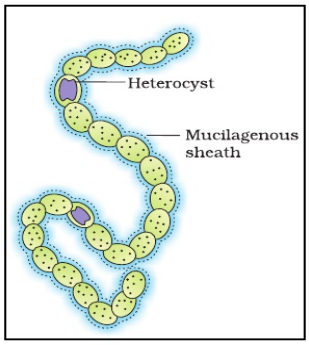
XI BOTANY - PREVIOUS QUESTIONS based on Diagrams- 2012-2024

Chapter1-Biological Classification

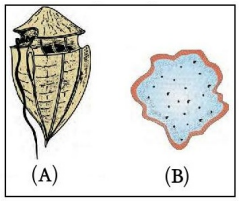
1Mark Questions

1. Observe the figure given beiow and identify the blue green alga.



2018 Model

2. Observe the given figures A and B. Identify the protista class in which these organisms belong.

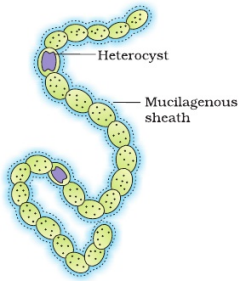


2019 1st term

3. Observe the figure given below. Name the organism.

2020 March

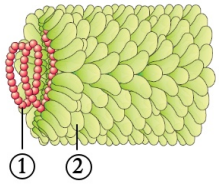
4. Observe the figure given below and identify the blue green alga.



2022 2nd term

2 Marks Questions

1. Observe the figure .
   a) Identify the organism.
   b) Mark the parts labelled as 1 and 2.

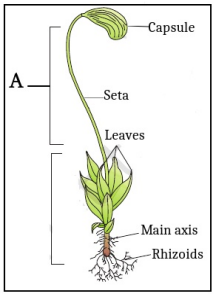


2019 1st term

Chapter 2 -Plant Kingdom

1 Mark Questions

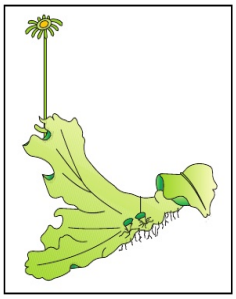
1. Observe the figure given below. It shows two phases in the life-cycle of Funaria. Identify and write the phase marked as "A".



2023 Model

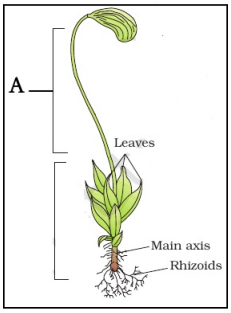
2 Marks Questions

1.The given figure shows a plant belonging to liverworts. Identify the plant. Name the asexual buds seen on it and write their features.



2018 March

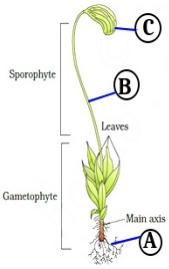
2.Observe the frgure given below. It shows two phases in the life cycle of a plant.



Identify the phase marked as A. Write any two peculiarities of this stage.

2019 March

3. Observe the diagram given below:
   (i) Identify this bryophyte.
   (ii) Label the parts A, B and C.

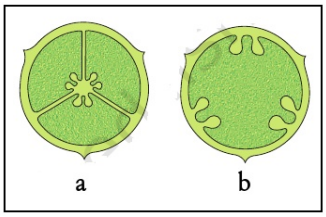


2023 March

Chapter 3 -Morphology of Flowering plants

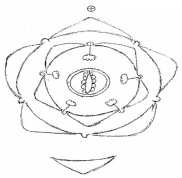
1Mark Questions

1. Observe the following diagrams "a" and "b"and identify the placentation.



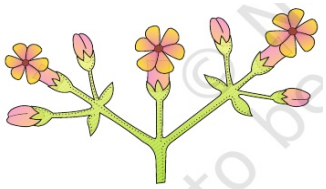
2012 Imp.

2. Observe the floral diagram and answer the following questions:
   a) Name the family
   b) Write the nature of stamen



2013 Imp.

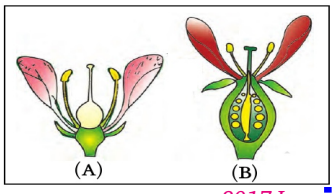
3. Observe the figure and identify the type of inflorescence.



2019 Model

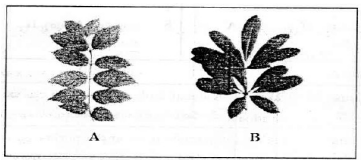
4. Observe the diagrams given below.

Name the type of flowers A and B.
Give one example of each.



2017 Imp.

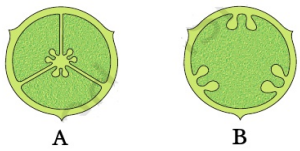
5. The following figures A and B shows two different types of phyllotaxy.



Identify the phyllotaxy A, B and explain them.

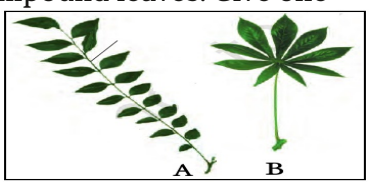
2018 Imp.

6. The following figures A and B shows two different types of placentation. Identify the placentation and explain.



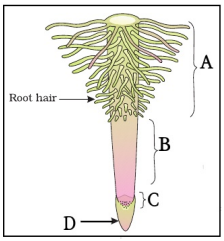
2019 Model

7. Identify the type of compound leaves. Give one example for each.



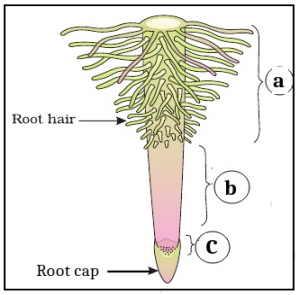
2019 1st term

8. Observe the diagram and label the parts noted as A, B, C and D.



2020 Model

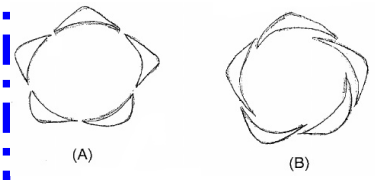
9. Observe the figure and label the parts (a), (b) and (c). Write down the functions of root hairs.



2022 Model

2 Marks Questions

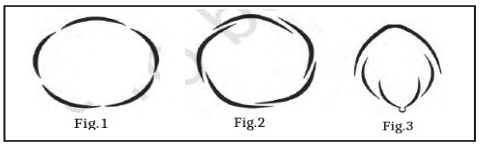
1. The following figures show two types of aestivation. Answer the following questions.



   a) Identify the types A and B
   b) How will you distinguish A and B ?

2013 Imp.

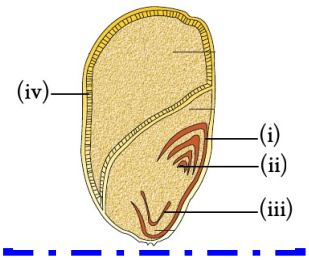
2.



Write the names of aestivation in figures 1, 2 and 3. Identify aestivation of petals in pea flowers from the above three aestivations.

2015 Imp.

3. Identify the diagram and label the parts shown as...
   (i) .....
   (ii).....
   (iii).....
   (iv).....

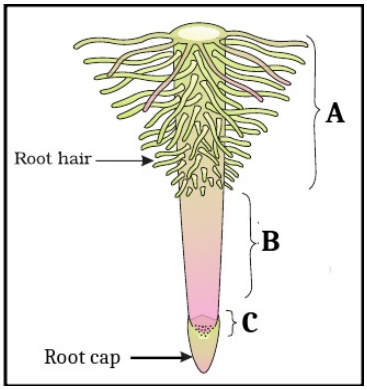


2016 Imp.

Chapter 3 -Morphology of Flowering plants

10.a) Observe the diagram and label the regions of root tip marked as A, B, C.
b) Write down the function of root cap.

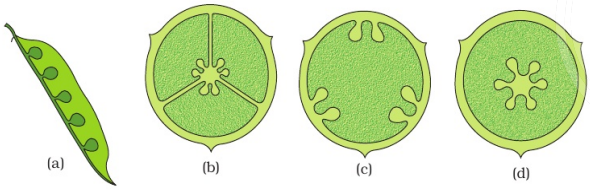
2022 2nd term



11.Floral diagram of family of an angiosperm plant is given below.
a) Identify the family.
b) Write any two floral character of this family.

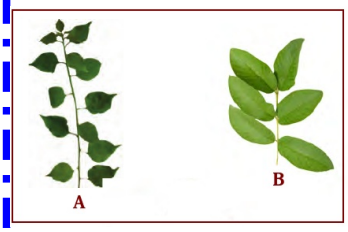
2022 2nd term

12.Observe the following diagram a, b, c, d and identify the placentation.



2023 Model

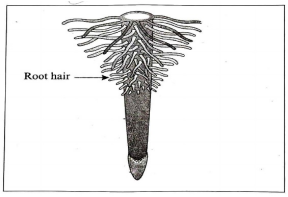
13.Observe the following figures A & B show two different types of phyllotaxy:



(i) Define phyllotaxy
(ii) Write the name of phyllotaxy A & B

2023 March

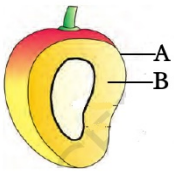
14. Rearrange the following regions of roots, as seen in the roots in vertical section.
i) Region of elongation
ii) Root cap
iii) Region of meristematic activity
iv) Region of maturation



2023 2nd term

2 1/2 Marks Questions

1. The diagram given below shows the parts of a true fruit.

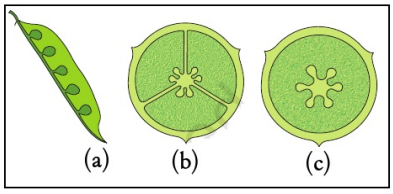


a) Write the technical name of this fruit developed from a monocarpellary superior ovary.
b) Label parts A and B
c) Can you distinguish a parthenocarpic fruit from the given fruit?

