

Chapter 1

Biological Classification

1. Identify the statement which is applicable to cyanobacteria

- a) Important decomposers
- b) Forms blooms in polluted water
- c) Presence of prominent pigment
- d) Completely lack cell wall

2. Observe the relationship between the first pair and fill up the blanks using appropriate terms

- a) Carolus Linnaeus : Two kingdom classification
R.H Whittaker :
- b) Thermoacidophiles : Extreme heat
Halophiles :

3. "Diatoms the chief producers of the ocean are useful to us even after their death" . Evaluate the statement

4. Fill up the second pair by observing the relationship of the first pair

- a) Monera : Prokaryote
Protista :
- b) Bacteria live in extreme marshy area : Methanogens
Bacteria live in extreme salty area :
- c) Association of fungus with algae : Lichens
Association of fungus with root of plants :

5. Ramu decided to construct a biogas plant in his home due to the recent hike in the cost of cooking gas. Name the group of bacteria involved in this process?

6. Lichens are the symbiotic association with of algae and fungi

- a) What is symbiosis?
- b) State the economic importance of lichens?

7. Five kingdom arrangement of organism was given by R.H Whittaker. State the criteria followed by Whittaker for his classification.

8. Slime moulds grow in damp places

- a) Name the vegetative part of the thallus
- b) Give an example of slime mould

9. "Viruses are called the biological puzzle" . comment

10. An organism that completely lack cell wall. It is the smallest known living cell and can survive without oxygen. Name the organism

11. Match the following

Rhizopus	Ascomycetes
Yeast	Deuteromycetes
Agaricus	Phycomycetes
Alternaria	Basidiomycetes

12. Why two kingdom classification become inadequate?

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Chapter 2

PLANT KINGDOM

1. Give reason for the following

- a) Bryophytes are called the amphibians of the plant kingdom
- b) Fertilization in angiosperm is known as double fertilization

2. Most pteridophytes are homosporous but there are exceptions

- a) Identify two heterosporous genera
- b) Heterospory is a precursor to the seed habit. Point out any one common character found in heterospory and seed habit

3. Even though algae are primary producers in aquatic ecosystem, man is benefited by algae in variety of ways. Write any four points in favour of this statement.

4. Write the name of the stored food of algal classes in the table given below

Class	Stored food
Phaeophyceae	
Rhodophyceae	

5. Plants with haplontic life cycle include dominant gametophyte while in diplontic life cycle sporophyte is the dominant phase. Name the type of cell cycle that is intermediate between the two.

6. Write any three distinguishable characters of bryophytes?

7. Fill up the second pair by observing the relationship of the first pair

Cycas : Coralloid root

Pinus :

8. Match the following

A	B
Algae	Naked seeded plant
Pteridophyte	Amphibians of the plant kingdom
Gymnosperm	Flowering plants
Angiosperm	Thalloid body, photosynthetic and mainly aquatic
Bryophyte	Independent sporophytic and gametophytic phase commonly called ferns

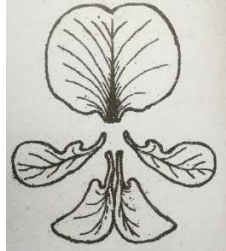
9. Sequoia is the tallest plant in the world.

- a) Name the plant group
- b) Write any two salient features of the plant group

Chapter 3

Morphology of flowering plants

1. The following diagram represents five petals of a plant belonging to a major family

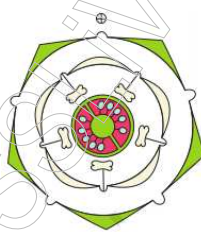


a) identify the family.

b) write the floral formula of the flower

2. Normally roots grow into the soil. But in some plants like Rhizophora many roots come out of the ground and grow vertically upwards. What are these roots called? Give their function?

