) Primary metabolite – Fatty acid b) Secondary metabolite – Concanavalin
c) Protein – GLUT – 4 d) Heteropolymer – Cellulose

18. The bond between 3'-carbon of one sugar of one nucleotide to the 5'-prime carbon of the sugar of the next nucleotide of DNA is
- a) Glycosidic bond b) Phosphodiester bond
c) Hydrogen bond d) Peptidyl bond
19. All of the following are composed of glucose except
- a) Starch b) Glycogen c) Cellulose d) Galactose
20. Which of the following metabolic pathways lead to formation of complex structure from a simpler structure is called
- a) Anabolism b) Catabolism c) Cellular respiration d) Digestion
21. The cofactors of an enzyme include
- a) Prosthetic groups b) Coenzymes c) Metal ions d) All of the above
22. Morphine is a/an
- a) Essential oil b) Lectin c) Pigment d) Alkaloid
23. **Statement I:** Bio macromolecules have molecular weight of 10,000 Daltons and above.
Statement II: Lipids with molecular weight of 800 Daltons are considered as bio macromolecules.
- Choose the correct statement
- a) Statement I & statement II are true b) Statement I is true & statement II is false
c) Statement I & statement II are false d) Statement I is false & statement II is true
24. The rate of a chemical reaction $S \rightarrow P$ is determined by the formula
- a) $r = \delta P / \delta t$ b) $r = \delta S / \delta t$ c) $r = \delta P / \delta S$ d) $r = \delta t / \delta P$
25. Consider the following statements
- A) Co-enzyme or metal ion that is tightly bound to enzyme protein is called prosthetic group
- B) A complete catalytic active enzyme with its bound prosthetic group is called apoenzyme
- Select the correct option:
- a) A is true but B is false b) A is false but B is true
c) Both A & B are false d) Both A & B are true
26. In a polysaccharide, monosaccharide units are linked by
- a) Peptide bond b) Phosphodiester bond c) Glycosidic bond d) Hydrogen bond
27. The following graph shows concentration of substrate on enzyme activity. What does the Y axis represent?



- a) Temperature b) Velocity of reaction c) pH d) Pressure
28. When enzyme succinic dehydrogenase is added to a mixture of substrates malonate and succinate, the rate of enzyme activity declines because of
- a) Increase in pH b) Decrease in pH
c) Decrease in concentration of substrate d) Competitive inhibition
29. Biomolecules are regarded as Biomacromolecules in which of the following conditions?
- a) The atomic weight of Biomolecules is greater than 1,000 Da.
b) The atomic weight of Biomolecules is greater than 10,000 Da.
c) The molecular weight is in the range of 1,000 Da and above.
d) The molecular weight is in the range of 10,000 Da and above
30. A typical fat molecule is made up of
- a) One glycerol & three fatty acid molecules
b) One glycerol & one fatty acid molecule
c) Three glycerol & three fatty acid molecules
d) Three glycerol molecules & one fatty acid molecule
31. Which one of the following statements is wrong?
- a) Cellulose is a polysaccharide b) Uracil is a pyrimidine
c) Glycine is a sulphur containing amino acid d) Sucrose is a disaccharide
32. Consider the following statement.
- A) The potential energy of transient state is more than potential energy of substrate
B) The difference between potential energy of transient state and that of substrate is called activation energy.
- a) Statement A is true & B is false
b) Statement A is false & B is true
c) Both statement A & B are true
d) Both statement A & B are false

33. Which of the following describes the given graph correctly?



- a) Endothermic reaction with energy A in the presence of enzyme & B in the absence of enzyme
- b) Exothermic reaction with energy A in the presence of enzyme & B in the absence of enzyme
- c) Endothermic reaction with energy A in the absence of enzyme & B in the presence of enzyme
- d) Exothermic reaction with energy A in the absence of enzyme & B in the presence of enzyme

34. Consider the following statements:

Statement I: Biomacromolecules have molecular weight greater than 10,000 Da.

Statement II: Lipids with 800 Da are regarded as biomacromolecules

- a) Statement I & statement II are true
- b) Statement I is true & statement II is false
- c) Statement I & statement II are false
- d) Statement I is false & statement II is true

35. Transition state structure of the substrate formed during an enzymatic reaction is

- a) Transient but stable
- b) Permanent but unstable
- c) Transient & unstable
- d) Permanent & stable

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

1 Mark Each

(Ribozyme, Nucleic acids, Cytosine, proteins, Cellulose, Lowering, Vitamin niacin

Isomerases, Lyases, Lipids, Catabolic, Enzyme activity, Apoenzyme, Water, V_{max} /2)

1. Enzymes that catalyze interconversion of optical, geometric & positional isomers are _____
2. The most abundant chemical in living organism is _____
3. Biomacromolecules that do not act as storage form of energy is _____
4. A non-proteinaceous enzyme is _____
5. _____ is not a polymeric biomolecule
6. Pyrimidine found in both in DNA & RNA is _____
7. Antibodies that fights infectious agents belong to _____
8. Conversion of lactic acid to glucose is a _____ process
9. Chemically the cotton fiber is composed of _____
10. In chemical reaction enzymes catalyze the reaction by _____ the activation energy
11. _____ is a co-enzyme for the functioning of an enzyme
12. In the graph that represents enzyme activity with respect to pH, X-axis represents pH. Y-axis represents _____
13. K_m Value for enzyme is the substrate concentration to produce velocity of a reaction (V) to _____
14. Enzymes that catalyze removal of groups from substrate by mechanism other than hydrolyses are _____
15. The protein part of an enzyme is _____

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Differentiate between biomacromolecules and biomicromolecules
2. Proteins are regarded as heteropolymers. Substantiate
3. Differentiate between primary and secondary metabolites with examples.
4. Depending on the number of fatty acids reacting with a glycerol, identify the different types of lipids
5. Differentiate between essential and nonessential amino acids.
6. Give an example of a) Homopolysaccharides b) Heteropolysaccharides
7. Mention the four structures formed by folding of protein chain to become functional.
8. What is activation energy? How does it vary with or without enzyme?
9. Glucose and fructose have same molecular formula but different structural formula. Explain the class of enzymes required for their interconversion.

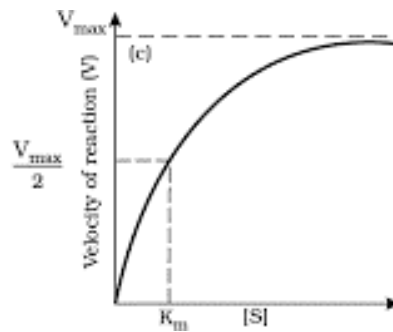
10. How does temperature affect the enzyme activity?

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. What are nucleotides? Mention the 5 types of nucleotides that make nucleic acids
2. Name the bonds between a) 2 nucleotides b) Amino acids
c) Nitrogen base and sugar of a nucleotide
3. With respect to enzyme activity considering the graph given below



- a) What is the parameter depicted on x-axis
 - b) What is maximum rate of reaction indicated?
 - c) If an inhibitor is added how would the curve change?
4. Mention the three types of Co-factors associated with enzymes.
 5. Identify the following secondary metabolites a) Coloured b) Scents c) Medicines
 6. Lipids are not strictly macromolecules. Substantiate

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

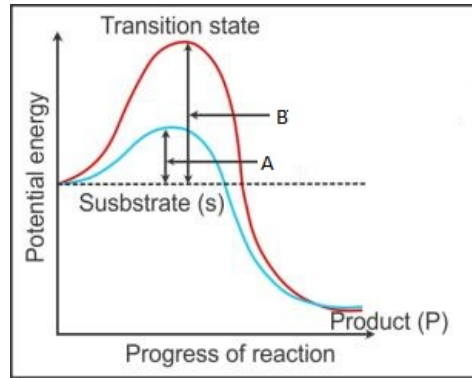
1. Classify the various classes of enzymes based on type of reaction they catalyze.
2. List any five functions of proteins with examples.
3. Name the following:
 - a) The protein part of the enzyme.
 - b) The organic compound bound to protein part of the enzyme
 - c) An example of prosthetic group.
 - d) Co factor for the enzyme carboxypeptidase
 - e) The nucleic acid that behave as enzyme.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. a) If 100 moles of product is formed in 20 seconds, calculate the rate of the chemical reaction. (2)

b) Analyze the below graph and answer



i) Is it an exothermic or endothermic reaction? How? (2)

ii) What does A and B indicate. (1)

2. Name the following:

- a) Most abundant chemical in living organism
- b) Most abundant protein in the whole biosphere
- c) Most abundant protein in animal kingdom
- d) Storage form of carbohydrate in animal.
- e) Energy source of carbohydrate in plant tissues

3. Considering E for enzyme and S for substrate. Depict the nature of enzyme action. Explain the four steps of catalytic cycle of an enzyme.

4. To analyze the chemical composition of a living tissue, the tissue is either dissolved and filtered or burnt to analyze the ash- incorporate the above clues and explain two methods of biochemical analysis.

CHAPTER 10
CELL CYCLE AND CELL DIVISION
PART - A

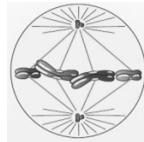
I. Select the correct alternative from the choices given below: 1 Mark Each

1. The sequence of events by which a cell duplicates its genome, synthesises the other constituents of cell and eventually divides into two daughter cells is termed as ____
a) Replication b) Cell cycle c) Mutation d) Amitosis
2. Yeast can progress through the cell cycle in about ____
a) 90 minutes b) 60 minutes c) 30 minutes d) 15 minutes
3. Identify the correct statement with regard to G₁ phase (Gap 1) of interphase.
a) DNA synthesis or replication takes place.
b) Cytoplasmic division takes place.
c) Cell is metabolically active, grows but does not replicate its DNA.
d) Nuclear division takes place.
4. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G₀). This process occurs at the end of
a) M phase b) G₁ phase c) S phase d) G₂ phase
5. Cells in G₀ phase
a) Terminate the cell cycle b) Exit the cell cycle
c) Enter the cell cycle d) Suspends the cell cycle.
6. The correct sequence of phases of cell cycle is
a) G₁ → S → G₂ → M b) M → G₁ → G₂ → S
c) G₁ → G₂ → S → M d) S → G₁ → G₂ → M.
7. During cell growth, DNA synthesis takes place on
a) S phase b) G₁ phase c) G₂ phase d) M phase.
8. A cell that has just completed the S phase of its cell cycle has
a) Twice the number of chromosomes and four times the amount of DNA
b) Four times the number of chromosomes and twice the amount of DNA
c) Twice the number of chromosomes and twice the amount of DNA
d) Same number of chromosomes but twice the amount of DNA
9. During which phase of cell cycle, amount of DNA in a cell increases to 4C level if the initial amount is denoted as 2C?
a) G₂ b) G₁. c) S d) M

10. Spindle fibres are attach to
- a) Centromere of the chromosome b) Kinetosome of the chromosome
 c) Telomere of the chromosome d) Kinetochore of the chromosome.
11. Which of the following is not a characteristic feature during mitosis in somatic cells?
- a) Chromosome movement b) Synapsis
 c) Spindle fibres d) Disappearance of nucleolus
12. A stage in cell division is shown in the figure. Select the answer which gives correct identification of the stage with its characteristics.



- a) Prophase - Nuclear envelope and Nucleolus disappear.
 b) Metaphase – Spindle fibres attach to kinetochores of chromosomes
 c) Anaphase – Centromeres split, chromatids separate and move to opposite poles
 d) Telophase - Nuclear envelope and Nucleolus reforms.
13. A stage of mitosis is shown in the diagram. Select the answer which gives correct identification of the stage with its characteristics.



- a) Metaphase - Spindle fibres attached to kinetochores, chromosomes moved to spindle equator.
 b) Telophase- Nuclear envelope and Nucleolus reforms
 c) Anaphase - Centromeres split and chromatids separate and start moving away.
 d) Prophase - Chromosomes move to spindle equator.
14. The formation of the new cell wall begins with the formation of a simple precursor called _____
- a) Cell plate b) Metaphase plate c) Quiescent phase d) Telophase plate
15. Dissolution of the synaptonemal complex occurs during
- a) Pachytene b) Zygotene c) Diplotene d) Leptotene
16. Select the mismatch:
- a) Zygotene – Synapsis b) Pachytene – Crossing over

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

2 Marks Each

(Centriole, Interphase, Metaphase plate, Tetrad, Cell plate, Interkinesis, Karyokinesis, Anaphase, Bivalent, Anaphase I)

1. In a cell cycle, _____ represents the phase between two successive M phases.
2. The separation of daughter chromosomes corresponding to nuclear division is _____
3. In animal cells, during the S phase _____ duplicates in the cytoplasm.
4. The plane of alignment of the chromosomes at the metaphase is referred to as _____
5. Chromatids move to opposite poles during _____
6. _____ represents the middle lamella between the walls of two adjacent cells.
7. The complex formed by a pair of synapsed homologous chromosomes is called a _____
8. Homologous chromosomes separate while sister chromatids remain associated at their centromeres during _____
9. The stage between two meiotic divisions is called _____
10. During Telophase II, the nuclear membrane and nucleolus reappear, cytokinesis follows resulting in _____ of cells.