2013 March

3 Marks Questions

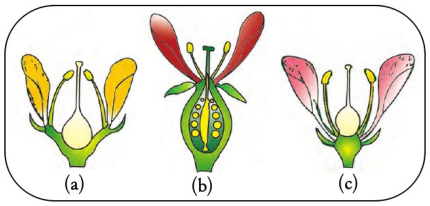
1. The arrangement of ovules in the ovary is known as placentation. Given below are different types of placentations.



a) Identify (a), (b) and (c).
b) Briefly explain (a), (b) and (c) in one or two sentences.

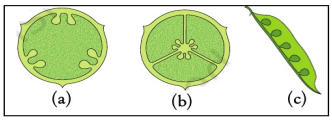
2014 Imp.

2. Observe the figures a, b and c. Identify the position of ovary of each flower and name the flowers accordingly.



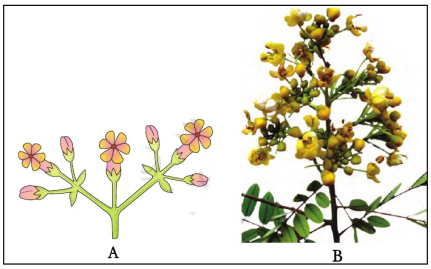
2017 2nd term

3.Observe the diagram. Identify the type of placentations. Give one example for each type.



2018 2nd term

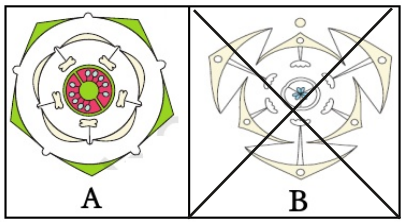
4.Observe the figures A and B
a) Identify the type of inflorescence.
b) Write any two difference between them.



2019 1st term

Chapter 3 -Morphology of Flowering plants

5.A and B are floral diagrams of two angiosperm families.
(a) Identify the families of A and B.
(b) Write the characters of gynoecium of A and B.



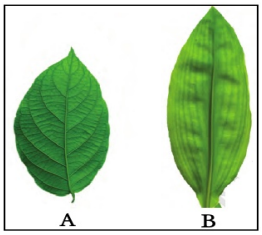
2020 Model

6.Observe the figures A and B.

(a) Identify the aestivation A and B
(b) Write one peculiarity of A.
(c) Name the three kinds of petals in B.

2020 March

7.Observe the figures A and B given below.



(a) Name the type of venation in A and B.
(b) Define venation.

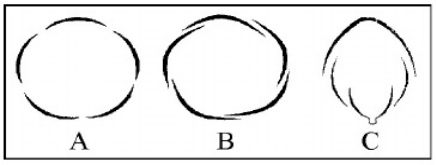
2020 March

8.Observe the given floral diagram.

(a) Identify the family.
(b) Write any two floral characters of this family.
(c) Write the name of two economically important plants of this family.

2020 Imp.

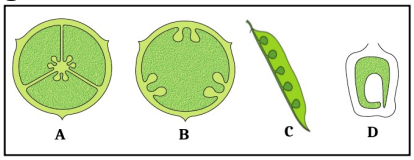
9. Observe the given diagram representing three types of aestivation seen in corolla.



(a)Identify the types of aestivation labelled A, B and C.
(b)What are the peculiarities of corolla in flowers with aestivation labelled 'C' ?

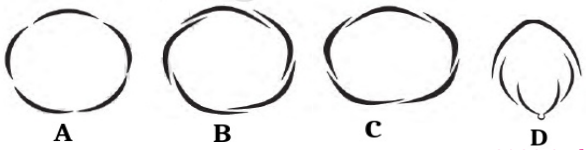
2021 Imp.

10. (a) What is Placentation ?
(b)Write the name of placentation given in the figure A, B, C and D.



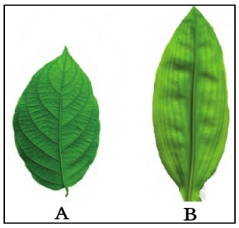
2022 Imp

11.Observe the diagram given below.
a) Define aestivation.
b) Identify type of aestivation labelled as A, B, C and D



2022 2nd term

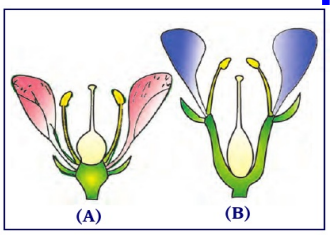
12.Observe the figure 'A' and 'B' and answer the questions.



a) Define venation.
b) Name and explain the type of venation in 'A' and 'B'.

2023 Model

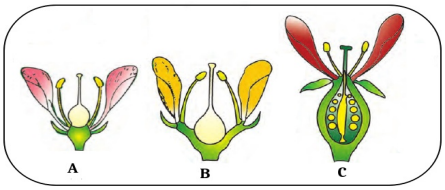
13.The given figure shows different types of flowers based on position of floral parts on thalamus:



(i) Identify (A) & (B).
(ii) Explain Epigynous flower.

2023 March

14.The figures A, B and C show different types of flowers based on the position of ovary. Write the name and position of ovary of each flower.



2023 Imp

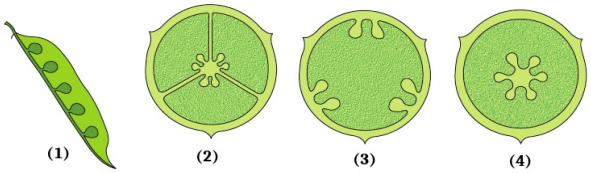
15.Floral diagram of family of an angiosperm plant is given below.

a) Identify the family
b) Write any floral character of this family
c) What is the economic importance of this family?

2023 2nd term

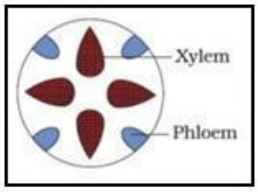
16.Observe the given diagram and answer the questions
a) What is placentation?
b) Write the type of placentation observed in figures (1), (2), (3), (4)

2024 Model



1Mark Questions

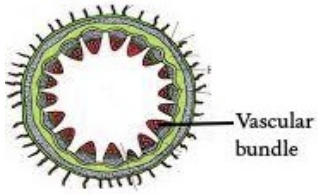
1.Name the type of vascular bundle in the figure:



2023 March

2 Marks Questions

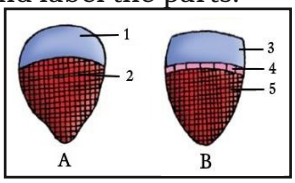
1. Observe the T.S of a plant part given below:



Identify the plant part and explain any two features of its vascular bundles.

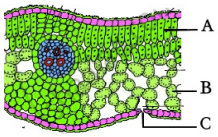
2018 Imp.

2.Identify the types of vascular bundles given below and label the parts.



2018 2nd term

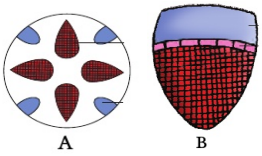
3.Observe the T.S. of a leaf given below:



(a) Label A, B and C.
(b) Identify the type of leaf .

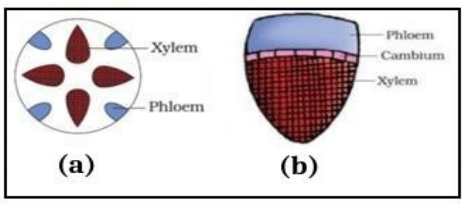
2019 Model

4.Observe the diagrams showing various types of vascular bundles. Identify and differentiate A and B.



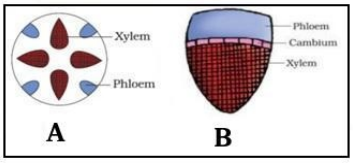
2019 2nd term

5.Observe the figure. Identify the types of vascular bundles.



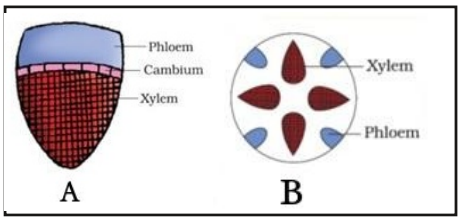
2021 Sept.

6. Observe the diagrams of vascular bundles. Identify and differentiate 'A' and 'B' *2023 2nd term*



3 Marks Questions

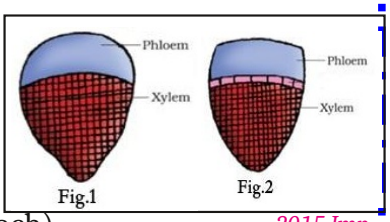
1. The following figures show two types of vascular bundles:



a) Identify the vascular bundles A and B
b) Briefly explain A and B in one or two sentences.

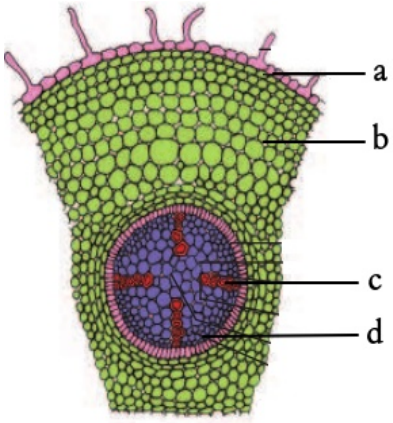
2014 Imp.