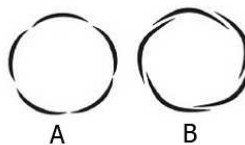
3. Observe the floral diagram and answer the following questions



a) Name the family

b) Write the nature of stamen

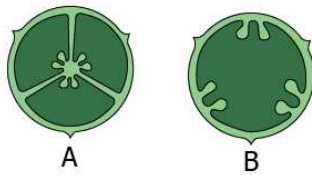
4. The following figure show two types of aestivation. Answer the following questions.



a) Identify A and B

b) How will you distinguish A and B

5. Observe the diagram A and B and identify the placentation



7. In cactus both stem and leaves are modified to perform different functions. Name the modifications and identify their functions.

8. Fill up the second pair by observing the relationship of the first pair

a) cucumber : Tendril

Citrus :

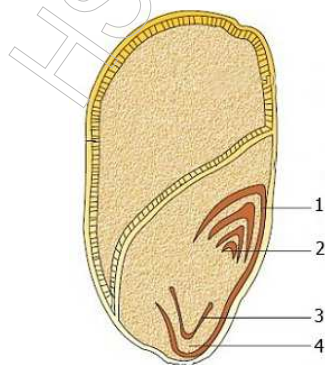
9. Floral formula of a pea plant is given below. Give the important floral characters of the plant using the floral formula

10. Use appropriate terms for the following description

a) Axillary buds of stems modified as slender and spirally coiled structures for helping plants to climb

b) Axillary buds of stem modified as woody straight pointed structures to protect plants from browsing animals

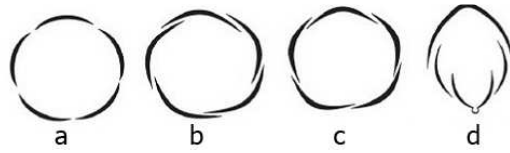
11. Name the parts of a monocot embryo in the given diagram



12. Fill in the blanks by choosing the correct term from the bracket

a) The arrangement of petals in the flower is known as

b) Identify the types of the arrangement of petals shown in the following diagrams



13. Respiratory roots in Rhizophora is called

14. Arrangement of flowers on the peduncle varies depending upon the nature and branching of the peduncle. Can you substantiate your answer with suitable examples

15. Identify the region A marked in the figure and write down its function



16. The rhizome of ginger is found underground . But it is not a root. Give reason

17. Technical name of fruit of mango and coconut is called

18.Fill up the second pair by observing the relationship of the first pair

Mango : Mesocarp

Coconut :

Chapter 4

Anatomy of flowering plants

1. Match the following column A and B

A	B
Companion cells	Stomata
Lenticels	Chlorophyll bearing cells
Bulliform cells	Casparian strips
Subsidiary cells	Present between xylem and phloem
Mesophyll cells	Phloem tissue
Endodermal cells	Empty colourless cells
	Exchange of gases

2. Two types of plant specimens were given to students for microscopical observation. They were directed to note down the features they observed. Major features noted by students were summarized in the box below

- a) Radial vascular bundle and are 20 in number
- b) Collateral vascular bundle arranged in the form of a ring and vascular bundles are few in number
- c) Xylem round in shape
- d) Cambium present between xylem and phloem
- e) Xylem is exarch
- f) Xylem is endarch

a) Name the two specimen

b) Substantiate your answer by picking up the features of specimens from the box and write them in two columns

3. In the anatomy lab, Eugen observed the following features in the T.S of plant part

- a) Radial and polyarch xylem bundles
- b) Parenchymatous (homogenous) cortex
- c) Large pith
- d) Epidermis with unicellular hairs
- e) Pericycle
- f) Endodermis with casparian strips

a) Identify the plant part

b) Rearrange the given regions from the periphery to the center in their correct sequence

c) Give an account of casparian strips

4. Imagine that you and your father are visiting a timber shop to buy wood for making furniture. Timber shop owner suggested rosewood. Father seeks your help to determine the age of the wood

- a) As a botany student can you help your father?
- b) Justify your answer

5. Dicot plants show secondary growth in their stem and root

- a) Name the meristem that cause secondary growth in vascular region and cortex
- b) Comment on the activity of this meristem