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. What is cell cycle? What is the time taken by yeast to progress through cell cycle?
2. Name the two basic phases of cell cycle.
3. What happens during the M phase of cell cycle?
4. Mention the four phase of Mitosis.
5. Mitosis is called as equational division. Justify.
6. Name the organelles which disappear at the end of prophase in mitosis?
7. Write the key features of metaphase of mitosis.
8. Write the key events of Anaphase of mitosis.
9. How syncytium condition is formed in some organisms? Give an example.
10. Differentiate between Animal and Plant mitotic division with respect to ploidy.
11. Write the key events of Metaphase I of Meiosis I.
12. Write the key events of Anaphase I of Meiosis I.
13. Write the key events of Prophase II of Meiosis II
14. Write the key events of Metaphase II of Meiosis II.

15. Write the key events of Anaphase II of Meiosis II
16. Write the key events of Telophase II of Meiosis II

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Explain the interphase of cell cycle.
2. Draw a neat labelled diagram of cell cycle.
3. Enumerate the significance of Mitosis.
4. Write the significance of Meiosis.
5. Explain Prophase of Mitosis.
6. Explain Telophase of mitosis.
7. Explain Telophase I of Meiosis I.
8. Write a note on Diplotene of Prophase I of Meiosis I.
9. Write a note on Pachytene of Prophase I of Meiosis I.
10. Name the cell organelles which reappear after Telophase in mitosis.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

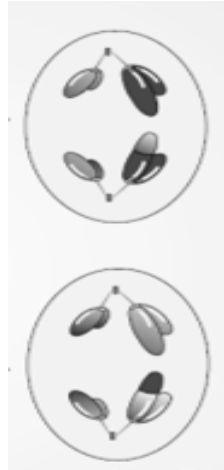
1. Explain the events of cell cycle.
2. Explain the stages of mitosis.
3. Describe the events of Prophase I of Meiosis I.
4. Differentiate between Mitosis and Meiosis.
5. Explain Meiosis II.
6. Explain Cytokinesis in plant cell and animal cell.
7. With respect to meiosis define: a) Bivalent b) Recombination nodules
c) Crossing over d) Recombination e) Chiasmata

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Identify the events of Meiosis based on the description given.
 - a) Lasts for several months or years in oocytes of some vertebrates.
 - b) Homologous chromosomes separate while sister chromatids remain associated at their centromeres.

- c) Marks the end of Meiosis; cytokinesis follows resulting in the formation of tetrad of cells.
 - d) Final stage of Prophase I marked by terminalisation of chiasmata.
 - e) Nuclear membrane and nucleolus reappear, cytokinesis follows and is called dyad of cells.
2. Identify the stage of meiosis and write its characteristic features.



CHAPTER 11
PHOTOSYNTHESIS IN HIGHER PLANTS

PART – A

I. Select the correct alternative from the choices given: 1 Mark Each

1. Which pigments acts directly to convert light energy to chemical energy?
a) Chlorophyll a b) Chlorophyll b c) Xanthophyll d) Carotenoid
2. Which of the following absorb light energy for photosynthesis
a) Chlorophyll b) Water molecule c) O₂ d) RuBP
3. Photosystem II occurs in
a) Cristae of mitochondria b) Grana of chloroplast
c) Stroma of chloroplast d) Lipid bilayer of cell membrane
4. The reaction centre in PSII has an absorption maximum at
a) 780 nm b) 680 nm c) 700 nm d) 660 nm
5. Which of the following is not a product of light reaction of photosynthesis?
a) ATP b) NADH c) NADPH d) Oxygen
6. Splitting of water is associated with
a) Photosystem I b) Lumen of thylakoid
c) Both photosystem I and II d) Inner surface of thylakoid membrane
7. In a chloroplast the highest number of protons are found in
a) Intermembrane space b) Antennae complex
c) Stroma d) Lumen of thylakoids
8. Read the following four statements, (i), (ii), (iii) and (iv) and select the right option having both correct statements.
(i) Z scheme of light reaction takes place in presence of PSI only.
(ii) Only PSI is functional in cyclic photophosphorylation.
(iii) Cyclic photophosphorylation results into synthesis of ATP and NADPH₂.
(iv) Stroma lamellae lack PSII as well as NADP.
a) (ii) and (iv) b) (i) and (ii) c) (ii) and (iii) d) (iii) and (iv)
9. Cyclic photophosphorylation results in the formation of
a) ATP and NADPH b) ATP, NADPH and O₂ c) ATP d) NADPH
10. Dark reaction in photosynthesis is called so because
a) It can occur in dark also b) It does not depend on light energy

- a) Increasing atmospheric CO₂ concentration up to 0.05% can enhance CO₂ fixation rate.
- b) C₃ plants respond to higher temperature with enhanced photosynthesis while C₄ plants have much lower temperature optimum.
- c) Tomato is a greenhouse crop which can be grown in CO₂-enriched atmosphere for higher yield.
- d) Light saturation for CO₂ fixation occurs at 10% of full sunlight.

23. Given below are two statements:

Statement I: The primary CO₂ acceptor in C₄ plants is phosphoenolpyruvate and is found in the mesophyll cells.

Statement II: Mesophyll cells of C₄ plants lack RuBisCo enzyme.

In the light of above statements choose the most appropriate answer from the options given below.

- a) Statement I is incorrect but statement II is correct
- b) Both statements I and statement II are correct
- c) Both statement I and statement II are incorrect
- d) Statement I is correct but statement II is incorrect

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket: 1 Mark Each

(Chlorophyll a, Grana, Cytochromes, CO₂, Regeneration, Chemiosmotic hypothesis, Kranz, Photophosphorylation, 10%, PEPcase)

1. In photosynthesis, light reactions take place in _____ region of chloroplast.
2. _____ is chief pigment associated with photosynthesis.
3. The electron transport system consists of _____.
4. The synthesis of ATP from ADP and inorganic phosphate in the presence of light is called _____.
5. The mechanism of ATP synthesis in photosynthesis was explained by _____.
6. The stages of CO₂ fixation in C₃ plants are carboxylation, reduction and _____.
7. In C₄ plants bundle sheath cells of leaves have special type of anatomy called _____.
8. The bundle sheath cells of leaves of C₄ plants are rich in an enzyme RuBisCO, but lack _____.
9. Light saturation occurs at _____ of the full sunlight.
10. The availability of _____ is limiting to C₃ plants.

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Photosynthesis is important for two reasons. What are they?
2. Name the hydrogen donor of green plants and purple and green sulphur bacteria.
3. Draw a labelled diagram of a chloroplast.
4. Mention the names of photosynthetic pigments.
5. What is a photosystem? Mention its components.
6. Differentiate between PSI and PSII.
7. Explain how oxygen is evolved by splitting of water.
8. Explain why non-cyclic photophosphorylation (z-scheme) occurs only in grana lamellae but not in stroma lamellae.
9. Only ATP molecules are produced in cyclic phosphorylation, but not NADPH. Why?
10. List the end products of light reaction.
11. Even though dark reaction is not light dependent, it is indirectly dependent on the light. Discuss.
12. How many molecules of ATP and NADPH are required to produce one molecule of Glucose?
13. Name the two different carboxylase enzymes involved in C₄ pathway.
14. "Photorespiration is a wasteful process." Justify.
15. RuBisCO is an enzyme that acts both as carboxylase and oxygenase. Justify
16. Mention the external factors that influence the rate of photosynthesis.

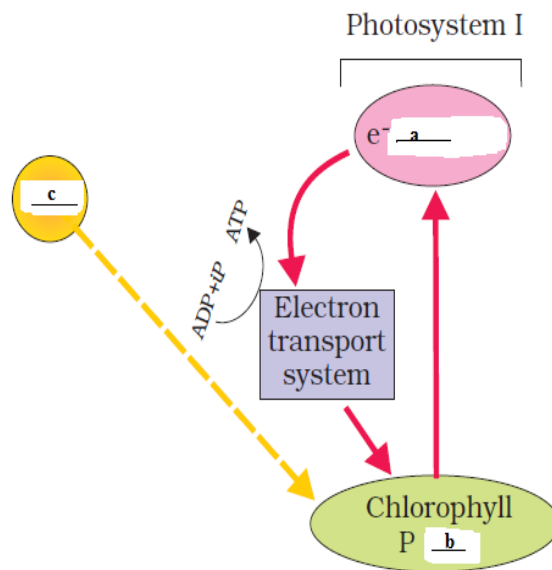
PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Explain half leaf experiment to show the necessity of CO₂ for photosynthesis.
2. Suppose a plant has high concentrations of chlorophyll-b, xanthophylls and carotenoids. It lacks chlorophyll-a. Can it carry out photosynthesis? Then why do the plants have these pigments?
3. Give the schematic representation of the cyclic photophosphorylation.
4. Name the two parts of ATPase enzyme. What are their roles?
5. The possible location of cyclic photophosphorylation is stroma lamellae. Justify with reasons.

6. Briefly describe the stages of Calvin cycle.
7. Explain 'Kranz' anatomy found in the leaves of C₄ plants.
8. Photorespiration occurs only in C₃ plants but not in C₄ plants. Why?
9. Productivity of C₄ plants is more than C₃ plants. How?
10. $2\text{H}_2\text{O} \rightarrow 4\text{H}^+ + \text{O}_2 + 4\text{e}^-$ Based on this equation answer the following questions.
 - a) Where does this reaction take place in plants?
 - b) What is the significance of this reaction?
11. Complete the flow chart for cyclic photophosphorylation by filling the blanks a, b and c.



PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

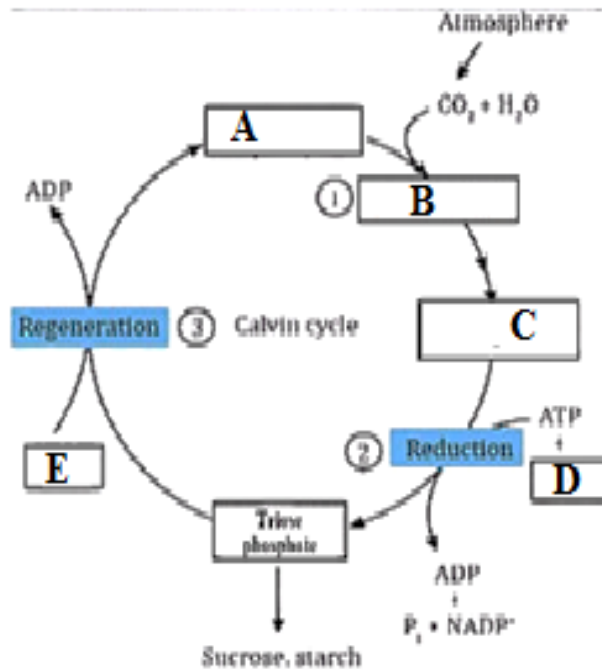
5 Marks Each

1. Explain the Z scheme of light reaction.
2. Schematically represent non-cyclic photophosphorylation.
3. Differentiate between cyclic and non-cyclic photophosphorylation.
4. Diagrammatically represent Calvin cycle or C₃ cycle.
5. Schematically represent Hatch and Slack pathway or C₄ pathway.
6. Explain C₄ pathway or Hatch and Slack pathway of CO₂ reduction.
7. Differentiate between C₃ and C₄ plants.
8. Explain the Blackman's law of limiting factor by taking the example of light as one of the factor.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Breakdown of proton gradient across the thylakoid membrane leads to synthesis of ATP. Describe how it occurs?
2. What are the special anatomical features displayed by leaves of C₄ plants? How do they provide advantage over the structure of C₃ plants?
3. Calvin pathway occurs in all the mesophyll cells of C₃ plants. In the C₄ plants, it does not take place in the mesophyll cells but only in the bundle sheath cells. Justify.
4. Study the schematic representation of Calvin cycle and answer the questions that follow.



- a) Which is the primary CO₂ acceptor A?
- b) Name the enzyme required for carboxylation B.
- c) Mention the compound formed from the carboxylation C.
- d) How many NADPH molecules are required for synthesis of one glucose molecule in reduction stage D.
- (e) How many ATP molecules are required to form RuBP during regeneration E?

CHAPTER 12
RESPIRATION IN PLANTS

PART – A

I. Select the correct alternative from the choices given: 1 Mark Each

1. Given below are two statements.

Statement I: ATP is used at two steps in glycolysis.