2. Identify the types of vascular bundle in figure 1 and 2. Write the features of each vascular bundle. (**Hint** : Any two points each)



2015 Imp.

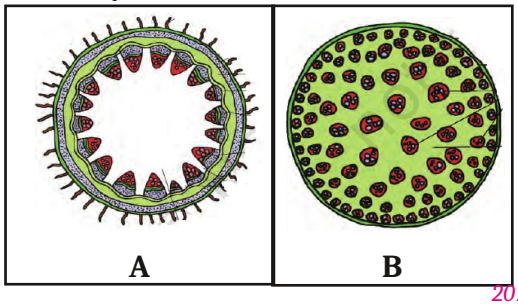
3.Observe the diagram given below.



Label the parts a,b, c, d. Write any two features of the vascular bundles seen in the figure.

2017 2nd term

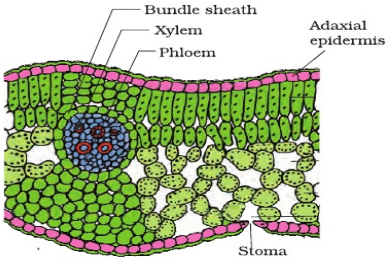
4.Following are the diagrams showing primary structure of dicot stem (A) and monocot stem (B).Write any three differences between them.



2020 Model

Chapter 4 -Anatomy of Flowering plants

5.Observe the figure given below:

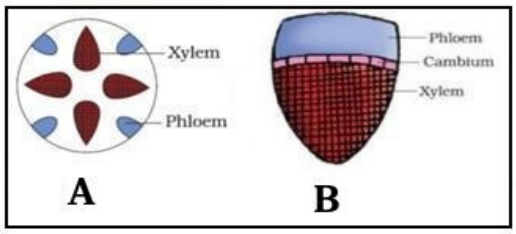


Write any three features on mesophyll cells from the figure.

2020 March

6. Identify the types of vascular bundles labelled as A and B. Write any two features of each vascular bundle.

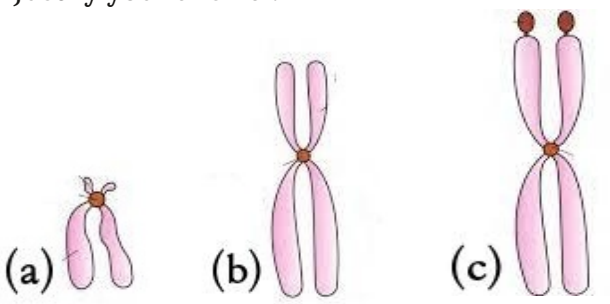
2022 2nd term



Chapter 5 -Cell:Structure and Functions

1Mark Questions

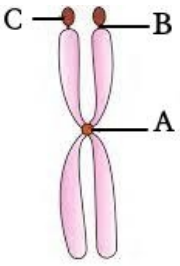
1. The diagrams a,b,c given below show three kinds of chromosomes. Of these, which is metacentric non-satellite chromosome? Justify your answer.



2013 Imp

2 Marks Questions

1. Name the type of chromosome based on the position of centromere in the figure and label the parts *A,B* and *C*

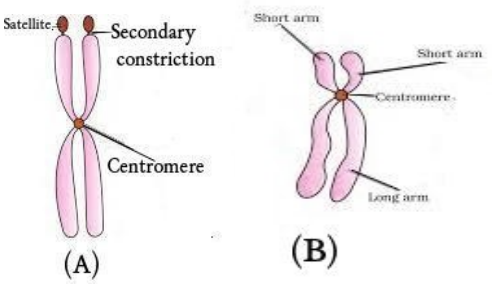


2015 Imp.

2. Observe the figure given below. Identify the organelle and write its two functions.

2017 2nd term

3.Observe the figures of chromosomes given below :

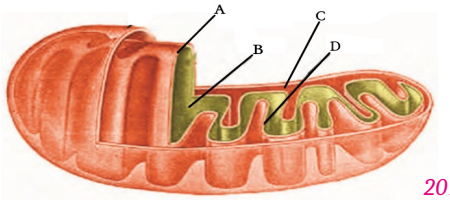


a)Identify the types of chromosomes labelled as A, B.

b) Name the chromosome which has a terminal centromere.

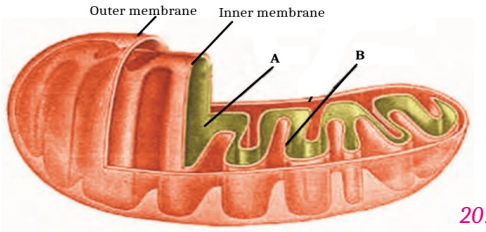
2019 Model

4.Identify the organelle and mark the parts labelled as A,B,C,D.



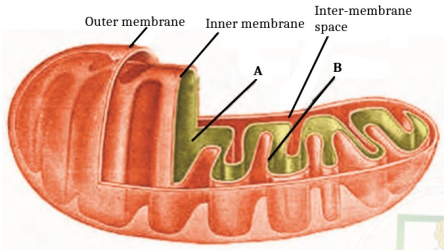
2019 2nd term

5. (a) Identify and write the name of the organelle given in the figure.
(b) Label the parts marked as A, B.



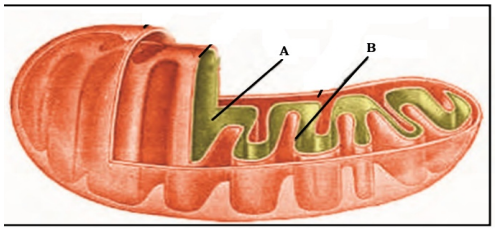
2021 Model

6.Observe the given diagram of Mitochondria.
(a) Identify and label parts A and B.
(b) Why Mitochondria is known as the power house of the cell?



2022 June

7.Observe the given diagram of Mitochondria.

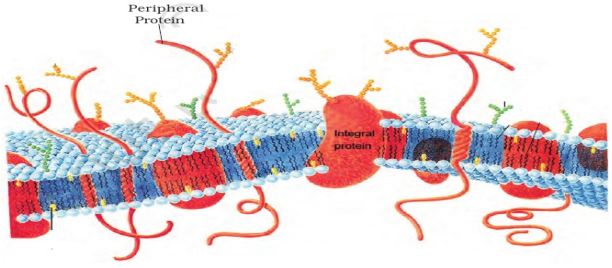


(a) Identify and write the name ofthe cell organelle given in the picture.
(b) Label the parts marked as A and B.

2022 Imp

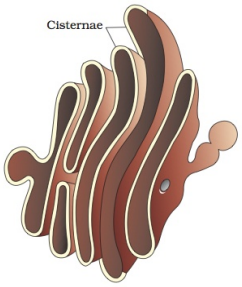
3 Marks Questions

1. Observe the given diagram. Analyze this diagram and explain the structure of plasma membrane.



2016 March

2. Given below is the diagram of a cell organelle.

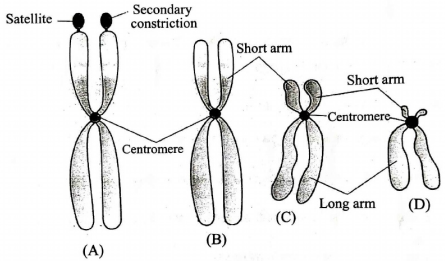


(a) Identify the organelle.
(b) Write any two functions of this organelle.

2020 Model

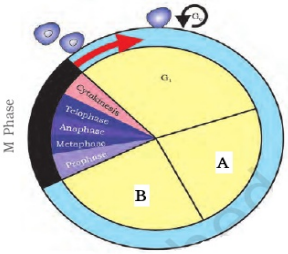
3.Given diagram shows different types of chromosomes. Observe the diagram and answer the following questions.
a) Identify four types of chromosomes based on the position of centromere observed in figures A, B, C and D
b) What is satellite?

2024 Model



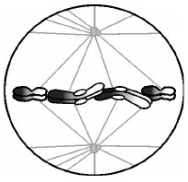
1Mark Questions

1. Observe the diagram related with cell cycle. Identify A and B.



2019 2nd term.

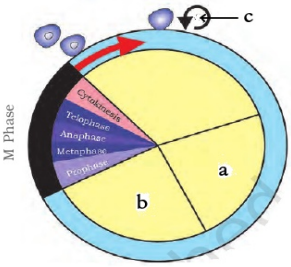
2.Observe the given diagram. Identify the stage of mitosis.



2021 Imp. .

2 Marks Questions

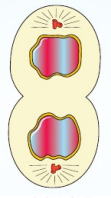
1. Observe the diagrammatic representation of cell cycle. Identify the stages 'a' and 'b'. Write the peculiarity of the stage noted as 'c'.



2017 2nd term

2. Observe the given stage of mitosis.

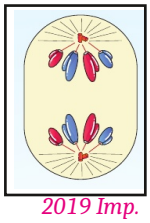
Identify the stage and write any two features of it.



2018 Imp.

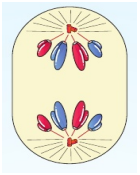
Chapter 6 -Cell Cycle and Cell division

3. Given below is the diagrammatic representation of a particular stage of mitosis.
   (a) Idenify the stage.
   (b) Write any two features of this stage.



2019 Imp.

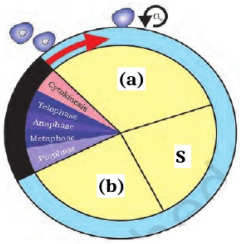
4.(a) Write the name of the stage of Mitosis in the given figure.
(b) Write one main event occurring in this stage.



2021Model

5.Observe the figure of cell cycle given below.