6. Some tissue in plants are not able to divide further

- a) Suggest name for such tissue
- b) Give any three examples
- c) List the difference between epidermal tissue system of roots and leaves

7. Analyse the given statement and correct the false statement with respect to the underlined line

- a) In roots, vascular tissue are **conjoint**
- b) Cork cambium is otherwise called **phelloderm**

8. In an anatomy lab Ramu and Salim were taking transverse section of two specimen, A and B respectively. Their observations are given in the table. Complete the table

Specimen A	Specimen B
Closed vascular bundle	Open vascular bundle

9. Grasses are capable of regeneration in spite of continuous grazing by cattle. Suggest the reason for this.

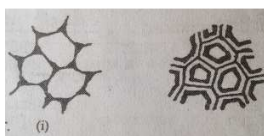
10. What are bulliform cells? Mention their function

11. Cambial rings is responsible for the formation of secondary vascular tissues, both in dicot stem and dicot root. Distinguish the differences in the origin of this cambial rings

12. Fill in the blanks

- a) Root : Radial vascular bundle
Stem :
- b) Inner to epidermis is hypodermis
Inner to endodermis is

13. a) Observe the diagrams and identify the tissue types

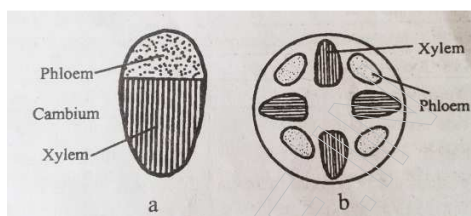


b) Justify your answer

14. Vascular bundles in monocot root is polyarch and hexarch radial. In dicot it is

15. In woody trees secondary growth takes place in stelar and extra stelar region. Comment on extra stelar secondary growth

16. Diagrammatic representation of vascular bundles are given



a) Distinguish a and b

b) State reason

17. Food in plants is transported from leaves to other parts of the plant body. Which is the tissue that does this function? What are its elements?

18. Analyse the table and arrange the matter in an appropriate order

A	B	C
Monocot stem	Bulliform cells	Casparian strips
Dicot stem	Radial	Protoxylem lacunae
Isobilateral leaf	Closed	Secondary thickening
Dicot root	Open	Epidermis

19. How do you correlate the activity of cambium with changing seasons?

20. Spring season : Early wood

Autumn season :

Chapter 5

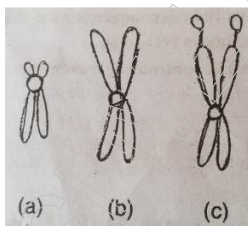
Cell the unit of life

1.State whether the statement is true or false . if false correct the statement by changing the underlined words

- a) Aleuroplast store **carbohydrate**
- b) The **centrioles** forms the basal body of cilia and flagella
- c) Ribosomes are **not surrounded by membranes**
- d) **RER** is the major site for synthesis of lipids

2.Prokaryotic cells posses a special membranous structure which is formed by the extension of the plasma membrane in the form of vesicles, tubules , and lamellae . Identify the structures and write any one of its functions

3.The diagram a,b, and c given below shows three kinds of chromosomes. Of this, which is metacentric non satellite chromosome. Justify your answer



4.An accepted model of the structure of a cell membrane was proposed by Singer and Nicolson

- a) Name the model
- b) List the two major biomolecule which this membrane is composed of.
- c) Mention two important points of this model from the point of view of function

5.Observe the given relation and fill in the blanks

- a) Plumule : Coleoptile
Radicle :
- b) Starch : Amyloplast
Fat :

6.The following is the list of cell organelles

(nucleus, endoplasmic reticulum, lysosomes, chloroplast, golgi complex, mitochondria, ribosome)

- a) Identify the organelle with double membrane envelope
- b) Mention the function of these organelle

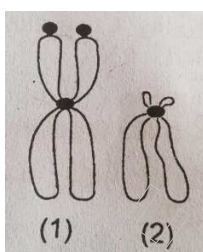
7.