Statement II: First ATP is used in converting glucose into glucose-6-phosphate and second ATP is used in conversion of fructose-6-phosphate into fructose-1, 6-diphosphate.

Select the correct answer from the options given below:

- a) Statement I is incorrect but statement II is correct
 - b) Both statements I and statement II are correct
 - c) Both statement I and statement II are incorrect
 - d) Statement I is correct but statement II is incorrect
2. Conversion of glucose to glucose-6-phosphate in glycolysis is catalysed by
- a) Phosphofructokinase b) Aldolase c) Hexokinase d) Enolase
3. End product of glycolysis is
- a) Acetyl CoA b) Pyruvic acid c) Glucose 1-phosphate d) Fructose 1-phosphate
4. In which one of the following processes CO₂ is not released?
- a) Aerobic respiration in plants b) Aerobic respiration in animals
 - c) Alcoholic fermentation d) Lactic acid fermentation
5. When yeast ferments glucose, the products obtained are
- a) Ethanol and CO₂ b) Methanol and CO₂ c) Ethanol and water d) Water and CO₂
6. Tricarboxylic acid cycle starts with the condensation of acetyl group with
- a) Malic acid (b) Citric acid (c) Succinic acid (d) Oxaloacetic acid
7. The number of substrate level phosphorylations in one turn of citric acid cycle is
- a) Zero (b) One (c) Two (d) Three
8. Where is respiratory electron transport system (ETS) located in plants?
- a) Mitochondrial matrix (b) Outer mitochondrial membrane
 - c) Inner mitochondrial membrane (d) Intermembrane space
9. Which statement is wrong for Krebs' cycle?
- a) There is one point in the cycle where FAD⁺ is reduced to FADH₂.
 - b) During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesised.

- c) The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid.
- d) There are three points in the cycle where NAD^+ is reduced to $\text{NADH} + \text{H}^+$.
10. Mitochondria produce cellular energy in the form of
 a) NADPH b) ATP c) CTP d) TTP
11. Oxidative phosphorylation is
 a) Formation of ATP by transfer of phosphate group from a substrate to ADP
 b) Oxidation of phosphate group in ATP
 c) Addition of phosphate group to ATP
 d) Formation of ATP by energy released from electrons removed during substrate oxidation
12. In mitochondria, protons accumulate in the
 a) Outer membrane b) Inner membrane c) Intermembrane space d) Matrix
13. End products of aerobic respiration are
 a) Sugar and oxygen b) Water and energy
 c) Carbon dioxide, water and energy d) Carbon dioxide and energy
14. The end products of oxidative phosphorylation is
 a) NADH b) ATP and water c) ADP d) Oxygen
15. Aerobic respiratory pathway is appropriately termed
 a) Parabolic b) Amphibolic (c) Anabolic (d) Catabolic
16. Respiratory Quotient (RQ) value of tripalmitin is
 a) 0.09 b) 0.9 c) 0.7 d) 0.07
17. Respiratory Quotient (RQ) is ratio of
 a) CO_2 produced to substrate consumed b) CO_2 produced to water consumed
 c) Oxygen consumed to water produced d) Oxygen consumed to CO_2 produced
18. What is the net gain of ATP when each molecule of glucose is converted to two molecules of pyruvic acid?
 a) Eight (b) Four (c) Six (d) Two
19. Mitochondria are called powerhouses of the cell. Which of the following observations support this statement?
 a) Mitochondria synthesize ATP b) Mitochondria have a double membrane
 c) The enzymes of the Krebs' cycle and the cytochromes are found in mitochondria
 d) Mitochondria are found in almost all plants and animals

20. Match the list-I with list-II.

List-I

- A. Molecular oxygen
- B. Electron acceptor
- C. Pyruvate dehydrogenase
- D. Decarboxylation

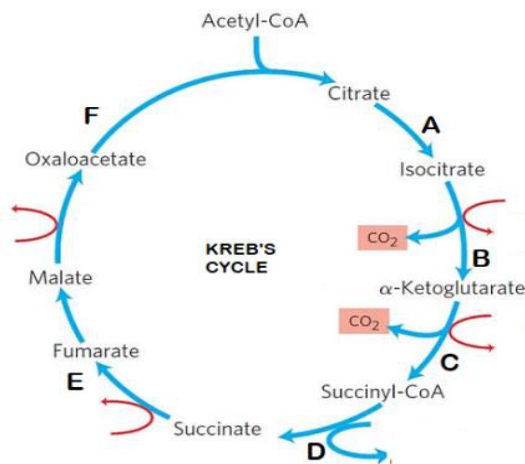
List-II

- i. α -Ketoglutaric acid
- ii. Hydrogen acceptor
- iii. Cytochrome C
- iv. Acetyl Co A

Choose the correct answer from the options given below:

- a) A- ii B-iv C-iii D-i
- b) A- iii B-i C-ii D-iv
- c) A- ii B-iv C-i D-iii
- d) A- iii B-iv C-ii D-i

21. Each steps of TCA cycle is labelled from A – F, which among these is the substrate level phosphorylation?



- a) A b) C c) D d) E

22. Which of the following will release more energy on oxidation?

- a) 1 gm of fat b) 1 gm of protein
- c) 1 gm of glucose d) 0.5 gm of protein + 0.5 gm of glucose

II. Fill in the blanks by choosing the appropriate word/words from those given in the bracket: 1 Mark Each

(Glycolysis, Pyruvic acid, Lactic acid, Electron transport system, Mitochondrial matrix, Oxidative phosphorylation, ATP, Respiratory substrates, Oxidative decarboxylation, Amphibolic)

1. The compounds that are oxidized during respiration are known as _____.
2. _____ occurs in the cytoplasm of the cell.
3. The end product of glycolysis is _____.
4. Pyruvate, which is the end product of glycolysis after entering into mitochondrial matrix, undergoes _____.
5. During exercise when oxygen is inadequate for cellular respiration in muscle cells, the pyruvic acid is reduced to _____.
6. The NADH synthesized in glycolysis is transferred to mitochondria and undergoes _____.
7. The Krebs' cycle operates in the _____ of cell.
8. The metabolic pathway through which the electron passed from one carrier to another is called _____.
9. F₀-F₁ particles participate in the synthesis of _____.
10. The respiratory pathway is known as _____ pathway as it involves both anabolism and catabolism.

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Name the respiratory substrates other than glucose.
2. Mention two steps of glycolysis where ATP is utilized.
3. List two steps of glycolysis where ATP is synthesized.
4. List the two types of fermentation.
5. Name the following event:
 - a) Conversion of glucose to pyruvic acid.
 - b) Conversion of pyruvate into ethyl alcohol.
6. Differentiate alcoholic fermentation from lactic acid fermentation.
7. "Aerobic respiration is more efficient". Justify the statement.
8. Do you know any step in the TCA cycle where there is a substrate level phosphorylation? Which one?
9. Oxygen is an essential requirement for aerobic respiration but it enters the respiratory process at the end. Discuss.
10. RQ (Respiratory Quotient) = A/B. What do A and B stand for?

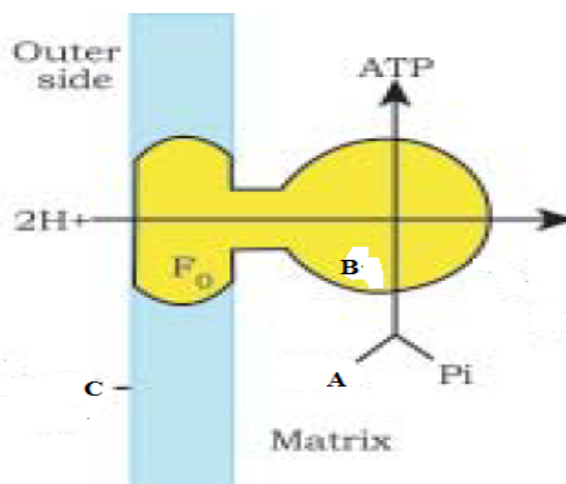
11. What is respiratory quotient? Write RQ value for proteins.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Plants can get along without respiratory organs. Substantiate the statement with three valid reasons.
2. What are the main steps in aerobic respiration?
3. Draw a diagram to show ATP synthase in mitochondria.
4. Distinguish between aerobic respiration and fermentation.
5. Based on need what are the three pathways that decide metabolic fate of pyruvate?
6. Write a note on oxidative decarboxylation of pyruvate in mitochondria.
7. Write the formula to derive RQ value. Mention the RQ value of fats and glucose.
8. Given below is a diagram showing ATP synthesis during aerobic respiration, replace the symbols A, B and C by appropriate terms.



PART- D

V. Answer the following questions in 200-250 words each, wherever applicable:

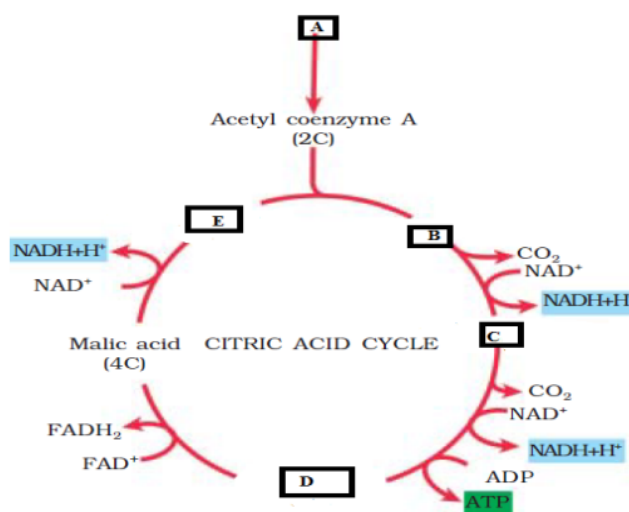
5 Marks Each

1. Give the schematic representation of glycolysis.
2. Explain the steps of glycolysis.
3. Give schematic representation of Tricarboxylic acid cycle/Citric acid cycle.
4. Briefly explain the events of Krebs' cycle.
5. Discuss 'the respiratory pathway is an amphibolic pathway'.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Answer the following:
 - a) In yeast and bacteria incomplete oxidation of glucose is achieved under anaerobic conditions. Illustrate the steps involved in it. (3M)
 - b) Mention the steps in which ATP are utilized during glycolysis. (2M)
2. List the complexes that are involved in electron transport system of inner mitochondrial membrane along with their names.
3. Answer the following:
 - a) Where does glycolysis occur? (1M)
 - b) Name the end product of glycolysis. (1M)
 - c) Trace the fate of end product in both aerobic and anaerobic respiration. (3M)
4. Schematic representation of citric acid cycle is given below. Fill in the boxes labelled as A, B, C, D, and E with suitable products produced during citric acid cycle.



CHAPTER 13

PLANT GROWTH AND DEVELOPMENT

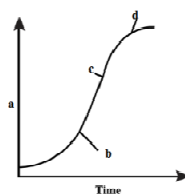
PART A

I. Select the correct alternative from the choices given below: 1 Mark Each

- The cell derived from meristems differentiates and regain the capacity to divide by a phenomenon called
 - Differentiation
 - Dedifferentiation
 - Redifferentiation
 - Regeneration
- Fruit and leaf drop at early stages can be prevented by the application of
 - Ethylene
 - Auxins
 - Gibberellic acid
 - Cytokinins
- The phenomenon called 'apical dominance' in plants is due to a phytohormone
 - Cytokinins
 - Auxins
 - ABA
 - Gibberellins
- Which of the following is not a physiological effect of auxin?
 - Initiates rooting in stem cuttings.
 - Promotes flowering
 - Prevents fruit and leaf drop at early stages
 - Promotes bolting
- Which of the following hormones does not occur naturally in plants?
 - GA
 - ABA
 - 2,4-D
 - IAA
- The potent weed killer is
 - Gibberellin
 - 2,4- D
 - Abscisic acid
 - Ethylene
- Gibberellins can promote seed germination because of their influence on
 - Rate of cell division
 - Production of hydrolyzing enzymes
 - Synthesis of abscisic acid
 - Absorption of water through hard seed coat.
- Spraying sugarcane crop with a plant hormone increases the length of the stem, thus increasing the yield by as much 20 tonnes per acre. The plant hormone is
 - Gibberellin
 - Auxin
 - Cytokinin
 - Abscisic acid
- Which of the following phytohormones promotes male flowering and parthenocarpy?
 - Auxin
 - Gibberellin
 - Cytokinin
 - Abscisic acid
- The rosette habit of cabbage can be promoted by application of
 - IAA
 - GA
 - ABA
 - Ethaphon
- Foolish seedling disease of rice led to the discovery of
 - Abscisic acid
 - Cytokinin
 - 2, 4- D
 - Gibberellin
- Cytokinin is not found in