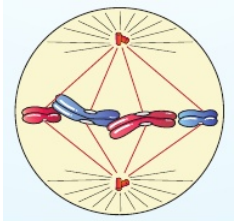
(a)Name the two phases of cell cycle.
(b) Identify the stages (a) and (b) of the cell cycle.

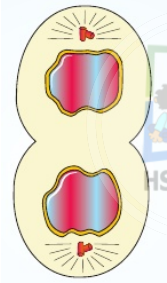


2022 Model

6. Observe the following phases of nuclear division during mitosis and answer the following questions.

a) Name the two phases of A and B
b) What are the main events occuring in "A" phase?

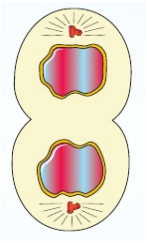

(A)


(B)

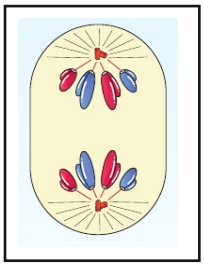
2023 Model

7. (a) Identify and write the name of stage of Mitosis shown in the picture.
   (b) Write one important event that takes place during this stage.

2023 Imp



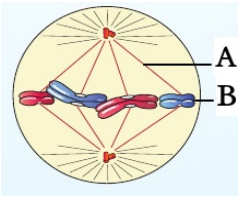
8. Observe the diagram showing a stage of mitosis
   a) Identify the stage.
   b) Write two key events during this stage.



2023 2nd term

3 Marks Questions

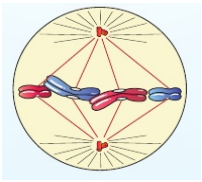
1. Observe the given diagram of cell division.



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

2012 March

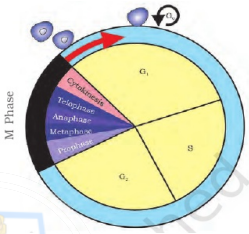
2. Observe the diagram given below representing a stage of mitosis.



a) Identify the stage.
b) Distinguish it from corresponding stage of meiosis-I
c) Mention the role of spindle fibres in Mitosis.

2012 Imp.

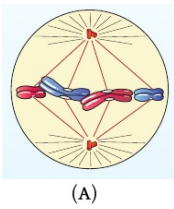
3. A diagrammatic view of a cell cycle is given below.

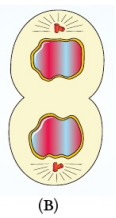


a) Identify the phase in which;
i)DNA synthesis takes place
ii) Chromosomes are arranged at the equator of the spindle
b) Mention two significant points of mitosis in the life of an organism.

2013 March

4. Observe the following phases of nuclear division during mitosis and answer the following questions.

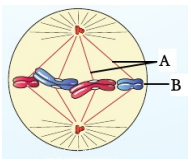

(A)


(B)

a) Name the two phases of A and B
b)What are the main events occuring in these two stages?

2013 Imp.

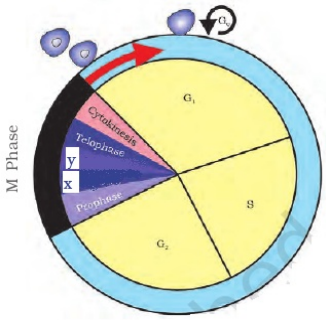
5. The diagram shown below represents a stage in mitosis.



a) Label the parts A and B
b) Identify the stage
c) Mention any two events occuring in this stage

2014 Imp.

6. Observe the diagrammatic view of a cell cycle and answer the questions.

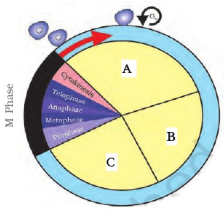


a) Identify the phase in which DNA synthesis takes place.
b) Mention any one event that takes place in the stages marked as 'x' and 'y'

2015 March

Chapter 6 -Cell Cycle and Cell division

7. Observe the diagram related with cell cycle.



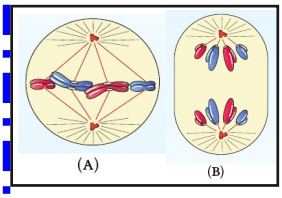
Identify and describe *A, B* and *C* in the diagram

(**Hint** : Description of one point each from *A,B* and *C*)

OR

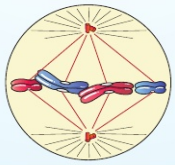
Write five sub-stages in prophase-I of meiosis. Point out in which sub-stage crossing over occurs. *2015 Imp.*

8.Observe the diagrams. Identify the A and B stages of mitosis. Write any two identifying features of each stage.



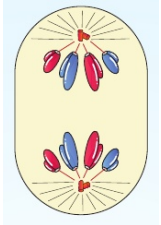
2016 Imp.

9.Given below is the metaphase of mitosis. Analyse the diagram and draw a sketch of anaphase. Write any two events of anaphase.



2017 March

10.Observe the figure.

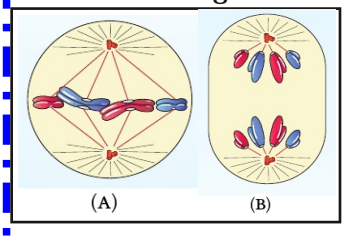


a) Identify the above stage of mitosis.

b) Name the preceding stage of the above stage. Write its main events.

2018 Model

11.Analyse the diagrams given below representing two stages of mitosis.

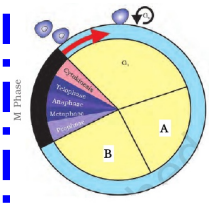


a) Identify the stages A and B.

b) Write two key features of each stages A and B.

2019 2nd term.

12.Observe the given figure of cell cycle :

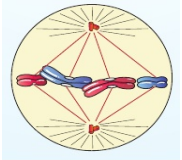


a) Write the name of phases marked as A and B.

b) Write one important event in A and B.

2021 Model

13.The figure shown below is the diagrammatic view of an important phase of mitosis.



(a) Identify the phase.

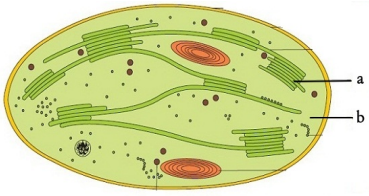
(b) What are the key events occurring during this phase ?

2021 Sept.

Chapter 7 - Photosynthesis in Higher Plants

2 Marks Questions

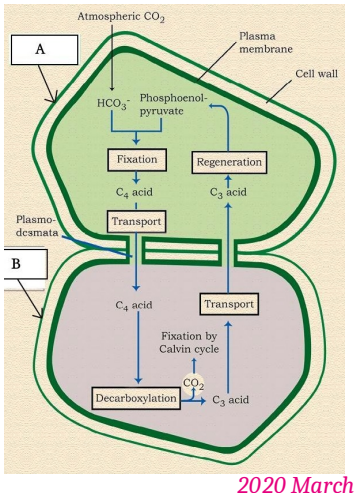
1.Observe the figure given below.



Identify the parts a & b. Write their functions.

2019 March

2.Observe the given figure showing C_4 pathway.



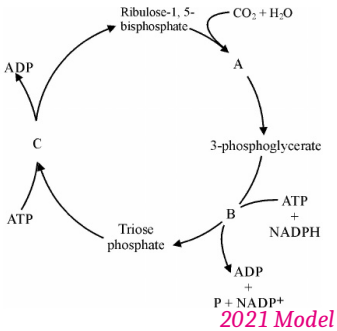
(a) Identify the cells A and B.

(b)Name the C_4 acid formed through this pathway.

(c)Name the enzyme involved in the formation of C_4 acid.

2020 March

3. Observe the figure of Calvin cycle given below:



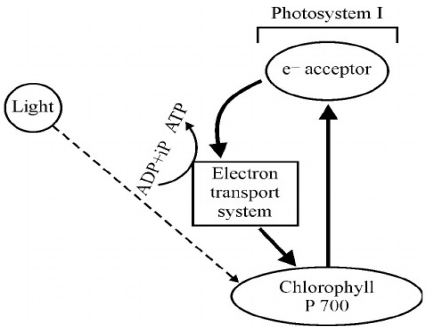
(a) Write the name of three major events marked as A, B and C.

(b) Find out the name of first CO_2 acceptor given in the figure.

2021 Model

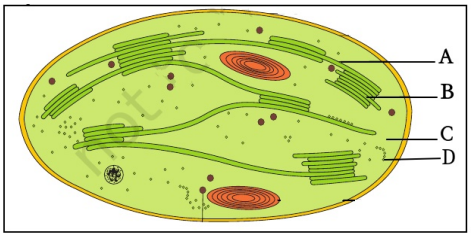
4. (a) Identify and write the process given in the picture.

(b) Where does it take place in chloroplast ?



2023 Imp

5. Label the parts A, B, C, D in the given diagram.

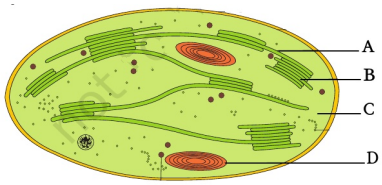


2023 2nd term

Chapter 7 - Photosynthesis in Higher Plants

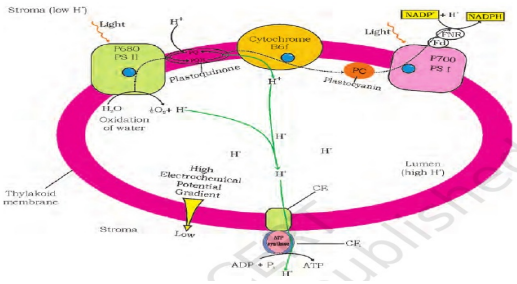
3 Marks Questions

1. RuBisCo is an enzyme that catalyse two entirely different processes.
   a) Which are the processes?
   b) In which process, chloroplast alone is used as cell organelle?
   c) Label the parts A, B, C, D in the given diagram.