- a) Identify the cell organelle found both in eukaryote and prokaryote
- b) Justify its presence in both types of cells

8. Match the following

A	B
Synthesis and storage of energy	Golgi apparatus
Packaging and delivery of material	Mitochondria
Digestion of intercellular material	Centriole
Formation of basal body of cilia and flagella	Lysosome
	chloroplast

9. given below are the diagrams of two chromosomes

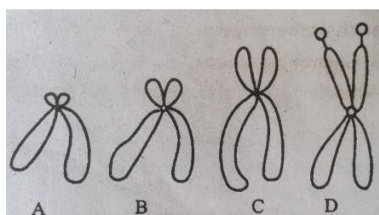


- a) identify the chromosome type (1) and (2)
- b) write the peculiarity of chromosomes.

10. bacterial cell envelope is a complex structure. It is made up of various layers. Name the different layers in the bacterial cell envelope

11. mitochondria is called power house of the cell. Comment

12. different types of chromosomes based on the position of centromere are given below. Classify them with necessary explanation. What is peculiarity of the chromosome "D" ?



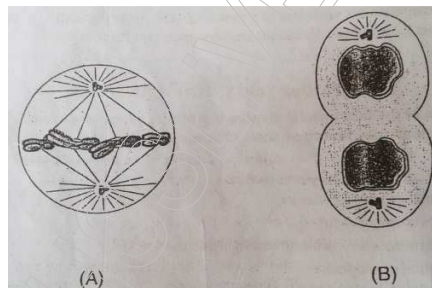
Chapter 6

Cell cycle

1. prophase of the first meiotic division is typically longer and complex. It has been further subdivided into five phases. The major events of these sub stages are given below

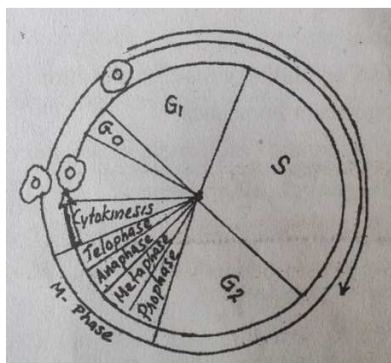
- a) Pairing of homologous chromosomes.
 - b) terminalization of chiasmata
 - c) Occurs crossing over
 - d) Chromosome are visible under a light microscope
 - e) Formation of chiasmata
- i. Identify the stages a,b,c,d and e
 - ii. Arrange these stages in correct order of occurrence

2. observe the following phases of nuclear division during mitosis and answer the following questions



- a) name the two phases A and B
- b) identify the main events occurring in these two stages

3. A diagrammatic view of a cell cycle is given below

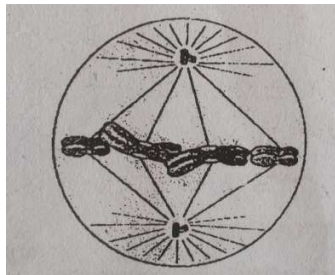


a) identify the phase in which

- i. DNA synthesis takesplace
- ii. Chromosomes are arranged at the equator of the spindle

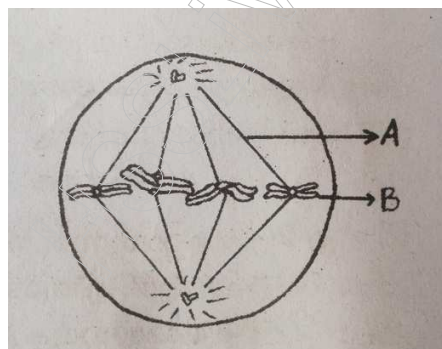
b)Mention two significant point of mitosis in the life of an organism

4. Observe the diagram given below representing a stage of mitosis



- a) Identify the stage
- b) Distinguish it from corresponding stage of meiosis-1
- c) Mention the role of spindle fibres in mitosis

5.observe the given diagram of cell division



- a) Identify the stage
- b) Label the parts A and B
- c) Mention any one peculiarity of the pachytene stage of meiosis

6.the following are some of the important events in mitotic cell division. Mention the stages of mitosis during which these events happen

- a) Centromere split and chromatids separate
- b) Chromosomal material condenses to form compact mitotic chromosomes

7.What is a quiescent stage?