- a) Root apex b) Shoot apex c) Young fruits d) Mature fruits
13. Which of the following is a growth regulator produced by plants?
 a) Naphthalene acetic acid b) Zeatin
 d) 2,4-Dichlorophenoxyacetic acid d) Benzyl aminopurine
14. Which of the following is not an effect of ethylene?
 a) Promotes senescence and abscission of plant organs
 b) Breaks seed and bud dormancy c) Helps to overcome apical dominance
 d) Hastens fruit ripening
15. Natural growth hormone is
 a) NAA b) Ethylene c) 2, 4, 5-T d) 2, 4-D
16. The phytohormone which induces triple response is
 a) IAA b) ABA c) GA₃ d) C₂H₄
17. Identify the incorrect statement about ABA growth regulator.
 a) It increases the tolerance of plants against different stresses.
 b) It acts as general plant growth inhibitor and inhibitor of metabolism
 c) It helps in seed maturation and dormancy
 d) It promotes morphogenesis and differentiation of shoots.
18. Which of the following growth regulator is known as ‘Stress hormone’?
 a) Abscisic acid b) Ethylene c) GA₃ d) Indole acetic acid
19. Abscisic acid is known as stress hormone because it
 a) Breaks seed dormancy b) Induces flowering
 c) Promotes leaf fall d) Promotes closure of stomata
20. Foolish seedling disease in rice seedlings is caused by
 a) *Penicillium notatum* b) *Gibberella fujikuroi*
 c) *Aspergillus niger* d) *Neurospora crassa*
21. Gibberellic acids were identified by
 a) Francis Darwin b) F. W. Went c) E. Kurosawa d) F. Skoog
22. Cytokinins were discovered by
 a) Skoog and Miller b) F. W. Went c) E. Kurosawa d) Cousins
23. **Statement I:** 2, 4 –D is used as herbicide to kill monocot weeds.
Statement II: It is used to prepare weed – free lawns by gardeners.
 a) Statement I is true, statement II is false. b) Statement I is false, statement II is true.
 c) Both the statements I and II are true. d) Both the statements I and II are false.

24. Given below is an ideal sigmoid growth curve. Identify the correct options for a, b, c, d.



- a) a - lag phase, b – exponential phase, c – stationary phase, d – size of the organ
 b) a – size of the organ, b - lag phase, c – exponential phase, d – stationary phase
 c) a - lag phase, b – exponential phase, c – size of the organ, d – stationary phase
 d) a – exponential phase, b - lag phase, c – stationary phase, c – size of the organ

25. **Statement I:** Abscisic acid is called as stress hormone.

Statement II: Abscisic acid acts as an antagonist to Gibberellic acids.

- a) Statement I is true, statement II is false. b) Statement I is false, statement II is true.
 c) Both the statements I and II are true. d) Both the statements I and II are false.

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

1 Mark Each

(NAA, Meristem, Growth rate, Plasticity, Protoplasm, Sigmoid curve, Ethylene, Bolting, Ethephon, *Gibberella fujikuroi*, Apical dominance, Abscisic acid, Zeatin, Growth, F. W. Went)

1. An irreversible permanent increase in size of an organ or its parts or a cell is called _____.
2. Primary growth in plants is due to the presence of _____ cells, located in their body.
3. Increase in _____ is difficult to measure.
4. The increased growth per unit time is termed as _____ .
5. _____ is a characteristic of living organism growing in a natural environment.
6. _____ is the ability of plants to follow different pathways in response to environment to form different kinds of structure.
7. Auxins were isolated by _____ from tips of coleoptile of oat seedlings.
8. Bakane disease of rice seedlings was caused by _____ .
9. The volatile substance _____ was identified as fruit ripening hormone by H.H. Cousins.
10. _____ is a phenomenon in which growing apical bud inhibits the growth of lateral buds.
11. _____ is a synthetic auxin.
12. Internode elongation just prior to flowering is called _____ .
13. The cytokinin isolated from corn-kernel and coconut milk is _____ .
14. _____ is also called the stress hormone.

15. _____ is a source of ethylene which hastens fruit ripening in tomatoes and apples.

PART - B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Differentiate between growth and development.
2. Mention the cause for a) Elongation of the plant body.
b) Increase in girth of the organs.
3. Graphically represent the ideal sigmoid growth curve of higher plants.
4. Differentiate between dedifferentiation and redifferentiation.
5. Define plasticity. Give example.
6. Heterophylly is an example for plasticity. Justify.
7. What are plant growth regulators? Mention the types with examples.
8. Mention the causal agent and symptom of bakane disease.
9. Give an example each for natural and synthetic auxins.
10. Differentiate between abscission and senescence.
11. What is respiratory climactic? Name the growth hormone responsible for it.
12. Abscisic acid is called as stress hormone. Give reason.
13. Name the gaseous PGR. Mention its application.
14. Ethylene is both a growth promoter and an inhibitor. Justify the statement.
15. Explain the role abscisic acid as a a) Growth inhibitor b) Stress hormone.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Briefly explain the phases of growth.
2. Define growth curve. Give the mathematical expression for linear and exponential growth.
3. Define the terms: a) Differentiation b) Dedifferentiation c) Redifferentiation
4. Graphically represent the sequence of the developmental process in a plant cell.
5. Briefly explain the physiological effects of auxins.
6. Briefly explain the physiological effects of gibberellins.
7. Briefly explain the physiological effects of cytokinins.
8. Briefly explain the physiological effects of Ethylene.
9. Briefly explain the physiological effects of Abscisic acid.
10. Auxins are used to prepare weed-free lawns by gardeners. Justify with example.

CHAPTER 14

BREATHING AND EXCHANGE OF GASES

PART A

I. Select the correct alternative from the choices given below: 1 Mark Each

- The entry of food into the larynx is prevented by
a) Peritonium b) Epiglottis c) Diaphragm d) Peritoneum
- Trachea terminates into
a) Bronchi b) Bronchial tree c) Atrium d) Alveoli
- Which of the following is not a step in human respiration?
a) Pulmonary ventilation b) Alveolar diffusion of O₂ and CO₂
c) Utilization of CO₂ by cells for catabolic reactions.
d) Transport of gases by blood.
- Vital capacity is
a) TV + IRV b) TV + ERV c) RV + ERV d) TV + IRV + ERV
- To generate pressure gradients to facilitate expiration and inspiration, the human body uses the intercostals muscles and
a) Alveolar sacs b) Diaphragm c) Windpipe d) Bronchi
- Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration, because of
a) Inspiratory reserve volume b) Tidal volume
c) Expiratory reserve volume d) Residual volume
- Amount of air in the lungs that remains after deep breathing is called
a) Dead space b) Residual volume c) Vital capacity d) Ventilation rate
- The volume of air left in the lungs after forceful expiration and after normal expiration is respectively called
a) Tidal volume and expiratory capacity
b) Residual volume and expiration capacity
c) Residual volume and functional residual capacity
d) Vital capacity and functional residual capacity
- The volume of air that will remain in the lungs after a normal expiration is
a) Vital capacity b) Functional residual capacity
c) Residual volume d) Total lung capacity

10. The volume of air that can be breathed in by maximum forced inspiration over and above the normal inspiration is called
- a) Expiratory reserved volume b) Inspiratory reserved volume
c) Vital capacity d) Inspiratory capacity
11. Tidal air in mammalian lungs is
- a) Air that normally goes in and out of lungs during breathing.
b) Total maximum air that can be drawn into lungs.
c) Air that is left in the lungs after normal expiration.
d) Air that can be expelled out from lungs forcibly after normal expiration
12. The inspiratory reserve volume + tidal volume + expiratory reserve volume is same as
- a) Inspiratory capacity + Expiratory reserve volume
b) Total lung capacity – Functional reserve volume
c) Inspiratory capacity + Functional residual capacity
d) Inspiratory capacity + Residual volume
13. The volume of air which remains in the conducting airways and is not available for gas exchange is called
- a) Vital capacity b) Functional residual capacity
c) Forced expiratory volume d) Anatomical dead space
14. The volume of 'anatomical dead space' air is normally
- a) 230 mL b) 210 mL c) 190 mL d) 150 mL
15. In which of the following subjects the dead space is highest?
- a) Old man b) Old woman c) Young man d) Young woman
16. The volume of air involved in breathing movements can be estimated by using
- a) Spirometer b) Osmometer c) Respirometer d) Aerometer
17. What is the percentage of O₂ transported by RBCs in the blood?
- a) 90% b) 98% c) 100% d) 97%
18. Out of total CO₂ transported by RBCs, 70% is transported in the form of
- a) Carbonate b) Bicarbonate c) Carbo-amine d) Bicarbo-amine
19. O₂ can bind with haemoglobin in a reversible manner to form
- a) Haemoxyglobin b) Oxyhaemoglobin
c) Oxygenoglobin d) Carboxyglobin
20. How many oxygen molecules could be carried by a single molecule of haemoglobin?
- a) 2 b) 4 c) 6 d) 8

21. **Statement I:** Oxygen dissociated curve is a sigmoid curve.
Statement II: It is highly useful in studying the effect of factors like $p\text{CO}_2$, H^+ concentration on binding of O_2 with haemoglobin.
- a) Statement I is true, statement II is false.
 b) Statement I is false, statement II is true.
 c) Both the statements I and II are true.
 d) Both the statements I and II are false.
22. Emphysema is a chronic respiratory disorder, in which the organ affected is
 a) Alveolar walls b) Bronchi c) Bronchioles d) Pleural membrane
23. Wheezing due to inflammation of bronchi and bronchioles is the result of
 a) Emphysema b) Asthma
 c) Bronchitis d) Occupational respiratory disorders
24. Identify the incorrect statement.
 a) Major amount of CO_2 is transported by RBCs in the form of bicarbonate.
 b) CO_2 is carried by haemoglobin as carbamino-haemoglobin.
 c) Alveolar walls are damaged in asthma.
 d) Epiglottis prevents the entry of food into the larynx.
25. Epiglottis prevent the entry of food into
 a) Pharynx b) Larynx c) Trachea d) Bronchi
26. Select the incorrect match:
 A) Inspiratory capacity - IV + IRV
 B) Functional Residual Capacity - ERV + RV
 C) Vital Capacity - ERV + TV + IRV
 D) Total lung Capacity - RV + ERV + IRV
27. Match the items listed under column I with those given under column II. Choose the appropriate option from the given choices.

Column I	Column II
A) Residual volume	i) 2500 – 3000 mL
B) Tidal volume	ii) 1000 – 1100 mL
C) Inspiratory Reserve Volume	iii) 1100 – 1200 mL
D) Expiratory Reserve Volume	iv) 6000 – 8000 mL
a) A-i, B-ii, C-iii, D-iv	b) A-ii, B-iii, C-iv, D-i
c) A-iii, B-iv, C-i, D-ii	d) A-iv, B-i, C-ii, D-iii

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

1 Mark Each

(Tidal volume, Emphysema, Skin, Oxyhaemoglobin, Expiration, Five, Tidal volume, Residual volume, Carbamino-haemoglobin, Larynx, Gills, Medulla, Sigmoid, Lungs, Alveoli)

1. _____ is a cartilaginous box, helps in sound production.
2. When intra-pulmonary pressure is higher than atmospheric pressure, _____ takes place.
3. Inspiratory capacity includes _____ and inspiratory reserve volume.
4. The volume of air remaining in the lungs even after a forcible expiration _____ .
5. _____ are the primary sites of exchange of gases.
6. Oxygen can bind with haemoglobin in a reversible manner to form _____ .
7. CO₂ is carried by haemoglobin as _____ .
8. _____ is a chronic disorder in which alveolar walls are damaged.
9. The respiratory organ in fishes are _____ .
10. Cutaneous respiration is a mode of respiration in frogs, where _____ is the organ of respiration.
11. The volume of air inspired or expired during a normal respiration is _____ .
12. Respiratory rhythm centre is located in _____ region of brain.
13. 100 ml of oxygenated blood can deliver around _____ ml of O₂ to the tissues.
14. _____ is the shape of the oxygen dissociation curve.
15. Functional Residual Capacity is the volume of air that will remain in _____ after a normal expiration.

PART - B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Mention the various respiratory organs found in different forms of organisms.
2. Mention the organs of human respiratory system.
3. Differentiate expiration and inspiration.
4. Intra pulmonary pressure is the cause for inspiration and expiration. Justify.
5. What is tidal volume (TV)? Mention the value of TV of a normal man.
6. What is Inspiratory Reserve Volume (IRV)? Mention the average value of IRV of human.