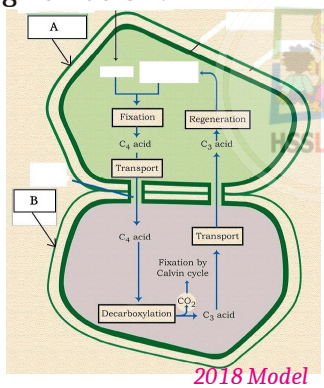
2013 Imp.

2. Observe the given figure and describe the process of ATP synthesis



2017 Imp.

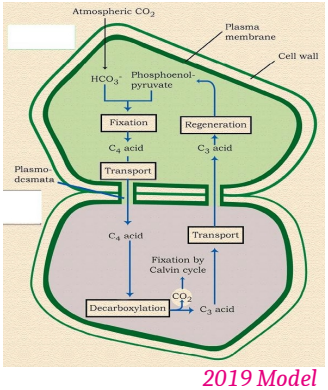
3. Observe the diagrammatic representation of Hatch and Slack pathway given below.
   Identify the cells A and B.
   Explain the process of formation of C_4 acid specifying the enzyme involved.



2018 Model

4. Diagrammatic representation of Hatch and Slack pathway is shown below.
   Analyse the figure.

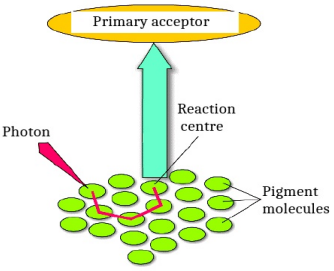
   (a) Name the cells involved in this pathway.
   (b) Identify the special type of anatomy present in the leaves of C4 pants.
   (c) Name two plants which show Hatch and Slack pathway



2019 Model

Chapter 7- Photosynthesis in Higher Plants

5. Observe the given diagram of LHC.
   a) Name the pigment that forms the reaction centre.
   b) Name any one accessory pigment involved in photosynthesis.
   c) Mention the function of accessory pigment.

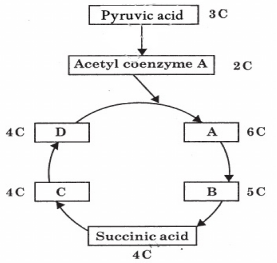


2022 Model

Chapter 8 - Respiration in Plants

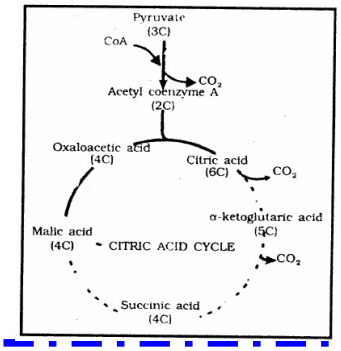
2 Marks Questions

1. The figure showing the pathway of Tricarboxylic acid cycle is given below. Name the compound present in the position of A, B, C and D.



2017 Imp.

2. Following figure shows the citric acid cycle.



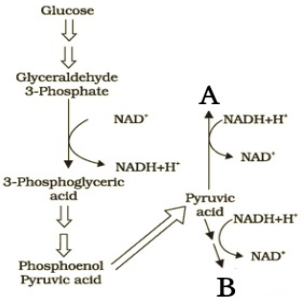
Identify the steps where FADH and GTP are synthesized.

2018 March

3.Observe the following pathways of anaerobic respiration.

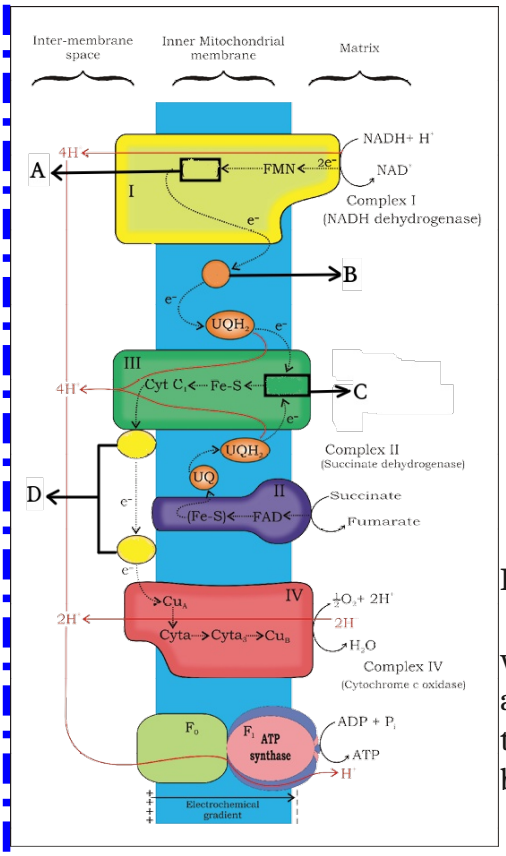
Identify the products A and B.

Give an example of organism in which any of these products are formed.



2018 Imp.

4.Observe the figure given below.

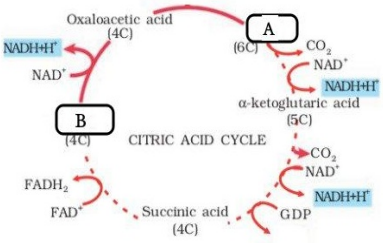


Fill in the blanks A, B, C and D with appropriate terms from the box given below.

Cyt c, Cyt b, FeS, UQ

2018 Imp.

5.Observe the schematic representation of Kreb's cycle given below.

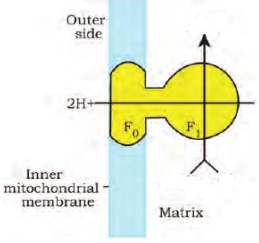


(a)Fill in the blanks A & B.

(b)Write down the step where substrate level phosphorylation occur in Kreb'scycle.

2019 Model

6.Observe the figure given below.

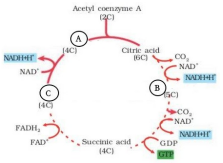


Name the complex.

Write its function.

2019 March

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

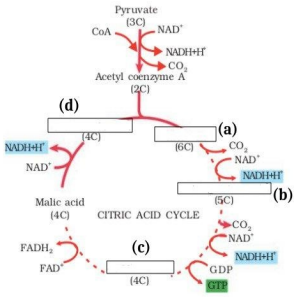


(a) Identify the cyclic pathway.

(b) Write the name of intermediate compounds marked as A, B & C.

2020 Imp.

8.Observe the figure of citric acid cycle given below. Identify (a), (b), (c) and (d) in the figure.

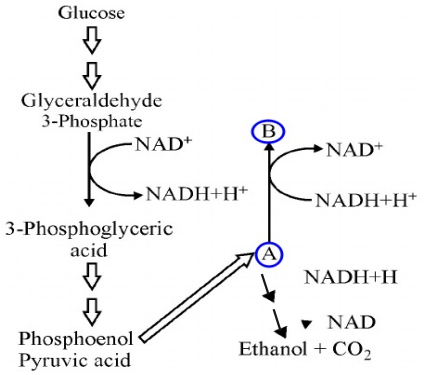


2022 Model

9. (a) Observe the figure and label A & B.

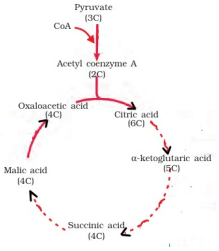
(b) The maximum concentration of alcohol in naturally fermented beverages is 13%. Give reason.

2023 Imp



3 Marks Questions

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



a) Identify the cyclic pathway.

b) Where does it occur?

c) Identify the steps of this pathway in which decarboxylation takes place.

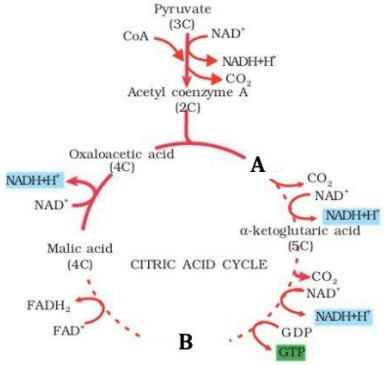
2012 Imp.

2.Given below is the schematic representation of tricarboxylic acid cycle in respiration.

(a) Identify and write the compounds A and B in the cycle.

(b) Name the scientist who first elucidated the cycle.

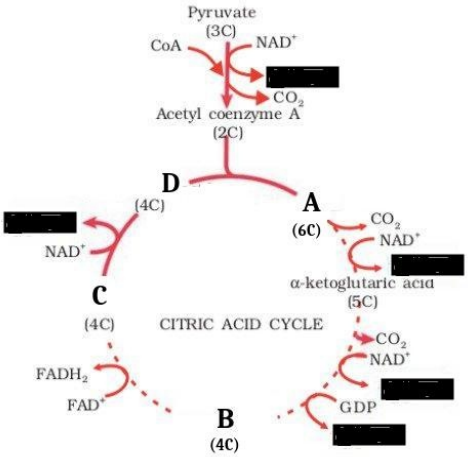
(c)Where does tricarboxylic cycle occur?



2022 June

3.(a) Identify and name the process given in the figure.

(b) Write the name of compounds marked as A, B, C and D.