8.mention the importance of crossing over

9. while studying the stages of meiosis, Prakash observed the following features at one stage

- a) Bivalent chromosomes clearly appear as tetrads
- b) Presence of recombination nodules

Identify the stage

10. there are four distinct stages in mitosis. At one stage, the chromosomes are oriented at the equator of the cell

- a) Identify the stage
- b) Write the other key feature of this stage

11. In the laboratory, the teacher asked you to identify the mitotic stage anaphase in the given slide. Write the characteristic features that help you to identify this stage

12. Choose the most appropriate answer and fill in the blanks

13. Interphase in cell cycle is sometimes referred to as resting phase. Do you consider this statement true? Substantiate your answer.

14. Life cycle of a cell is called cell cycle. It consists of four stages such as G_1 , S, G_2 and M phase

- a) Construct a pie diagram showing the different stages indicated above
- b) State the major events occurring in G_1 , S, and G_2 phases

Chapter 7

Transport in plants

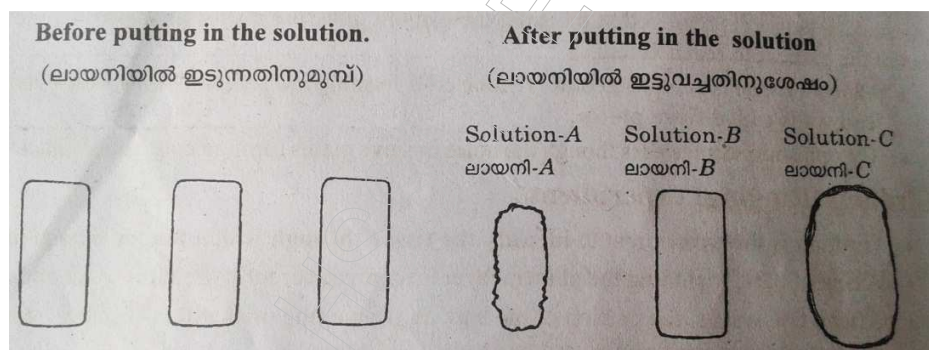
1. Match the following

A	B
Apoplast	Phloem transport
Transpiration	Semipermeable membrane
Mass flow hypothesis	Cell wall
Osmosis	stomata

2. suggest reason for the following

- a) In tomato plants drop of water are seen along leaf margins in the morning
- b) Farmers remove leaves of banana plants before planting

3. three potato pieces of equal weight (2g) were left in three types of solutions (A,B and C) over night, the weight change of potato pieces are as shown in the figure



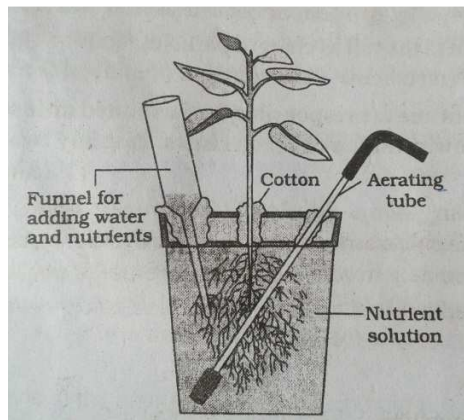
- a) identify the solution A and C
- b) discuss the reason for not having any change in the piece put in the solution B