7. What is Expiratory Reserve Volume (ERV)? Mention the average value of ERV of human.
8. What is Residual Volume (RV)? Mention the average value of RV of human.
9. Differentiate between Inspiratory capacity and Expiratory capacity.
10. Differentiate between residual capacity and functional residual capacity.
11. Differentiate between vital capacity and total lung capacity.
12. What is partial pressure (pO)? What is the pO of O₂ and CO₂ in alveoli?
13. Give the graphical representation of oxygen dissociation curve.
14. Explain the causes and effects of occupational respiratory disorder.
15. Mention the major cause and the organ affected in emphysema.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Mention the functions of the following organs of respiration
 a) Larynx b) Respiratory membrane c) Glottis
2. Explain the role of diaphragm and rib cage in the breathing process.
3. Briefly explain any three disorders of human respiratory system.
4. Mention the organs of respiration affected in the following respiratory disorders:
 a) Asthma b) Emphysema c) Occupational Respiratory Disorders
5. Give an example of organism in which the respiratory organ is
 a) Gills b) Skin c) Lungs
6. Describe the role of haemoglobin in oxygen transport.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

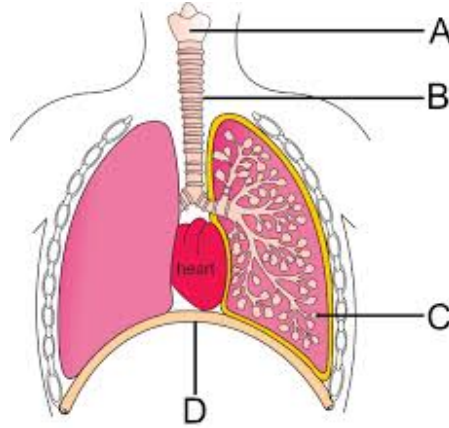
5 Marks Each

1. Mention the steps involved in human respiration.
2. Write the diagrammatic view of human respiratory system.
3. Briefly explain the transportation of CO₂ in human blood during respiration.
4. Briefly explain the transportation of O₂ in human blood during respiration.
5. Briefly explain the process of regulation of respiration in human.
6. Explain the conducting part of the respiratory system in man. How it is adapted to purify air?

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. a) Diagrammatic view of human respiratory system is given below. Identify the parts labelled as A, B, C and D. (2)



- b) Give the functions of A, B, C. (3)
2. Steps involved in human respiration are given below. Arrange them in a definite order.
- a) Transport of gases by the blood.
 - b) Diffusion of O_2 and CO_2 between blood and tissues.
 - c) Diffusion of O_2 and CO_2 across alveolar membrane.
 - d) Breathing or pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
 - e) Utilization of O_2 by the cells for catabolic reactions and resultant release of CO_2 .
3. Alveoli are the primary sites of exchange of gases. Diffusion of gases occurs in the alveolar region only not in other parts of the respiratory system. Why?
4. Give the significances of the following during human respiratory process.
- a) Oxyhaemoglobin
 - b) Bicarbonate
 - c) Carbamino-haemoglobin
 - d) Carbonic anhydrase
 - e) Respiratory rhythm centre.
5. Graphically represent the path of transportation of respiratory gases from nasal opening up to alveoli. (3)
- b) Give the functions of any organs in the path. (2)

CHAPTER 15
BODY FLUIDS AND CIRCULATION

PART – A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. The special fluids that transport materials all over the human body.
a) Blood b) Lymph c) Plasma d) Both a & b
2. The plasma without clotting factors is called:
a) Lymph b) Matrix c) Serum d) Pus
3. Which of the following is not required for clotting of blood?
a) Fibrinogen b) Heparin c) Thrombocytes d) Calcium ions
4. **Statement I:** RBC cells are formed in the red bone marrow in the adults and are destroyed in spleen.
Statement II: RBCs have lifespan of 120 days.
a) Both Statement 1 and Statement 2 are true
b) Both Statement 1 and Statement 2 are true
c) Statement 1 is true but Statement 2 is false.
d) Statement 1 is false but Statement 2 is true.
5. The most abundant WBC Cells are :
a) Neutrophils b) Eosinophils c) Basophils d) Lymphocytes
6. **Statement 1:** The blood exhibits coagulation in response to injury or trauma.
Statement 2: The Clot complex is formed by a series of linked enzymatic reactions.
a) Both Statement 1 and Statement 2 are true
b) Both Statement 1 and Statement 2 are true
c) Statement 1 is true but Statement 2 is false.
d) Statement 1 is false but Statement 2 is true.
7. Which of the following is not function of lymph?
a) Immune response. b) Carrier for nutrients
c) Absorption of fat d) Carrier of oxygen
8. Vertebrates possess muscular chambered heart. The number of chambers is 2, 3 & 4 respectively.
a) Fishes, Amphibians, Reptiles. b) Amphibians, Reptiles, mammals.
c) Reptiles, Fishes, mammals. d) Fishes, Amphibians, mammals.

9. The only reptile with four chambered heart is:
 a) Lizards b) Crocodile c) Snakes d) Salamanders
10. **Statement 1:** In Amphibians the left atrium receives oxygenated blood from gills, lungs, skin.
Statement 2: Gills, lungs & skins are the respiratory organs.
 a) Both Statement 1 and Statement 2 are true.
 b) Both Statement 1 and Statement 2 are true.
 c) Statement 1 is true but Statement 2 is false.
 d) Statement 1 is false but Statement 2 is true.
11. **Statement 1:** Mature vertebrates RBCs always lack nucleus.
Statement 2: Mature vertebrates use haemoglobin to carry oxygen.
 a) Both Statement 1 and Statement 2 are true.
 b) Both Statement 1 and Statement 2 are true.
 c) Statement 1 is true but Statement 2 is false.
 d) Statement 1 is false but Statement 2 is true.
12. Human heart is derived from which of the germ layers
 a) Ectoderm b) Endoderm c) Mesoderm d) All germ layers
13. **Statement 1:** The opening between right atrium and right ventricle is guarded by Mitral valves
Statement 2: The valves help in flow of blood in heart in one direction.
 a) Both Statement 1 and Statement 2 are true.
 b) Both Statement 1 and Statement 2 are true.
 c) Statement 1 is true but Statement 2 is false.
 d) Statement 1 is false but Statement 2 is true.
14. The duration of cardiac cycle is
 a) 0.8 sec b) 8.0 sec c) 0.1 sec d) 1.0 sec.
15. In ECG graph the QRS complex represents.
 a) Depolarisation of atria b) Depolarisation of ventricles
 c) Repolarisation of atria. d) Repolarisation of ventricles
16. Tunica intima, tunica media, tunica externa, all these represent the wall layers of
 a) Heart. b) Artery only c) Veins d) Both b & c
17. The rate of heart beat is not
 a) Auto regulated. b) Controlled by sympathetic nerve

- c) Para sympathetic nerves. d) Adrenal medullary hormones

18. **Statement 1:** Human heart is set to be myogenic.

Statement 2: A special centre in medulla oblongata moderates the cardiac function through ANS.

- a) Both Statement 1 and Statement 2 are true and reason is the correct explanation.
 b) Both Statement 1 and Statement 2 are true but reason is not correct explanation.
 c) Statement 1 is true but Statement 2 is false.
 d) Statement 1 is false but Statement 2 is true.

19. Match the following:

Coloumn 1	Coloumn 2
1. Atherosclerosis	i. Acute chest pain
2. Angina	ii. Not pumping enough blood
3. Heart failure	iii. Narrow arteries
4. Heart attack	iv. Heart stops beating
5. Cardiac arrest	v. Heart muscle is damaged

- a) 1-ii, 2-iv, 3-i, 4-iii, 5-v b) 1-iii, 2-v, 3-ii, 4-i, 5-iv c) 1-ii, 2-i, 3-v, 4-iv, 5-iii
 d) 1-i, 2-iii, 3-v, 4-iv, 5-ii e) 1-iii, 2-i, 3-ii, 4-v, 5-iv

20. In the subsequent pregnancy of a mother with foetus would cause severe anaemia and jaundice to the baby. This condition occurs when the blood group of mother, father & foetus are respectively

- a) Rh+ve, Rh-ve & Rh+ve. b) Rh-ve, Rh-ve & Rh+ve
 c) Rh+ve, Rh+ve & Rh+ve d) Rh-ve, Rh+ve & Rh+ve

21. If a patient affected by dengue is said to have less platelet count. The normal count is:

- a) 1, 50,000 – 3, 50,000/mm³ b) 2, 50,000 – 3, 50,000/ mm³
 c) 2, 00,000 – 3, 50,000/ mm³ d) 3, 00,000 – 4, 40,000/ mm³

22. In mammals the oxygenated and deoxygenated blood are pumped without any mixing up because of :

- a) One atria and one ventricle. b) Two atria and one ventricle
 c) One atria and two ventricles d) Two atria and two ventricles

23. **Statement I:** SAN is responsible for initiating and maintaining the rhythmic contractile activity of the heart.

Statement II: SAN is called the pacemaker.

- a) Both Statement 1 and Statement 2 are true.
 - b) Both Statement 1 and Statement 2 are true.
 - c) Statement 1 is true but Statement 2 is false.
 - d) Statement 1 is false but Statement 2 is true.
24. When the blood pressure was measured of a person it is found that the systolic pressure was 143 & diastolic was 92 conclude the disorder:
- a) Hypertension.
 - b) Angina
 - c) Anaemia
 - d) Stress

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket: 1 Mark Each

(Lymphocytes, Tunica media, Open circulatory system, ABO incompatibility, 70-75/min., 12 – 16, Medulla oblongata, Thrombokinase, Cardiac muscle, Semi lunar, 70ml)

1. The healthy individual has _____ grams of haemoglobin per 100ml of blood.
2. A patient receiving a blood transfusion from a donor with type A blood may experience clumping and destruction of red blood cells (RBCs) due to _____.
3. The enzyme involved in blood clotting is _____.
4. The fluid present in the lymphatic system contains _____.
5. During the dissection of cockroach, the blood is found filled in body cavity such a circulatory path way is called _____.
6. The type of specialised muscle present in heart wall is _____.
7. The SAN can generate maximum no. of action potential of _____.
8. The second heart sound (dub) is associated with closure of the _____ valves.
9. The vein differs from artery in having a thin _____ layer.
10. The special neural centre is located in _____ of brain that moderates the cardiac function.

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Which are the two fluid tissues present in human body
2. Blood is the connective tissue devoid of fibres. Mention the main components.
3. How are Spleen and bone marrow associated with RBC?
4. Name the two types of agranulocytes.
5. Differentiate between open and closed circulatory system with example.

6. Differentiate between artery and vein.
7. How does the effect of sympathetic and parasympathetic neural signals effect the rate of heart beat.
8. What is stroke volume giving its numeric value?
9. The cardiac output of healthy individual is about 5000 ml. Mention the two parameters involved.
10. The heart sounds are of clinical diagnostic significance. Substantiate.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Name the three proteins present in blood plasma.
2. Mention the secretions of basophils that are involved in anti-inflammatory reactions.
3. Name the three formed elements of blood tissue.
4. Conclude on studying the blood report of subject A, B & C with the following results
A) Had high Eosinophil count. B) 3 million RBC/ mm³ C) 80,000 platelets/ mm³
5. Explain the three steps involved in coagulation of blood.
6. Mention the three different types of granulocytes and their significance.
7. A & B antigens are present on RBC membrane. Mention the probable blood groups and the antibodies present in plasma.
8. A mother immediately after the delivery of the first child was administered with anti-Rh antibodies. Give reason.
9. Give an account of any three disorders of circulatory system.
10. Differentiate between a) Heart failure b) Cardiac arrest c) Heart attack
11. Give the diagrammatic presentation of a standard ECG.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

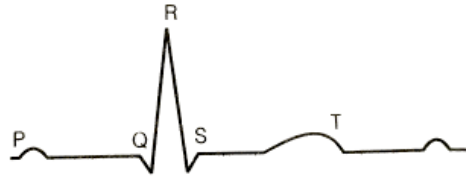
5 Marks Each

1. Draw a neat labelled diagram of section of human heart.
2. Explain the process of initiation and conduction of heart beat in humans.
3. What is cardiac cycle? Mention the stages involved.
4. The birds have double circulation as a requirement for flight. Substantiate.
5. Write a note on neural & hormonal regulation of cardiac activity.
6. Write a note on conditions and symptoms of erythroblastosis foetalis.