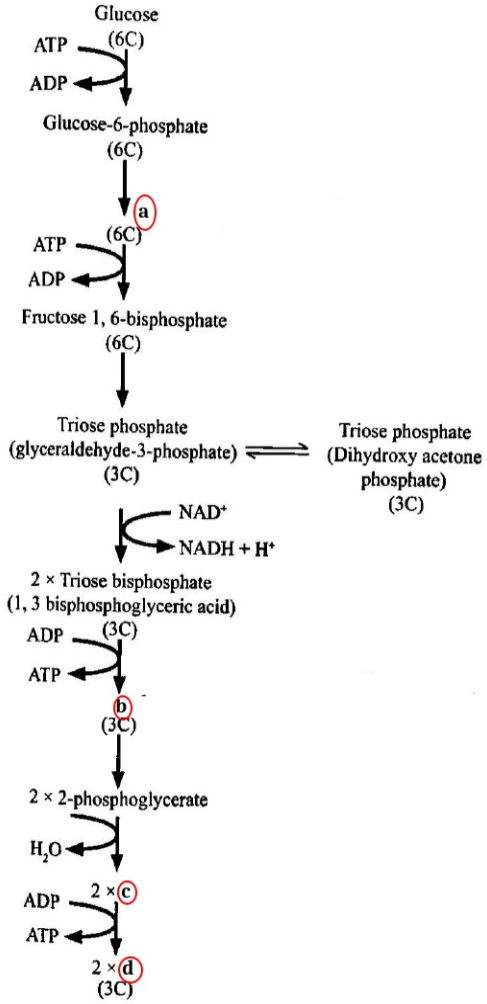


2022 Imp

4.Glycolysis is the partial oxidation of glucose to produce 2 molecules of pyruvic acid.

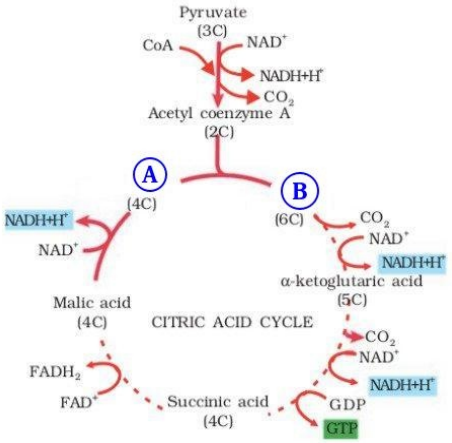
a) Where does glycolysis occur?

b) Steps of glycolysis are given below. Write the name of compounds marked as (a), (b), (c) and (d)



2023 Model

5.Observe the figure given below and answer the following questions.



(i) Write the name of this cycle.

(ii) Identify A & B in the cycle.

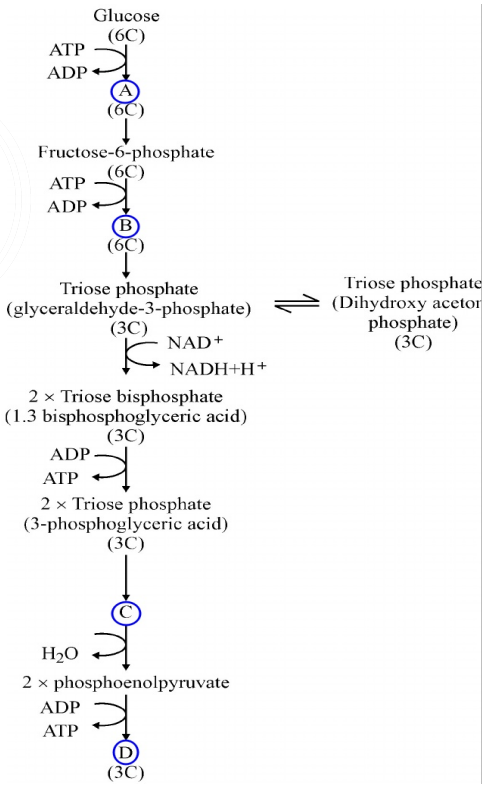
2023 March

6. Steps of glycolysis is given below :

(a) Write the name of compounds marked as A, B, C and D.

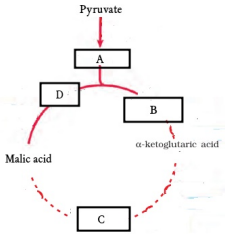
(b) Where does Glycolysis occur in a cell ?

2023 Imp



4 Marks Questions

1. Observe the given figure and answer the questions.



a) Identify the cycle and name the scientist who traced the pathway.

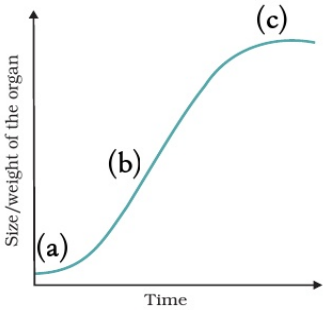
b)Complete the cycle by filling A, B, C & D in the boxes.

c)How many NADH and FADH2 are yielded during the complete oxidation of one molecule of pyruvate by this pathway?

2012 March

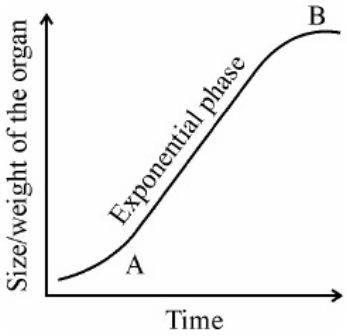
2 Marks Questions

1. Observe the graph:



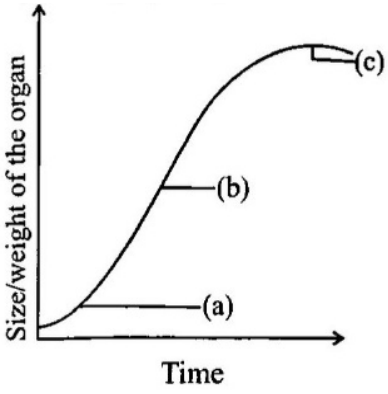
The graph represents the different phases of growth.
Name the growth curve and identify the different phases of growth represented in the diagram as (a), (b) and (c) *2014 Imp.*

2.(a) Write the name of the growth curve seen in the given figure.
(b) Write the name of phases marked as A and B.



2021 Model

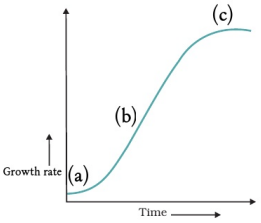
3.Observe the given graph. The graph represents the phases of growth.
a) Name the growth curve.
b) Name the different phases of growth represented as (a), (b) and (c).



2023 Model

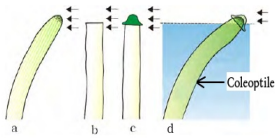
3 Marks Questions

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



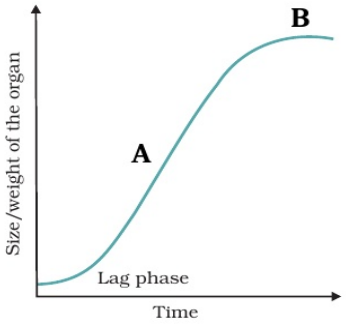
a) Name the growth curve
b)Label (a) and (c) phases of growth in the growth curve
c)When the tip of cassava plant is lost, a number of lateral branches grow from the nodes below. Explain this phenomenon and specify the hormone responsible for this.
2012 March

2. Observe the figure given below:



a) Source of which plant hormone is indicated in the figure?
b) Write four roles of above identified hormone.
2018 Model

3.Given below is the graph of a Growth curve.
(a) Write the name of the Growth curve
(b) Label the stages marked as A & B



2022 Imp

Answer key

Chapter1-Biological Classification

1Mark Questions

1. Nostoc
2. (A) Dinoflagellates (B) Slime mould
3. Euglena
4. Nostoc

2 Marks Questions

1. a) Tobacco Mosaic Virus (TMV)
   b) 1. RNA 2. Capsid

Chapter 2 -Plant Kingdom

1 Mark Questions

1. Sporophyte

2 Marks Questions

1. Marchantia
   Gemmae. Green, multicellular, asexual buds, which develop in small receptacles called gemma cups located on the thalli.
2. A. Sporophyte
   The sporophyte is not free-living but attached to the photosynthetic gametophyte and derives nourishment from it/consist of a foot, seta and capsule/some cells of the sporophyte undergo reduction division (meiosis) to produce haploid spores/the capsule contains spores ***(any two)***
3. (i) Funaria
   (ii) A. Rhizoids B. Seta C. Capsule

Chapter 3 -Morphology of Flowering plants

1Mark Questions

1. a. Axile b. Parietal
2. a) Solanaceae b) Epipetalous
3. Cymose

2 Marks Questions

1. a) A. Valvate B. Twisted
   b) Valvate - sepals or petals in a whorl just touch one another at the margin, without overlapping.
   Twisted - one margin of the appendage overlaps that of the next one and so on.
2. 1. Valvate 2. Twisted 3. Vexillary
   Pea flower - Vexillary
3. (i) Coleoptile (ii) Plumule (iii) Radicle
   (iv) Aleurone layer

Chapter 3 -Morphology of Flowering plants

4. A. Hypogynous B. Epigynous
5. A. Opposite - a pair of leaves arise at each node and lie opposite to each other.
   B. Whorled - more than two leaves arise at a node and form a whorl.
6. A. Axile - placenta is axial and the ovules are attached to it in a multilocular ovary.
   B. Parietal - the ovules develop on the inner wall of the ovary or on peripheral part.
7. A. Pinnately compound, Neem
   B. Palmately compound, Silk Cotton
8. A. Region of maturation
   B. Region of elongation
   C. Region of meristematic activity
   D. Root cap
9. a. Region of maturation
   b. Region of elongation
   c. Region of meristematic activity
   Root hairs absorb water and minerals from the soil.
10. a) A. Region of maturation
    B. Region of elongation
    C. Region of meristematic activity
    b) Protects the tender apex of the root as it makes its way through the soil.
11. a) Solanaceae
    b) Inflorescence : Solitary, axillary or cymose
    Flower: bisexual, actinomorphic
    Calyx: sepals five, united, persistent, valvate aestivation
    Corolla: petals five, united; valvate aestivation
    Androecium: stamens five, epipetalous
    Gynoecium: bicarpellary obligately placed, syncarpous; ovary superior, bilocular, placenta swollen with many ovules, axile placentation ***(any 2)***
12. a. Marginal b. Axile c. Parietal d. Free central
13. (i) The pattern of arrangement of leaves on the stem or branch.
    (ii) A. Alternate B. Opposite
14i) Region of maturation
    ii) Region of elongation
    iii) Region of meristematic activity
    iv) Root cap

$2^1/_2$ Marks Questions

1. a) Drupe b) A. Epicarp B. Mesocarp
   c) This fruit is developed from a fertilised ovary. A parthenocarpic fruit is developed from ovary without fertilisation.