chapter 8

mineral nutrition

1. If you cut through the root nodules of a pea plant, you will notice that the central portion is red or pink
 - a) What makes the nodule pink?
 - b) Mention the role of this pink pigment
2. The deficiency symptom of macro elements like calcium tends to appear first in young tissue. Why?
3. Ammonia is first oxidized to nitrite and the nitrite is further oxidized to nitrate. Name the process. Give any one example of a bacterium which is involved in this process
4. Nitrogen in the atmosphere exists as N_2 . But it cannot be absorbed by plants as such. So it is converted into ammonia (NH_3) by microorganism and gets fixed in the soil
 - a) Name the enzyme in the microorganism which helps to convert nitrogen into ammonia
 - b) What is the role of leg hemoglobin in this process
5. Chlorophyll contains a metallic element
 - a) Name the metallic element
 - b) Mention any one deficiency symptom of that element
6. A botany teacher brought a diseased plant in the classroom. Manoj identified the pathogen as a virus. Can you list any two symptoms of diseases, that helped him to identify the pathogen?
7. 'Unlike water, all minerals cannot be passively absorbed by roots'. Write any two reasons to justify the above statement
8. Proteins in the membrane are responsible for facilitated diffusion and active transport and hence both show common characteristics. List any two such characteristics
9. 'In a plant the deficiency of N_2 is visible in older parts and that of Ca is visible in younger parts'. Critically evaluate this statement.
10. The biochemical assay of some plants indicates the presence of Gold, Vanadium, Silicon, etc. But these elements are not considered as essential elements. Comment.
11. The nitrogenase enzyme and leg hemoglobin are two important compounds related to nitrogen fixation in plants. Mention the function of each.

12. Observe the diagram and answer the following



- a) This is a peculiar type of plant cultivation. Name it
- b) Aeration is necessary for the conduct of this type of cultivation. Why?

CHAPTER 9

PHOTOSYNTHESIS IN HIGHER PLANTS

1. Plants that are adapted to dry tropical regions have a special type of CO_2 fixation. In addition to the C_3 cycle.

- Name this pathway?
- Can you identify any specialty in the leaf anatomy of such plants? If so, what is this anatomy called?
- Which is the primary CO_2 acceptor in this pathway?
- Write any one advantage of such plants over C_3 plants?

2. The use of ^{14}C by Melvin Calvin in algal photosynthesis studies led to the discovery of CO_2 fixation in green plants.

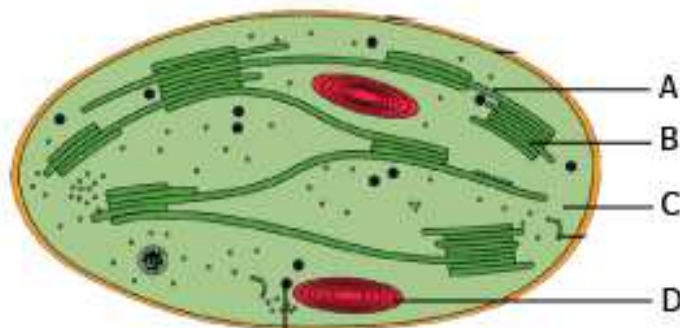
- Identify the first stable product in this CO_2 fixation cycle?
- Which are the main stages in this cycle?
- Name the enzyme which catalyzes the first stage of this cycle?
- Work out how many ATP and NADPH molecules will be required to make one molecule of glucose.

3. Light reaction of photosynthesis is divided into two processes. In one process the electron emitted will return to the place from where it is emitted.

- What are the names of these two processes?
- What happens to the electrons in the second phase?
- Explain it with schematic representation.

4. RuBisCO is an enzyme that catalyzes two entirely different processes.

- Which are the processes?
- In which process the chloroplast alone is used as cell organelle?
- Label the parts A, B, C, D of the given diagram.



5. C₄ plants are adapted to overcome a wasteful process found in C₃ plants and hence productivity and yields are better in these plants.

- Name the wasteful process found in C₃ plants?
- Identify the cells involved in the C₄ pathway?
- Write any two differences between C₃ plants and C₄ plants

6. Light reaction is otherwise called photophosphorylation

- Justify the statement
- Locate the site of this reaction
- Write any two differences between cyclic photophosphorylation and non-cyclic photophosphorylation

7. Light reaction and dark reaction are the two stages of photosynthesis

- Where does the light reaction occur?
- What are its products?
- Comment on their roles in dark reaction

8. Photorespiration is a curse to plants

- Evaluate this statement?
- Find the reason for this event to take place?