VI. Answer the following questions in 200-250 words each, wherever applicable:

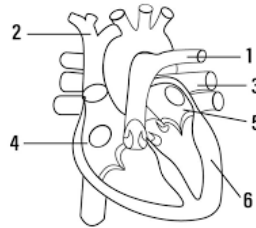
5 Marks Each

1. Refer to the ECG of a normal human being below and answer the questions.



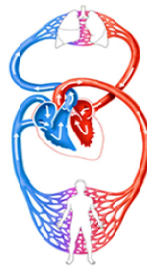
- a) Expand ECG. (1)
- b) What does P, QRS, T indicates? (2)
- c) ECG has diagnostic signification. Justify. (2)

2. Answer the following questions about the section of human heart given below.



- a) Label the parts marked 1 & 3. What is special about these? (2)
- b) Label the parts marked 4 & 5. What is the common dividing wall between them called? (2)
- c) Why is labelled part 6 comparatively so thicker? (1)

3. Refer to the diagram given below:



- a) What is depicted in the figure? (1)
- b) Mention the two types of circulation involved as per the figure. (2)
- c) Construct a flow chart for each of the circulation. (2)

CHAPTER 16
EXCRETORY PRODUCTS AND THEIR ELIMINATION

PART – A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. Terrestrial animals produce lesser toxic nitrogenous waste for conservation of water called.

- a) Sodium chloride. b) Ammonia c) Urea d) Uric acid

2. Match the following:

<i>Coloumn 1</i>	<i>Coloumn 2</i>
1. Protonephridia	i. Human
2. Nephridia	ii. Cockroach
3. Malphigian tubules	iii. Prawns
4. Green glands	iv. Planaria
5. Kidneys	v. Earthworm

- a) 1-ii, 2-iv, 3-i, 4-iii, 5-v b) 1-iii, 2-v, 3-ii, 4-i, 5-iv
 c) 1-ii, 2-i, 3-v, 4-iv, 5-iii d) 1-i, 2-iii, 3-v, 4-iv, 5-ii
 e) 1-iv, 2-v, 3-ii, 4-iii, 5-I

3. Which of the following is excreted with minimum loss of water?

- a) Ammonia. b) Urea c) Uric acid d) Both a and b

4. **Statement 1:** The medulla region of kidney is made up of medullary pyramids.

Statement 2: The extension of cortex between the medullary pyramids is called columns of Bertini.

- a) Statement I & statement II are true b) Statement I is true & statement II is false
 c) Statement I & statement II are false d) Statement I is false & statement II is true

5. Which of the following is not part of renal tubules?

- a) PCT b) DCT c) Henle's Loop d) Peritubular capillaries

6. The cortical nephrons lac

- a) PCT b) DCT c) Henle's Loop d) Vasa recta

7. **Statement 1:** Glucose & ammonia acids are re-absorbed by active process.

Statement 2: Re-absorption of glucose and ammonia does not require energy.

- a) Statement I & statement II are true b) Statement I is true & statement II is false

- c) Statement I & statement II are false d) Statement I is false & statement II is true
8. GFR in a healthy individual is approximately.
 a) 100ml/minute b) 125 ml/minute c) 200 ml/minute d) 500 ml/day
9. **Statement 1:** Mammals have the ability to produce concentrated urine.
Statement 2: The Henle's Loop and Vasa recta play significant role by forming counter current pattern.
 a) Statement I & statement II are true b) Statement I is true & statement II is false
 c) Statement I & statement II are false d) Statement I is false & statement II is true
10. **Statement I:** ADH produced by neurohypophysis causes increase in blood pressure.
Statement II: ANF produced by the heart decreases blood pressure by vasodilatation.
 a) Statement I & statement II are false b) Statement I is false & statement II is true
 c) Statement I & statement II are true d) Statement I is true & statement II is false
11. **Statement 1:** DCT & collecting duct concentrate the filtrate about 4 times from 300 mOsmolL⁻¹ to 1200 m OsmolL⁻¹
Statement 2: The mechanism of concentration of filtrate in the kidneys is an excellent method of conservation of water.
 a) Statement I & statement II are false b) Statement I is false & statement II is true
 c) Statement I & statement II are true d) Statement I is true & statement II is false
12. **Statement:** 1/5 th of the blood pumped by the heart in a minute is filtered by the kidneys
Statement II: On an average 1100- 1200 ml of blood is filtered by the kidneys in a minute.
 a) Statement I & statement II are false b) Statement I is false & statement II is true
 c) Statement I & statement II are true d) Statement I is true & statement II is false
13. The epithelial cells of Bowman's capsule are called?
 a) Renal cells. b) Podocytes c) Slit pores d) Vasa recta
14. Vasa recta is absent in :
 a) Cortical nephrons
 b) Medullary nephrons
 c) Juxta medullary nephrons
 d) All nephrons of xeric animals

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

1 Mark Each

(Micturition reflex, Glycosuria, 8g/ml, Liver, 25 – 30 grams, Renal calculi, ammonia, Renin, Angiotensin II, Glomerulus)

1. _____ is a hormone released to activate JG cells to bring back of GFR to normal.
2. Kidneys do not play any significant role in excretion of _____.
3. Ammonia produced by metabolism is converted to urea in _____.
4. The tuft of capillaries formed from afferent arterioles is called _____.
5. If the concentration of initial filtrate is 2g/ml then the concentration of urine produced by human kidneys would be _____.
6. _____ activates adrenal glands to produce aldosterone.
7. A healthy adult human on an average excretes _____ of urea per day.
8. The neural mechanism causing release of urine is called _____.
9. The condition of presence of glucose in urine which is indicative of diabetes mellitus is called _____.
10. Insoluble mass of crystalized salts formed within the kidney is _____.

PART – B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

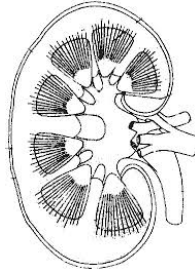
1. Differentiate between uricotelic and ureotelic animals with examples.
2. Bony fishes are set to be ammonotelic. Give reason.
3. Define the terms: a) Glycosuria b) Ketonuria
4. Counter current mechanism involves which two structures of the kidney.
5. Mention the two main parts of a nephron.
6. Differentiate between afferent arteriole and efferent arteriole.
7. What conclusion would you draw by comparing the volume of filtrate formed to be 180 litres/ day to volume of urine released as 1.5 litres?
8. With respect to permeability to water differentiate the two loops of Henle's loop
9. Mention the two effects of aldosterone on nephron.
10. Malfunctioning of the kidneys can lead to accumulation of urea in blood. What is the condition called? How can it be corrected?

PART – C

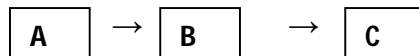
IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Classify the animals based on excretory products.
2. Mention the three processes involved in urine formation.
3. Skin also helps in elimination of excretory waste. Substantiate.
4. In the diagram of L.S. of kidney



- a) Name the outer tough layer of the kidney
 - b) Mention the two zones within.
5. In regulatory role in kidney function where fall in GFR activates J G cells release A, which converts inactive B in blood to active B and further to C. Identify



6. In case of uremic patients, how can urea be removed from blood. Explain the process.
7. Define the terms: a) Glycosuria b) Ketonuria c) Uremia
8. Describe any three disorders of excretory system.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable.

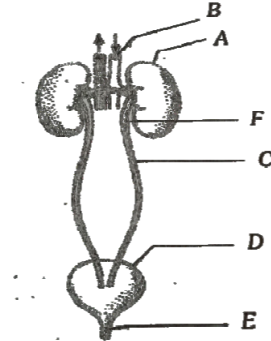
5 Marks Each

1. Draw a neat labelled diagram of human urinary system.
2. Draw a labelled diagram of L.S of human kidney.
3. Categorize the following animals based on the nitrogenous excretory products:
 - a) Aquatic Amphibians
 - b) Terrestrial Amphibians
 - c) Reptiles
 - d) Bony fishes
 - e) Marine fishes

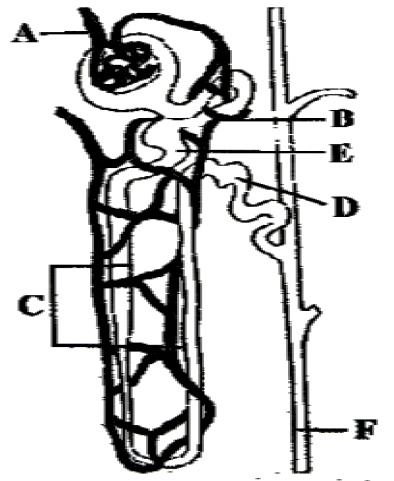
VI. Answer the following questions in 200-250 words each, wherever applicable.

5 Marks Each

1. Answer the following questions with reference to the diagram given below.



- a) The artery that supplies blood to the kidneys.
 - b) Labelled part C connects kidneys to part Identify C&D.
 - c) Name the sphincter present at the tip of E.
 - d) What is the role of part D?
 - e) Renal vein join which major vein that opens into right atria of the heart.
2. With respect to the diagram below mention the parts of nephron involved.



- a) Glomerular filtration
- b) Tubular secretion
- c) Counter current mechanism
- d) The efferent arteriole forming fine capillary network around renal tubule.
- e) Maximum reabsorption of electrolytes and water occurs.

CHAPTER 17
LOCOMOTION AND MOVEMENT
PART - A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. In human beings, skeletal system is made p of
a) 208 bones b) 206 bones c) 204 bones d) 205 bones
2. Inflammation of joints due to accumulation of uric acid crystals is called
a) Arthritis b) Gout c) Osteoporosis d) Tetany
3. Sarcoplasmic reticulum is a store house of
a) Ferric ions b) Ferrous ions c) Calcium ions d) Magnesium ions
4. **Statement I:** Mechanism of muscle contraction is best explained by sliding filament theory.
Statement II: Contraction of muscle fibre takes place by the sliding of thick filaments over the thin filaments.
a) Statement I is true, statement II is false.
b) Statement I is false, statement II is true.
c) Both the statements I and II are true.
d) Both the statements I and II are false.
5. The globular head of myosin contains
a) ATPase enzyme b) Calcium ions in large quantities c) ATP d) Troponin
6. Muscles of heart are
a) Striated and voluntary b) Non-striated and voluntary
c) Striated, unbranched and involuntary d) Striated, branched and involuntary
7. The striated appearance of a myofibril is due to the distribution pattern of
a) Actin and myosin b) Meromyosin c) Troponin d) Sarcoplasmic reticulum
8. The thick filament in muscles is polymerized protein of
a) Meromyosin b) Actin c) Troponin d) Tropomyosin
9. During muscle contraction in humans, the
a) Sarcomere does not shorten b) A band remains same
c) A, H, and I bands shorten d) Actin filaments shorten
10. Dark bands are
a) A- band b) B-band c) I-band d) Z-line

11. Name the ion responsible for unmasking of active sites for myosin for cross-bridge activity during muscle contraction.
- a) Calcium b) Magnesium c) Sodium d) Potassium
12. Lack of relaxation between successive stimuli in sustained muscle contraction is known as
- a) Tetanus b) Fatigue c) Gout d) Spasm
13. Anaerobic breakdown of glycogen due to repeated activation of muscles leads to the accumulation of
- a) Uric acid b) Lactic acid c) Glutamic acid d) Acetic acid
14. Choose the wrongly matched pair.
- a) Isotropic band - Actin
- b) Anisotropic band - Myosin
- c) Central part of I- band - M-line
- d) Central part of A-band - H-zone
15. In the resting muscle fibre tropomyosin partially covers
- a) Ca binding sites on troponin b) Actin binding sites on myosin
- c) Myosin binding sites on actin d) Ca binding sites on actin
16. Which one of the following sets of ions are necessary in the chemical events for muscle contraction?
- a) Na^+ and K^+ ions b) Na^+ and Ca^{++} ions
- c) Ca^{++} and Mg^{++} ions d) Na^+ and Mg^{++} ions
17. Pectoral girdle constitute
- a) Scapula and clavicle b) Radius and ulna
- c) Ilium and ischium d) Maxilla and mandible
18. In human beings the cranium is formed by
- a) Eight bones of which two are paired
- b) Fourteen bones of which six are paired
- c) Ten bones of which two are paired
- d) Twelve bones of which four are paired
19. The scapula is a large triangular flat bone situated in the dorsal part of the thorax between
- a) Second and seventh rib b) Third and fourth rib
- c) Fifth and sixth rib d) Second and fifth rib
20. Number of cervical vertebrae in humans is
- a) 7 b) 5 c) 12 d) 10

21. The pivotal joint between atlas and axis is a type of
- a) Cartilaginous joint b) Synovial joint
c) Saddle joint d) Fibrous joint
22. The ball and socket joint is found in
- a) Skull b) Shoulder c) Knee d) Atlas and axis
23. Select the correct statement with respect to locomotion in humans.
- a) The vertebral column has 10 thoracic vertebrae.
b) The joint between adjacent vertebrae is fibrous joint.
c) A decreased level of progesterone causes osteoporosis in old people.
d) Accumulation of uric crystals in joints causes their inflammation.
24. Select the correct matching of the type of the joints with the example in human skeletal system.