3 Marks Questions

1. a) (a) Marginal (b) Axile (c) Free central
   b) Marginal - placenta forms a ridge along the ventral suture of the ovary and the ovules are borne on this ridge
   Axile - placenta is axial and the ovules are attached to it in a multilocular ovary
   Free central - ovules are borne on central axis and septa are absent
2. (a) Ovary half inferior - Perigynous
   (b) Ovary inferior - Epigynous
   (c) Ovary superior - Hypogynous
3. (a) Parietal - mustard/argemone ***(any 1)***
   (b) Axile - china rose/tomato/lemon ***(any 1)***
   (c) Marginal - pea
4. a) A. Cymose B. Racemose
   b) Cymose - the main axis terminates in a flower, flowers are borne in a basipetal order.
   Racemose - the main axis continues to grow, the flowers are borne laterally in an acropetal succession.
5. (a) A. Solanaceae
   (b) A. Bicarpellary, obligately placed, syncarpous, ovary superior, bilocular, placenta swollen with many ovules, axile placentation.
6. (a) A. Twisted B. Vexillary
   (b) One margin of the appendage overlaps that of the next one and so on.
   (c) Standard, Wing, Keel
7. (a) A. Reticulate B. Parallel
   (b) The arrangement of veins and the veinlets in the lamina of leaf is termed as venation.
8. (a) Solanaceae
   (b) Inflorescence : Solitary, axillary or cymose
   Flower: bisexual, actinomorphic
   Calyx: sepals five, united, persistent, valvate aestivation
   Corolla: petals five, united; valvate aestivation
   Androecium: stamens five, epipetalous
   Gynoecium: bicarpellary obligately placed, syncarpous; ovary superior, bilocular, placenta swollen with many ovules, axile placentation ***(any 2)***
   (c) Tomato/brinjal/potato/chilli/belladonna/ashwagandha/tobacco/petunia ***(any 2)***
9. (a) A. Valvate B. Twisted C. Vexillary
   (b) There are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel)
10. (a) The arrangement of ovules within the ovary is known as placentation.
    (b) A. Axile B. Parietal C. Marginal D. Basal
11. a) The mode of arrangement of sepals or petals in floral bud with respect to the other members of the same whorl is known as aestivation.
    b) A. Valvate B. Twisted
    C. Imbricate D. Vexillary
12. a) The arrangement of veins and the veinlets in the lamina of leaf is termed as venation.
    b) A. Reticulate : veinlets form a network
    B. Parallel : veins run parallel to each other within a lamina.
13. (i) (A) Hypogynous (B) Perigynous
    (ii) The margin of thalamus grows upward enclosing the ovary completely and getting fused with it, the other parts of flower arise above the ovary. Hence, the ovary is said to be inferior.
14. A. Hypogynous - Ovary superior
    B. Perigynous - Ovary half inferior
    C. Epigynous - Ovary inferior
15. a) Solanaceae
    b) Inflorescence : Solitary, axillary or cymose
    Flower: bisexual, actinomorphic
    Calyx: sepals five, united, persistent, valvate aestivation
    Corolla: petals five, united; valvate aestivation
    Androecium: stamens five, epipetalous
    Gynoecium: bicarpellary obligately placed, syncarpous; ovary superior, bilocular, placenta swollen with many ovules, axile placentation ***(any 1)***
    c) Many plants belonging to this family are source of food (tomato, brinjal, potato), spice (chilli); medicine (belladonna, ashwagandha); fumigatory (tobacco); ornamentals (petunia).
16. a) The arrangement of ovules within the ovary is known as placentation.
    b) (1) Marginal (2) Axile
    (3) Parietal (4) Free central

1Mark Questions

1. Radial

2 Marks Questions

1. Dicot stem : A large number of vascular bundles are arranged in a ring, vascular bundle is conjoint, open and with endarch protoxylem. ***(any 2)***
2. A. Closed B. Open
   1. Phloem 2. Xylem 3. Phloem
   4. Cambium 5. Xylem
3. (a) A. Palisade mesophyll B. Spongy mesophyll C. Stoma
   (b) Dorsiventral/Dicotyledonous Leaf
4. A. Radial : xylem and phloem within a vascular bundle are arranged in an alternate manner along the different radii.
   B. Conjoint open : the xylem and phloem are jointly situated along the same radius of vascular bundles. Cambium is present between phloem and xylem.
5. (a) Radial (b) Conjoint open
6. A. Radial vascular bundles : xylem and phloem within a vascular bundle are arranged in an alternate manner along the different radii.
   B. Conjoint open vascular bundles : xylem and phloem are jointly situated along the same radius of vascular bundles and cambium present

3 Marks Questions

1. a) A. Conjoint open B. Radial
   b) Conjoint open vascular bundles : xylem and phloem are jointly situated along the same radius of vascular bundles and cambium present
   Radial vascular bundles : xylem and phloem within a vascular bundle are arranged in an alternate manner along the different radii.
2. 1.Conjoint closed : xylem andphloem are jointly situated along the same radius of vascular bundles and cambium absent
   2. Conjoint open : xylem and phloem are jointly situated along the same radius of vascular bundles and cambium present
3. a. Epidermis b. Cortex c. Xylem d. Phloem
   There are usually two to four xylem and phloem patches/Xylem Polygonal/Radial arrangement/ Exarch protoxyem ***(any 2)***
4.

Dicot Stem	Monocot Stem
Ground tissue differentiated into cortex, endodermis, pericycle and pith.	Ground tissue undifferentiated.
Hypodermis collenchymatous.	Hypodermis schlerenchymatous.
Limited number of vascular bundles arranged in the form of a ring.	Large number of scattered vascular bundles.
Schlerenchymatous bundle cap.	Schlerenchymatous bundle sheath.
Vascular bundles conjoint, open.	Vascular bundles conjoint, closed.
Vascular bundles similar in size.	Peripheral bundles are smaller.
Phloem paremchyma present.	Phloem parenchyma absent.
Water containing cavities absent in vascular bundles ***(any 3)***	Water containing cavities present in vascular bundles ***(any 3)***

5. Mesophyll is made up of parenchyma. It has two types of cells – the palisade parenchyma and the spongy parenchyma. The adaxially placed palisade parenchyma is made up of elongated cells, which are arranged vertically and parallel to each other. The oval or round and loosely arranged spongy parenchyma is situated below the palisade cells and extends to the lower epidermis. There are numerous large spaces and air cavities between these cells.
6. A. Radial : xylem and phloem within a vascular bundle are arranged in an alternate manner along the different radii. Found in root.
   B. Conjoint open vascular bundles : xylem and phloem are jointly situated along the same radius of vascular bundles and cambium present

Chapter 5 -Cell:Structure and Functions

1Mark Questions

1. (b) Centromere at the centre, only primary constriction present.

2 Marks Questions

1. Metacentric
   A. Centromere B. Secondary constriction
   C. Satellite
2. Golgi apparatus
   Packaging materials, important site of formation of glycoproteins and glycolipids.
3. a) A. Metacentric B. Acrocentric
   b) Telocentric
4. A. Inner membrane B. Matrix
   C. Inter-membrane space D. Crista
5. (a) Mitochondria
   (b) A. Matrix B. Crista
6. (a) A. Matrix B. Crista
   (b) They produce cellular energy in the form of ATP.
7. (a) Mitochondria
   (b) A. Matrix B. Crista

3 Marks Questions

1. Cell membrane is mainly composed of lipids and proteins. The major lipids are phospholipids that are arranged in a bilayer. The lipids are arranged within the membrane with the polar head towards the outer sides and the hydrophobic tails towards the inner part.This ensures that the nonpolar tail of saturated hydrocarbons is protected from the aqueous environment
2. (a) Golgi apparatus
   (b) Packaging materials, important site of formation of glycoproteins and glycolipids.
3. a) A. Metacentric B. Metacentric
   C. Sub-metacentric D. Acrocentric
   b) Small fragment of chromosome found beyond secondary constriction in some chromosomes.