9. During photosynthetic CO₂ fixation certain plants produce PGA as first stable product. Name such plants? Who reported the pathway? What is the enzyme for the carboxylation? Name the molecule which accepts CO₂ in such plants

10. Given below are the scientific terms related to photosynthesis. Classify them in appropriate manner in the given table.

RuBisCO, Rice plant, CO₂, maize plant, Oxaloacetic acid, 3-PGA, PEP

SL NO	C ₃ plant	C ₄ plant

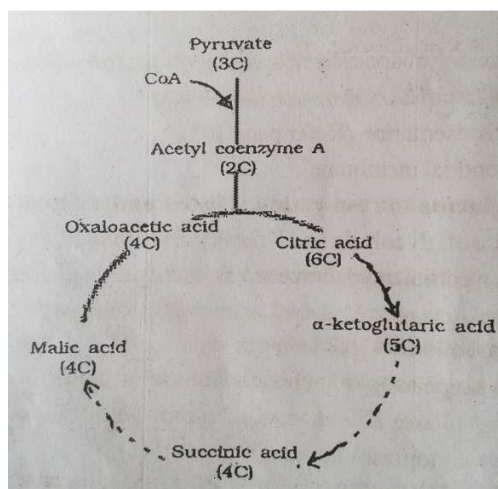
11. Comment on the specialty of carbon dioxide fixation in some plants adapted to dry tropical regions. What are the anatomical peculiarities of the leaves of these plants

Chapter 10

Respiration in Plants

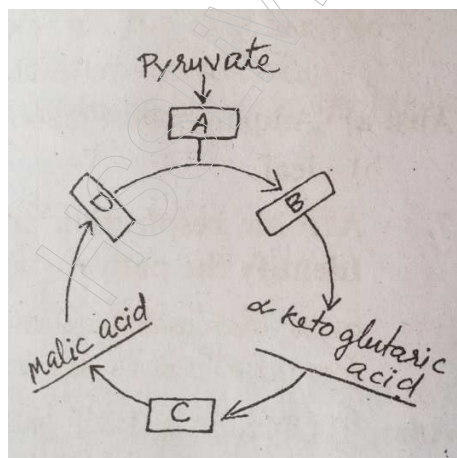
1. Anaerobic respiration also occurs in animal cells. Suggest an occasion for this
2. Glycolysis is present in all organisms and it is the only process of respiration in anaerobic organisms.
 - a) What is glycolysis?
 - b) Where does glycolysis occur?
 - c) Glycolysis is a partial oxidation. Justify
 - d) Calculate the number of ATP molecules synthesized in glycolysis by the partial oxidation of one molecule of glucose
3. Oxidative phosphorylation is an important event in cellular respiration
 - a) Which organelle is associated with this process?
 - b) Name the phase of cellular respiration that is common to both aerobic and anaerobic conditions
 - c) Draw the schematic representation of that phase
4. During terminal oxidation electrons in the hydrogen atoms are transported to the oxygen through a series of electron carriers in ETS. The electron carriers are given below
FMN, FAD, Ubiquinone, FeS, cyt a, cyt b, cyt c, cyt a₃ etc
 - a) Briefly explain the ETS with schematic representation
 - b) Where does ETS occur?
5. Breakdown of glucose in respiration is listed under glycolysis and Krebs's cycle
 - a) Locate the site of glycolysis and Krebs's cycle in the cell
 - b) Glycolysis is a partial oxidation process. Justify
6. Analyse the given statement and correct them with respect to the underlined words
 - a) Respiration is an anabolic pathway
 - b) The site of perception of light by a plant for a photoperiodic response is a flower
7. Aerobic respiration and anaerobic respiration start with a common pathway. Identify the pathway and its end product.

8. Observe the illustration given below and answer the following questions.



- Identify the cyclic pathway
- Where does it occur
- Identify the steps of this pathway in which decarboxylation takes place

9. Observe the given figure and answer the questions



- Identify the cycle and name the scientist who traced this pathway
- Complete the cycle by filling A, B, C and D in the boxes
- How many NADH and FADH_2 are yielded during the complete oxidation of one molecule of pyruvate by this pathway?