Type of joint

Example

- | | | |
|------------------------|---|---|
| a) Cartilaginous joint | - | Between frontal and parietal |
| b) Pivot joint | - | Between third and fourth cervical vertebrae |
| c) Hinge joint | - | Between humerus and pectoral girdle |
| d) Gliding joint | - | Between carpals |

25. Osteoporosis, an age-related disease of skeletal system, may occur due to
- a) Immune disorder affecting neuromuscular junction leading to fatigue.
b) High concentration of Ca^{++} and Na^{++} . c) Decreased level of estrogen.
d) Accumulation of uric acid leading to inflammation of joints.

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

(Sarcolemma, Sternum, Femur, Ciliary, Neurotransmitter, Sarcomere, Meromyosins, Mesodermal, Myoglobin, Amoeboid, Troponin, Hyoid, Gout, Lactic acid, Fascia)

- Cells like macrophages and leucocytes in blood exhibit _____ movement.
- Passage of ova through the female reproductive tract is facilitated by _____ movement.
- Muscle tissue has _____ origin.
- _____ is the plasma membrane of muscle fibre.
- The functional unit of contraction in a myofibril is called as _____ .
- Muscle bundles are held together by a common collagenous connective tissue layer called _____ .

7. A complex protein _____ is distributed at regular intervals on the tropomyosin.
8. Each myosin protein is composed of monomeric proteins called _____.
9. Acetyl choline acts as _____ to generate an action potential in the sarcolemma.
10. Repeated activation of muscles can lead to _____ accumulation.
11. White fibres possess less quantity of _____ .
12. A single U-shaped bone called _____ is present at the base of the buccal cavity.
13. _____ is a flat bone on the ventral midline of thorax.
14. The longest bone in human body is thigh bone, which is called as _____ .
15. _____ is the inflammation of joints due to accumulation of uric acid crystals.

PART - B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Compare skeletal muscles with cardiac muscles.
2. Differentiate between skeletal muscles and visceral muscles.
3. Write the difference between fascicles and fascia
4. List any 4 properties of muscle tissue.
5. Mention the proteins present in dark and light bands of myofibrils.
6. Name the bands formed by specific arrangement of proteins.
7. Write the complex proteins associated with actin.
8. Show diagrammatic representation of a sarcomere.
9. Draw a neat labelled diagram of actin filament.
10. Draw a neat labelled diagram of myosin monomer.
11. What is appendicular skeleton? Name the parts.
12. What is skull? Name its parts.
13. Mention the two sets of bones present in human skull.
14. Differentiate between red muscle fibres and white muscle fibres.
15. Differentiate between pectoral and pelvic girdles.
16. What is sarcoplasmic reticulum? How are sarcoplasmic reticulum and Ca^{++} related?

PART - C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks each

1. What is movement? With suitable example explain the types of movements.

2. Name the type of movement found in *Amoeba*, *Paramecium* and limbs of mammals.
3. Mention the types of movements exhibited by cells by human body.
4. Mention the types of muscles based on their location.
5. Define the following. a) Fascia b) Meromyosin c) Sternum
6. Depict diagrammatically formation and breaking of cross bridge.
7. Repeated muscle contraction causes accumulation of lactic acid. Why? What is the effect of it? Specify role of myoglobin.
8. Name the bones of middle ear.
9. Name the bones forming pelvic girdle
10. List the three types of ribs.
11. Enlist the parts of pectoral girdle.
12. Enlist the types of vertebrae?
13. Write a short note on ribcage.
14. List three types of joints.
15. Name any three disorders of skeletal system.
16. Explain significance of joints.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Describe in detail the structure of actin and myosin.
2. Explain the steps involved in sliding mechanism of muscle contraction.
3. What is skeletal system? Write two divisions of skeletal system.
4. Sketch the diagrammatic view of human skull.
5. Describe the bones of the skull in man.
6. Describe the vertebral column of man.
7. What is rib cage? List the parts of it.
8. Enlist the synovial joints and write the location of each joint.
9. Enlist the bones forming forelimb.
10. Enlist the bones forming hind limb.
11. What is a joint? Name different types of joints in the human skeletal system. Give one example for each.

12. Briefly explain the types of joints present in human skeletal system. Give any two examples for each.
13. Describe the disorders of human muscular and skeletal system.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Name the types of joint between the following:
 - a) Atlas and Axis
 - b) Phalanges
 - c) Femur and acetabulum
 - d) Pubic bone and pelvic girdle
 - e) Cranial bones
2. Name the location of the following synovial joints:
 - a) Ball and socket joint
 - b) Hinge joint
 - c) Pivot joint
 - d) Gliding joint
 - e) Saddle joint
3. Write true or false. If found false, correct the statement as true.
 - a) Actin is present in the thin filament.
 - b) H- zone of a striated muscle represents both thick and thin filaments.
 - c) Human skeleton has 206 bones.
 - d) There are 11 pairs of ribs in man.
 - e) Sternum is present on the ventral side of the body.

CHAPTER 18
NEURAL CONTROL AND COORDINATION

PART- A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. In human beings, the pairs of cranial nerves arising from the brain is
a) 12 b) 8 c) 24 d) 16
2. The part of the brain which controls body temperature is
a) Cerebellum b) Hypothalamus c) Corpus callosum d) Cerebral aqueduct
3. The bundle of axons in the central nervous system is known as
a) Neuron b) Ganglion c) Tract d) Nerve
4. Which of the following statements is correct regarding spinal cord?
a) It is composed of grey matter only.
b) It is composed of outer grey matter and inner colourless matter.
c) It is composed of outer white matter and inner grey matter.
d) It is composed of outer grey matter and inner white matter.
5. The brain stem is made up of
a) Midbrain, pons, cerebellum b) Midbrain, pons, medulla oblongata
c) Diencephalon, medulla oblongata, cerebellum
d) Cerebellum, cerebrum, medulla oblongata
6. Which of the following is not related to the autonomic nervous system?
a) Digestion b) Excretion c) Peristalsis d) Memory and learning
7. Myelin sheath is produced by
a) Astrocytes and Schwann cells b) Oligodendrocytes and osteoclasts
c) Osteoclasts and osteocytes d) Schwann cells and oligodendrocytes.
8. How many laminae are present in the grey matter of spinal cord?
a) Four b) Ten c) Eight d) Fifteen
9. Sympathetic nerve arises from
a) Thoracolumbar b) Thoracocranial c) Craniosacral d) Craniolumbar
10. Bipolar neurons are found in
a) Retina b) Choroid c) Cornea d) Sclera
11. Receptor sites for neurotransmitters are present on
a) Pre-synaptic membrane b) Tips of axons

- c) Post-synaptic membrane d) Membranes of synaptic vesicles
12. Which of the following is the main ion involved in nerve impulse transmission?
 a) Ca^{2+} b) Na^+ c) Mg^{2+} d) K^+
13. The primary neurotransmitter at the neuromuscular junction is
 a) Dopamine b) Adrenaline c) Acetylcholine d) Acetaldehyde
14. In cell body neuron, the granular bodies are called
 a) Starch granules b) Nissl's granules c) Protein crystals d) Ionic crystals
15. Junction between the axon ending of one neuron and dendrites of next neuron is termed as
 a) Neurilemma b) Ganglia c) Synapse d) Fasciculi
16. Nerve fibre gets depolarized when it acquires
 a) +ve charge on inner side b) +ve charge on outer side
 c) -ve charge on inner side d) Na^+ and K^+ from outside
17. During the propagation of a nerve impulse, the action potential results from the movement of
 a) K^+ ions from intracellular fluid to extracellular fluid
 b) Na^+ ions from extracellular fluid to intracellular fluid
 c) K^+ ions from extracellular fluid to extracellular fluid
 d) Na^+ ions from intracellular fluid to extracellular fluid.
18. Which is a characteristic of a graded potential?
 a) The amplitude is always the same b) The duration varies
 c) Always followed by a refractory period d) Is an all or none impulse
19. The nerve transmitter produced at the synapse and neuromuscular junction is
 a) GTP b) ATP c) Acetylcholine d) Phosphokinase
20. The junction of axon and Dendron is called
 a) Synaptic knob b) Pre synaptic membrane c) Synapse d) Synaptic vesicle
21. The electrical potential difference between outside and inside of a nerve axon before excitation is known as
 a) Resting potential b) Action potential c) Synaptic potential d) Ionic potential
22. In a medullated nerve fibre, the conduction of impulse is faster due to the presence of
 a) Pericytes b) Endoneurium and epineurium
 c) Nissl's granules d) Myelin sheath and nodes of Ranvier
23. When a neuron is in resting state i.e., not conducting any impulse, the axonal membrane is

- a) Comparatively more permeable to Na^+ ions and nearly impermeable to K^+ ions
 b) Equally permeable to both Na^+ and K^+ ions c) Impermeable to both Na^+ and K^+ ions
 d) Comparatively more permeable to K^+ ions and nearly impermeable to Na^+ ions.
24. Which of the following statements is wrong regarding conduction of nerve impulse?
 a) In a resting neuron, the axonal membrane is more permeable to K^+ ions and nearly impermeable to Na^+ ions.
 b) A neuron is polarized only when the outer surface of the axonal membrane possesses a negative charge and its inner surface is positively charged.
 c) Ionic gradients are maintained by Na-K pumps across the resting membrane, which transport 3 Na^+ ions outwards for 2 K^+ ions into the cell.
 d) Resting potential is the electrical potential difference across the resting membrane.
25. Unidirectional transmission of a nerve impulse through nerve fibre is due to the fact that
 a) Nerve fibre is insulated by a medullary sheath.
 b) Sodium pump starts operating only at the cyton and then continues into the nerve fibre.
 c) Neurotransmitters are released by dendrites and not by axon endings.
 d) Neurotransmitters are released by the axon ending and not by dendrites.

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket: **1 Mark Each**

(Resting potential, Corpora quadrigemina, Multipolar, Cranial meninges, Neurotransmitters, Nodes of Ranvier, Hypothalamus, Synapse, Action potential, Schwann cell, Cerebral cortex, Spinal cord, Corpus callosum, Arachnoid)

1. The central nervous system includes brain and _____ as the site of information processing and control.
2. The gaps between two adjacent myelin sheaths in a neuron are called _____ .
3. The electrical potential difference across the resting plasma membrane is called _____
4. Electrical current can flow directly from one neuron into another across _____ .
5. Dura mater and pia mater are the layers of _____ .
6. _____ are the tract of nerve fibres which connects the cerebral hemispheres.
7. Body temperature, urge for eating and drinking are controlled by _____ of the brain.
8. Four round swellings called _____ are found in dorsal portion of the midbrain.
9. _____ is referred as grey matter in forebrain.
10. _____ is a very thin layer present between dura mater and pia mater.
11. The gap between pre synaptic neuron and post-synaptic neuron are called _____ .

12. The electrical potential difference across the plasma membrane at the site A is called _____
13. The axon terminals contain vesicles filled with _____ .
14. One axon and two or more dendrites are found in a ___ neuron, present in cerebral cortex.
15. Unmyelinated nerve fibre is enclosed by _____ that does not form a myelin sheath around the axon.

PART - B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. Mention the two types of nerve fibres of the peripheral nervous system.
2. What are the two divisions of peripheral nervous system?
3. How autonomic neural systems are classified?
4. Differentiate between unipolar and a multipolar neuron.
5. Differentiate between synaptic knob and a synaptic cleft.
6. Differentiate between action potential and resting potential.
7. Differentiate between myelinated and non-myelinated neurons.
8. Mention the ions involved in generation and conduction of nerve impulse.
9. Differentiate between electrical synapse and chemical synapse.
10. Mention the functions of afferent fibres and efferent fibres in human neural system.

PART - C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Mention the parts of a neuron.
2. Draw a neat labelled diagram showing axon terminal and synapse.
3. Mention the functions of the following:
 - a) Hypothalamus
 - b) Medulla oblongata
 - c) Cerebral cortex
4. Define the terms:
 - a) Action potential
 - b) Synapse
 - c) Nerve impulse
5. Differentiate unipolar, bipolar and multipolar neurons.
6. Briefly explain the cause for generation of nerve impulse.
7. Explain the process of electrical synapse during transmission of nerve impulse.
8. Explain the process of chemical synapse during transmission of nerve impulse.
9. Mention the parts and functions of forebrain.
10. Mention the parts of hindbrain and regions connected by them.

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

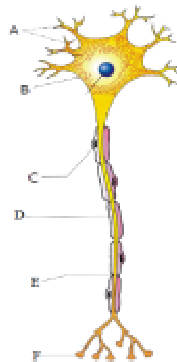
5 Marks Each

1. Draw a neat labelled diagram of structure of a neuron.
2. Draw a neat labelled diagram showing sagittal section of the human brain.
3. Briefly explain the process of transmission of impulses across the neurons.
4. List the functions of a) cerebrum b) cerebellum
5. What is a synapse? Explain the types of synapses of transmission of impulses.