Chapter 6 -Cell Cycle and Cell division

1Mark Questions

1. A. S phase B. G_2 phase
2. Metaphase

2 Marks Questions

1. a. S phase b. G_2 phase
   c. It is the quiescent stage (G_0): Cells in this stage remain metabolically active but no longer divide.
2. Telophase : Chromosomes cluster at opposite spindle poles and start unwinding/Nuclear envelope develops around the chromosome clusters at each pole forming two daughter nuclei/Nucleolus, golgi complex and ER reform. ***(any 2)***
3. (a) Anaphase
   (b) Centromeres split and chromatids separate. Chromatids move to opposite poles.
4. (a) Anaphase
   (b) Centromeres split and chromatids separate. Chromatids move to opposite poles. ***(any 1)***
5. (a) Interphase and M phase(Mitosis phase)
   (b) (a) G_1 phase b. G_2 phase
6. a) A. Metaphase B. Telophase
   b) Spindle fibres attach to kinetochores of chromosomes.
   Chromosomes are moved to spindle equator and get aligned along metaphase plate.
7. (a) Telophase
   (b) Chromosomes cluster at opposite poles unwind to chromatin fibres/
   Nuclear envelope develops around the chromosome clusters at each pole forming two daughter nuclei/Nucleolus, golgi complex and ER reform***(any 1)***
8. a) Anaphase
   b) Centromeres split and chromatids separate. Chromatids move to opposite poles.

3 Marks Questions

1. a) Metaphase
   b) A. Spindle fibre B. Metaphase plate/ Chromosome
   c) Crossing over/Formation of recombination nodules

2. a) Metaphase
   b) Metaphase of Mitosis : Spindle fibres from one pole attach to kinetochore of one chromatid and spindle fibres from the opposite pole attach to the kinetochore of the sister chromatid of a chromosome.
   Metaphase of Meiosis : Spindle fibres from the opposite poles attach to the kinetochore of homologous chromosomes.
   c) Spindle fibres attached to the kinetochores are responsible for the spliting of centromere and formation of daughter chromatids.
3. a) i) S phase ii) Metaphase
   b) Mitosis results in the production of daughter cells with identical genetic characters to the parent cell. The growth of multicellular organisms is due to mitosis.
4. a) A. Metaphase B. Telophase
   b) Metaphase : Spindle fibres attach to kinetochores of chromosomes.
   Chromosomes are moved to spindle equator and get aligned along metaphase plate.
   Telophase : Chromosomes cluster at opposite poles unwind to chromatin fibres. Nuclear envelope develops around the chromosome clusters at each pole forming two daughter nuclei. Nucleolus, golgi complex and ER reform
5. a) A. Spindle fibres B. Metaphase plate/ chromosome
   b) Metaphase
   c) Spindle fibres attach to kinetochores of chromosomes. Chromosomes are moved to spindle equator and get aligned along metaphase plate.
6. a) S phase
   b) x- Spindle fibres attach to kinetochores of chromosomes/Chromosomes are moved to spindle equator and get aligned along metaphase plate.***(any 1)***
   y - Centromeres split and chromatids separate/Chromatids move to opposite poles. ***(any 1)***
7. A. G_1 phase : cell is metabolically active and continuously grows
   S phase : DNA synthesis or replication takes place.
   G_2 phase : proteins are synthesised in preparation for mitosis and cell growth continues.
8. A. Metaphase : Spindle fibres attach to kinetochores of chromosomes.
   Chromosomes are moved to spindle equator and get aligned along metaphase plate.
   B. Anaphase : Centromeres split and chromatids separate. Chromatids move to opposite poles.
9. Anaphase : Centromeres split and chromatids separate. Chromatids move to opposite poles.
10. a) Anaphase
    b) Metaphase : Spindle fibres attach to kinetochores of chromosomes.
    Chromosomes are moved to spindle equator and get aligned along metaphase plate.
11. a) A. Metaphase B. Anaphase
    b) Metaphase : Spindle fibres attach to kinetochores of chromosomes.
    Chromosomes are moved to spindle equator and get aligned along metaphase plate.
    Anaphase : Centromeres split and chromatids separate. Chromatids move to opposite poles.
12. a) A. S phase B. G_2 phase
    b) A. DNA synthesis or replication takes place.
    B. proteins are synthesised in preparation for mitosis and cell growth continues.
13. (a) Metaphase
    (b) Spindle fibres attach to kinetochores of chromosomes.
    Chromosomes are moved to spindle equator and get aligned along metaphase plate.

Chapter 7 - Photosynthesis in Higher Plants

2 Marks Questions

1. a. Grana - trapping the light energy and synthesis of ATP and NADPH(Light-reaction/ Photochemical reaction)
   b. Stroma - enzymatic reactions synthesise sugar (Dark reaction/Biosynthetic phase)
2. (a) A. Mesophyll cells B. Bundle sheath cells
   (b) Oxaloacetic acid/OAA
   (c) PEPcase(PEP carboxylase)
3. (a) A. Carboxylation B. Reduction
   C. Regeneration
   (b) Ribulose-1,5-bisphosphate/RuBP
4. (a) Cyclic photophosphorylation
   (b) Thylakoid (Stroma lamella)
5. A. Stroma lamella B. Granum(Grana lamella)
   C. Stroma D. Ribosomes

3 Marks Questions

1. a) Carboxylation(C_3 cycle) and Oxygenation (Photorespiration)
   b) Carboxylation(C_3 cycle)
   c) A. Stroma lamella B. Granum
   C. Stroma D. Starch granule
2. Chemiosmotic Hypothesis explains accumulation of protons in the lumen of thylakoid forming a proton gradient. Protons released by splitting of water accumulate within the lumen of the thylakoids. As electrons move through the photosystems, protons are transported across the membrane. To reduce NADP + to NADPH+ H+, protons are taken from the stroma. When the protons move from the lumen to the stroma through ATP synthase enzyme ATP is synthesised.
3. A. Mesophyll cells B. Bundle sheath cells
   Phosphoenol pyruvate (PEP), a 3-carbon molecule present in the mesophyll cells combines with CO_2 to form Oxaloacetic acid/ OAA, a C_4 acid. The enzyme responsible for this fixation is PEP carboxylase or PEPcase.
4. (a) Mesophyll cells and Bundle sheath cells
   (b) Kranz anatomy
   (c) Maize, Sorghum
5. a) Chlorophyll *a*
   b) Chlorophyll *b*, xanthophylls and carotenoids ***(any 1)***
   c) Absorb light and transfer the energy to chlorophyll *a* and protect chlorophyll *a* from photo-oxidation

Chapter 8 - Respiration in Plants

2 Marks Questions

1. A. Citric acid B. α-ketoglutaric acid
   C. Malic acid D. Oxaloacetic acid
2. During the conversion of succinyl-CoA to succinic acid a molecule of GTP is synthesised. During the conversion of succinic acid to Malic acid $FADH_2$ is formed.
3. A. Lactic acid - Eg.Lactic acid bacteria
   B. Ethyl alcohol and CO_2- Yeast
4. A. FeS B. UQ C. Cyt b D. Cyt c
5. (a) A. Citric acid B. Malic acid
   (b) During the conversion of succinyl-CoA to succinic acid a molecule of GTP is synthesised.
6. Complex V (ATP synthase)
   ATP Synthesis
7. (a) Krebs' cycle/Tricarboxylic Acid Cycle/Citric acid cycle
   (b) A. Oxaloacetic acid B. α-ketoglutaric acid
   C. Malic acid
8. (a) Citric acid (b) α-ketoglutaric acid
   (c) Succinic acid (d) Oxaloacetic acid
9. (a) A. Pyruvic acid B. Lactic acid
   (b) Yeasts poison themselves to death when the concentration of alcohol reaches about 13 percent.

3 Marks Questions

1. a) Krebs' cycle/Tricarboxylic Acid Cycle/Citric acid cycle
   b) Mitochondrial matrix
   c) 1. Pyruvate to Acetyl coenzyme A
   2. Citric acid to α-ketoglutaric acid
   3. α-ketoglutaric acid to Succinic acid
2. (a) A. Citric acid B. Succinic acd
   (b) Hans Krebs
   (c) Mitochondrial matrix
3. (a) Krebs' cycle/Tricarboxylic Acid Cycle/Citric acid cycle
   (b) A. Citric acid B. Succinic acd
   C. Malic acid D. Oxaloacetic acid
4. a) Cytoplasm
   b) (a) Fructose-6-phosphate
   (b) 3-phosphoglyceric acid
   (c) Phosphoenolpyruvic acid
   (d) Pyruvic acid
5. (i) Krebs' cycle/Tricarboxylic Acid Cycle/Citric acid cycle
   (ii) A. Oxaloacetic acid B. Citric acid

Chapter 8 - Respiration in Plants

6. (a) A. Glucose-6-phosphate
   B. Fructose1, 6-bisphosphate
   C. 2-phosphoglyceric acid
   D. Pyruvic acid
   (b) Cytoplasm

4 Marks Questions

1. a) Krebs' cycle/Tricarboxylic Acid Cycle/Citric acid cycle
   Hans Krebs
   b) A. Acetyl coenzyme A B. Citric acid
   C. Succinic acd D. Oxaloacetic acid
   c) NADH - 8 $FADH_2$ - 2

Chapter 9 - Plant growth and development

2 Marks Questions

1. (a) Lag phase (b) log or exponential phase
   (c) Stationary phase
2. (a) Sigmoid or S- growth curve
   (b) A. Lag phase B. Stationary phase
3. a) Sigmoid or S- growth curve
   b) a) Lag phase b) Log or exponential phase
   c) Stationary phase

3 Marks Questions

1. a) Sigmoid or S- growth curve
   b) (a) Lag phase (c) Stationary phase
   c) Growing apical bud inhibits the growth of the lateral (axillary) buds which is called apical dominance. Auxin is responsible for this. When tip of the plant is removed, auxin is lost and the lateral buds grow.
2. a) Auxins
   b) Initiate rooting in stem cuttings, promote flowering, prevent fruit and leaf drop at early stages, promote the abscission of older mature leaves and fruits, apical dominance, induce parthenocarpy, controls xylem differentiation and helps in cell division. ***(any 4)***
3. (a) Sigmoid or S- growth curve
   (b) A. Log or exponential phase
   B. Stationary phase