10. Observe the incomplete schematic representation given below and answer the questions

- Identify this pathway common for both aerobic and anaerobic respiration
- Complete the scheme by filling the boxes A, B, C and D

- c) Mention the three major ways in which different cells handle pyruvic acid produced by this pathway

11. The TCA cycle starts with the condensation of acetyl group with OAA and water to yield citric acid.

- a) Name the enzyme catalyzing the reaction
- b) How many $\text{NADH} + \text{H}^+$ molecules are produced in TCA cycle?
- c) How many FADH_2 molecules are produced?
- d) How many ATP molecules are produced?

12. Glycolysis and Krebs cycle are the two important steps in aerobic respiration. Suggest where exactly in the cell these events take place

13. Plants are living organisms respiring just like animals, taking in oxygen and giving out carbon dioxide. But they are without any organ for this purpose. Mention any two reasons for it

14. Suggest a method for finding out the biochemical compound used as the respiratory substrate in plants.

15. Plants respire using glucose as the substrate

- a) Name the two types of respiration
- b) Among the two types, which one is more efficient? Critically evaluate

16. Plant physiologists observed a relationship between respiration and salt absorption. Is absorption of salt increased due to respiration? Explain

Chapter 11

Plant growth and development

1. By observing the relationship of the first pair, fill in the blanks of the second pair

- a) F.W Went : Auxins
E. Kurosawa :
- b) Auxins : Apical dominance
..... : Overcome Apical dominance

2. which one of the plant growth regulators would you use if you are asked to do the following processes?

- a) Induce parthenocarpy
- b) Quickly ripen a fruit
- c) Induce immediate stomatal closure in leaves
- d) To increase the length of grape stalks

3. Given are certain physiological effects. Name the plant hormone responsible for it

- a) Increase stem length
- b) Apical dominance
- c) Closure of stomata
- d) Ripening of fruits
- e) Bolting
- f) Active cell division

4. Match the following

A	B
Auxin	Fruit ripening
Gibberellins	Stomatal closure
Cytokinins	Root initiation
Ethylene	bolting
	Overcome Apical dominance

5. Based on the relationship fill in the blanks

- a) Cell division : Cytokinins
Bolting :

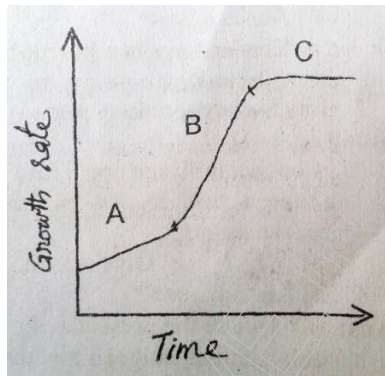
6. Suggest the correct scientific terms for the following

- a) Flowering on exposure to low temperature
- b) Algal partner in lichens

7. Artificial phytohormones are widely used in agriculture

- a) Name any two artificial phytohormones
- b) Mention their roles in agriculture

8. Given below is the growth curve of a plant. Observe it and answer the questions



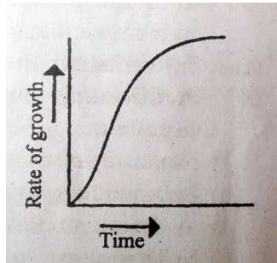
- a) Name the growth curve
- b) Label A and C phase of growth in the growth curve
- c) When the tip of *Cassava* plant is lost, a number of lateral branches grow from the nodes below. Explain this phenomenon and specify the hormone responsible for this phenomenon

9. Some wheat varieties are sown in the spring season and some are sown in the autumn season. Mention the physiological phenomenon responsible for it

10. Most of the seeds germinate only after a period of rest

- a) Name the period of rest
- b) Name the plant growth regulators (PGR) which control the period of rest
- c) Write any other important roles of this PGR

11. Growth pattern of plant is displayed in the graph. Analyse the figure and answer the following questions



- a) What kind of growth form is this?
- b) Why does the graph show a decline to a near constant levels?

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