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Give reasons for the following:
 - a) Transmission of impulse across electrical synapse is faster than across chemical synapse.
 - b) Neurotransmitters are present in vesicles of axon terminals.
 - c) Cerebral cortex is referred as grey matter.
 - d) The rise in the stimulus-induced permeability to Na^+ is extremely short lived.
 - e) Neurons are excitable cells.
2. a) Diagram showing the structure of a neuron is given below. Identify the parts labelled as A, B, C, D, E and F. (3)
b) Mentions the functions of the labelled parts A and F. (2)



3. Conduction of impulse through an axon is due to the presence of ion channels on the neural membrane. These ion channels are selectively permeable to different ions. Explain the permeability of membrane and the transport of ions across the membrane during conduction of impulse through one end to other end of the axon.

CHAPTER 19
CHEMICAL COORDINATION AND INTEGRATION

PART- A

I. Select the correct alternative from the choices given below: 1 Mark Each

1. Adenohypophysis consists of _____
 - a) Sella tursica
 - b) Pars distalis and Pars intermedia
 - c) Pars distalis and Pars nervosa
 - d) Pars intermedia and Sella tursica
2. Neurohypophysis is made up of
 - a) Pars distalis
 - b) Pars intermedia
 - c) Pars nervosa
 - d) Sella tursica
3. Select the incorrect statement with respect to hormones produced by hypothalamus
 - a) GnRH stimulates the pituitary synthesis and release of gonadotrophins.
 - b) Hormones reach the pituitary through portal circulatory system.
 - c) Regulate the functions of anterior pituitary.
 - d) Somatostatin stimulates the release of growth hormone from pituitary
4. GnRH, a hypothalamic hormone, needed in reproduction, acts on
 - a) Anterior pituitary gland and stimulates secretion of LH and FSH
 - b) Posterior pituitary gland and stimulates secretion of oxytocin and FSH
 - c) Posterior pituitary gland and stimulates secretion of LH and relaxin
 - d) Anterior pituitary gland and stimulates secretion of LH and oxytocin.
5. The synthesis and secretion of androgens from testis is stimulated by ____.
 - a) FSH
 - b) LH
 - c) GH
 - d) ACTH
6. Which is true about the posterior pituitary gland?
 - a) It consists of Pars distalis and Pars intermedia
 - b) It stores and releases hormones of the hypothalamus
 - c) It is not under direct neural regulation of the hypothalamus.
 - d) It synthesises Oxytocin and Vasopressin.
7. Which of the following hormones though synthesised elsewhere, is stored and released by the pituitary gland?
 - a) Prolactin
 - b) Melanocyte stimulating hormone
 - c) Antidiuretic hormone
 - d) Luteinising hormone
8. Diurnal rhythm of our body is regulated by _____
 - a) Melatonin
 - b) Thyroxine
 - c) Vasopressin
 - d) Thymosin

9. Hypothyroidism during pregnancy leads to defective development and maturation of the baby leading to _____
- a) Goitre b) Graves' disease c) Dwarfism d) Cretinism
10. Graves' disease is caused due to
- a) Hypo secretion of thyroid gland b) Hyper secretion of thyroid gland
c) Hypo secretion of adrenal gland d) Hyper secretion of adrenal gland
11. A pregnant female delivers a baby who suffers from stunted growth, mental retardation, low intelligence quotient, deaf mutism and abnormal skin. This is the result of
- a) Hypothyroidism b) Hyper secretion of growth hormone
c) Hyperthyroidism d) Hypo secretion of growth hormone.
12. Which is false about hormones of Fight or flight?
- a) Commonly called catecholamines b) Increase alertness, piloerection, etc
c) Decrease heart beat and rate of respiration d) Stimulate breakdown of glycogen.
13. The main glucocorticoid in our body is _____
- a) Cortisol b) Aldosterone c) Vasopressin d) Thyroxine
14. Presence of which of the following in urine are indicative of diabetes mellitus?
- a) Glucose b) Calculi c) RBC d) Albumin
15. Select the correct statement.
- a) Glucocorticoids stimulate gluconeogenesis.
b) Glucagon is associated with hypoglycaemia.
c) Insulin acts on pancreatic cells and adipocytes.
d) Insulin is associated with hyperglycemia.
16. Select the mismatch
- a) Pituitary gland – Diabetes insipidus b) Thyroid gland – Goitre
c) Adrenal gland - Addison's disease d) Pancreas - Graves' disease
17. Select the mismatch
- a) Insulin - Diabetes mellitus b) Thyroxin - Goitre
c) Corticoids - Diabetes insipidus d) Growth hormone - Acromegaly
18. Which hormone plays a significant role in regulating circulating levels of calcium ions?
- a) Aldosterone b) Progesterone c) Parathyroid hormone d) Prolactin
19. A temporary endocrine gland in the human body is
- a) Corpus callosum b) Corpus luteum c) Corpus albicans d) Pineal gland
20. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances

- a) Peptide, polypeptide, protein hormones b) Steroids
c) Iodothyronines d) Amino acid derivatives

29. Non endocrine tissues secrete hormones called _____

- a) Insulin b) Growth factors c) Glucagon d) Androgen

30. Select the incorrect statement regarding hormone action.

- a) Hormones bind to their receptor to form hormone receptor complex.
b) Hormones which interact with membrane bound receptors generate secondary messengers.
c) Hormones which interact with intracellular receptors regulate gene expression.
d) Hormones which interact with membrane bound receptors enter the target cell.

II. Fill in the blanks by choosing the appropriate word/ words from those given in the bracket:

1 Mark Each

(Hypothalamus, Acromegaly, Somatostatin, Sella tursica, hormones, isthmus, Vasopressin, Aldosterone, erythropoietin, Thyroid)

1. Non nutrient chemicals which act as intercellular messengers and are produced in trace amounts are _____
2. The basal part of diencephalon that regulates a wide spectrum of body functions is _____
3. _____ from the hypothalamus inhibits the release of growth hormone from pituitary.
4. Pituitary gland is located in a bony cavity called _____
5. Excess secretion of growth hormones in adults result in _____
6. _____ stimulates reabsorption of water and electrolytes by distal tubules and reduces diuresis.
7. The two lobes of the thyroid gland are interconnected with a thin flap of connective tissue called _____
8. Regulation of the basal metabolic rate is done by hormones of the _____
9. _____ acts on renal tubules and stimulates the reabsorption of Na^+ and water and excretion of K^+ and phosphate ions.
10. Juxtaglomerular cells of kidney produce a peptide hormone called _____

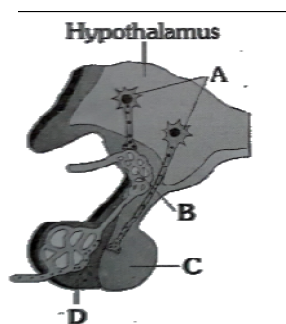
PART - B

III. Answer the following questions in 3-5 sentences each, wherever applicable:

2 Marks Each

1. What are hormones? Give an example.
2. List any four organised endocrine bodies in our body.
3. a) Name the cells of the hypothalamus which secrete hormones.

- b) Where is the hypothalamus located?
4. Mention the two types of hormones secreted by hypothalamus regulating the secretion of pituitary based on their mode of action.
 5. Name the two regions of pituitary based on the anatomy.
 6. Name the two portions of adenohypophysis.
 7. List any four hormones of the adenohypophysis.
 8. Name the hormones stored and released by neurohypophysis.
 9. State the function of the hormones stored and released by neurohypophysis.
 10. Vasopressin is called anti diuretic hormone. Justify.
 11. Oxytocin plays a major role in child birth. Justify.
 12. Write a note on diabetes insipidus.
 13. Name the target organ of hormone MSH and ACTH.
 14. Iodine is very essential part of our diet. Why?
 15. List the causes for hyperthyroidism.
 16. Differentiate between Goitre and Exophthalmic Goitre.
 17. Write the characteristics of exophthalmic goitre.
 18. Name the hormones synthesised by the follicular cells of thyroid gland.
 19. List four functions of thyroid hormone.
 20. What is the thyroid gland composed of?
 21. What are the symptoms seen in the growing baby of hypothyroidism pregnant woman?
 22. Identify the parts A, B, C, and D.



23. What is TCT? What is its function?
24. Mention two regulations by melatonin.
25. List the two hormones which regulate the blood calcium level in our body.
26. What are the functions of thymosins?
27. Name the tissues of the adrenal gland.

28. Mention two hormones secreted from adrenal medulla.
29. Mention the hormones secreted by the adrenal cortex.
30. Name the main glucocorticoid and mineralocorticoid.
31. What is the function of corticoids?
32. What is the function of androgenic steroids secreted by adrenal cortex?
33. Which hormones are secreted during stress?
34. Name the cells of Islet of Langerhans. Mention the hormones secreted by them.
35. Differentiate between hypoglycemia and hyperglycemia.
36. What is the testis composed of?
37. Name the steroid hormones produced by the ovary.
38. Mention the functions of Progesterone.
39. Write a note on erythropoietin.
40. What is CCK? What are its functions?
41. List the four major peptide hormones secreted by gastro intestinal tract.

PART – C

IV. Answer the following questions in 40-80 words each, wherever applicable:

3 Marks Each

1. Enumerate the mode of action of the hormones of the hypothalamus on the pituitary.
2. Describe the structure of the pituitary gland.
3. List any six hormones of the adenohypophysis.
4. Mention the disorders associated with the growth hormone secretion.
5. Melatonin plays an important role in the regulation of diurnal rhythm of our body. Substantiate.
6. Mention the effects of hypothyroidism in pregnant woman.
7. Parathyroid hormone is a hypercalcemic hormone. Substantiate.
8. Thymus plays a major role in immune responses. Justify.
9. What happens when emergency hormones are secreted?
10. Enlist three layers of adrenal cortex.
11. Explain the function of mineralocorticoids.
12. Write a note on diabetes mellitus.
13. Enumerate the actions of estrogen.
14. Write a note on ANF.
15. Which hormonal deficiency is responsible for

- a) Diabetes mellitus b) Diabetes insipidus c) Cretinism
16. Name the disorder caused by the deficiency of
- a) Thyroxine b) Insulin c) Growth hormone

PART – D

V. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Write a note on the hypothalamus.
2. Enumerate the functions of the hormones of adenohypophysis.
3. What are gonadotrophins? Enumerate their action in males and females.
4. Write a note on Pineal gland.
5. Write a note on the Thyroid gland.
6. List the functions of the Thyroid hormone.
7. Write a note on Parathyroid gland.
8. Write a note on Thymus.
9. Write a note on Adrenal gland.
10. Catecholamines are hormones of fight or flight. Justify.
11. Explain the functions of glucocorticoids.
12. Write a note on Pancreas.
13. Glucagon is a hyperglycemic hormone. Substantiate.
14. Insulin is a hypoglycemic hormone. Substantiate.
15. Glucagon and Insulin are antagonistic in their action. Justify.
16. Write a note on testis as an endocrine gland.
17. Enumerate the role of androgens in a male.
18. Write a note on ovary as an endocrine gland.
19. Enumerate the role of ovarian hormones in a female.
20. Gastro intestinal tract secretes four major hormones.
 - a) What type of hormones are they? (1)
 - b) Explain the role of these hormones. (4)
21. Define hormone. Explain four types of hormones based on their chemical nature.
22. Explain the mechanism of hormone action.
23. Diagrammatically represent the mechanism of protein hormone action.
24. Diagrammatically represent the mechanism of steroid hormone action.
25. Schematically represent the action of FSH.

26. Schematically represent the action of Estrogen.
27. Name the endocrine gland in which the following hormones are synthesized. Write one function for each hormone.
- a) Melatonin b) Glucagon c) Thyrocalcitonin d) Progesterone e) Cortisol
28. Name one hormone secreted by
- a) G-I tract b) Kidney c) Atrium d) Pancreas e) Ovary
29. Write one physiological function of
- a) LH b) GH c) Oxytocin d) Vasopressin e) TSH
30. A sample of urine was diagnosed to contain a high content of glucose and ketone bodies. Based on this observation answer the following questions.
- a) Which endocrine gland and hormone is related to this condition? (2)
- b) Name the cells on which this hormone acts. (1)
- c) What is the condition called? (1)
- d) How can it be treated? (1)

VI. Answer the following questions in 200-250 words each, wherever applicable:

5 Marks Each

1. Observe the location of endocrine glands labelled A, B, C, D & E. Identify them and mention a hormone secreted by each of them.

