PREVIOUS QUESTIONS XI 2012-2022 : *Chapter 9 - Photosynthesis in Higher Plants*

1Mark Questions

1. C_4 cycle is so called because of the presence of a C_4 acid.
   a) Name the C_4 acid.
   b) Name the leaf anatomy present in C_4 plants. *2014 Imp.*

2. The reaction centre of photosystems in green plants during light reaction is.....
   a) Xanthophyll
   b) Carotenoids
   c) Chlorophyll *b*
   d) Chlorophyll *a* *2016 March*

3. An enzyme present in plants, which shows carboxylation and oxygenation activity. Identify the enzyme. *2017 Imp.*

4. Choose the correct answer.
   Law of limiting factors is proposed by,
   a) CorneliusVanNiel
   b) Blackman
   c) Joseph Priestley
   d) Engelmann *2018 Model*

5. Choose the correct answer from the bracket.
   First stable product of carbondioxide fixation in C_4 palnt is...
   (PGA, OAA, PEP, RUBP) *2018 March*

6. Observe the relationship between first two terms and fill in the blank.
   C_4 plants : PEPcase
   C_3 plants : ..... *2018 Imp.*

7. Choose the correct answer.
   The primary acceptor of carbon dioxide(CO_2) in C_3 plants :
   (a) PEP (b) RuBP
   (c) PGA (d) OAA *2019 Model*

8. Name the special type of anatomy present in C_4 plants. *2022 Model*

2 Marks Questions

1. An anatomist observed a peculiar type of large spherical bundle sheath cells in sugarcane leaf and a physiologist identified the presence of PEP carboxylase in that leaf mesophyll.
   a) Name the peculiar leaf anatom.y
   b) Explain the physiological advantages of such type of plants. *2012 March*

2. 'Photorespiration is a curse to plants'
   a) Evaluate this statement.
   b) Find the reason for this event to takeplace. *2012 March*

3. 'There is a clear division of labour within the chloroplast.'
   Substantiate the given statement with an explanation stating two points. *2015 March*

4. Photosynthesis can be considered as the most significant physicochemical process on earth. Evaluate this statement citing any two significances. *2015 March*

5. C_4 plants have special features. List out any four specialities of C_4 plants compared to C_3 plants. *2015 March*

6. Write any four peculiarities of 'Z scheme' electron transport in light reaction. *2015 Imp.*

7. Name the following in C_4 pathway in C_4 plants:
   Leaf anatomy,
   Primary CO_2 acceptor,
   Enzyme responsible for primary CO_2 - fixation,
   First C_4 acid formed in mesophyll cells. *2015 Imp.*

8. Light reaction involve cyclic and non-cyclic electron transport. Classify the features given below under the above stages of light reaction.
   a) Only pigment system I is involved
   b) ATP and NADPH are formed
   c) Splitting of water occurs
   d) Only ATP is formed

Cyclic electron transport	Non-cyclic electron transport

2016 Imp.

9. Chemiosmosis theory of photosynthesis requires a proton gradient for ATP synthesis to occur. Explain any two events that causes proton gradient. *2016 Imp.*

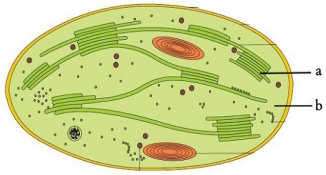
10. An important difference between C_3 and C_4 plants is photorespiration. Explain how photorespiration occurs in C_3 plants. *2017 March*

11. Define Blackman's law of limiting factors and identify any two important factors which influence the rate of photosynthesis in plants. *2017 March*

12. Certain thylakoid pigments are called accessory pigments. Name them. Write their significance. *2019 March*

13. Observe the figure given below.

Identify the parts a, b.
Write their functions.



2019 March

14. C_4 plants have a special leaf anatomy. Name that anatomy. Write three peculiarities of this kind of anatomy. *2019 March*

15. Plants that are adapted to dry tropical regions have the C_4 pathway. Write any two advantages of C_4 plants over C_3 plants. *2019 Imp.*

16. RuBisCO is the most abundant enzyme in the plant world. How does RuBisCO involve in photorespiration ? *2019 Imp.*

17. Plants that are adapted to dry tropical regions have the C_4 pathway. Write any two advantages of C_4 plants. *2020 Model*

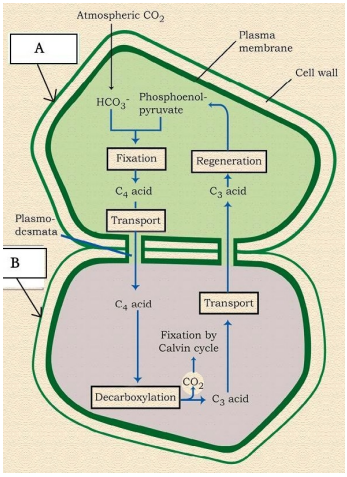
18. Define "The law of limiting factors". Write any two external factors which directly affect the rate of photosynthesis. *2020 Model*

19. Analyse the table given below and fill in the blanks a, b, c, d.

Process	Cyclic photophosphorylation	Non-cyclic photophosphorylation
Movement of electrons	Cyclic	_____(a)_____
Number of photosystems	_____(b)_____	_____(c)_____
Splitting of water	_____(d)_____	Absent

2020 March

20. 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*

21. Notice the three stages of Calvin cycle given below.

Reduction, Regeneration, Carboxylation

(a) Arrange the above stages in correct order.
(b) Calvin cycle is also known as C_3 cycle (pathway). Give reason. *2020 March*

22. Analyse the table and fill in the blanks.

Charateristics	C_3 Plants	C_4 Plants
Primary CO2 acceptor	_____(a)_____	PEP
Primary CO2 fixation product	_____(b)_____	OAA
Leaf anatomy	Normal anatomy	_____(c)_____
Example	Hibiscus	_____(d)_____

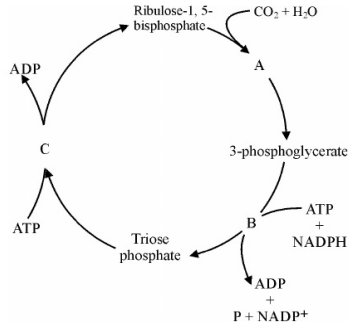
2020 Imp.

23. Light reaction and dark reaction are the two stages of photosynthesis. Write the differences between light reaction and dark reaction. *2020 Imp.*

24. Write any two differences between Cyclic and Non-cyclic photophosphorylation. *2021 Model*

25. (a) Write the name of two phases of Photosynthesis.
(b) Which are the sites of these phases in chloroplast ? *2021 Model*

26. 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

27. (a) What is 'Kranz' anatomy ?
(b) Write two examples of plants that exhibit 'Kranz' anatomy. *2021 Model*

28. Light reaction is a process involved in photosynthesis.
(a) What is light reaction ?
(b) Where does it take place ? *2021 Sept.*

29. In some plants that are adapted to dry tropical region have the C4 pathway.
(a) Name the special type of anatomy seen in C4 plants.
(b) List out any two plants that shows C4 pathway. *2021 Sept.*

30. Write any two events take place in z-scheme of light reaction. *2021 Sept.*

31. The Calvin cycle represents the main events in Dark reaction.
(a) Name the three main stages of Calvin cycle.
(b) What is the main product of Calvin cycle ? *2021 Sept.*

32. Calvin cycle or C_3 cycle in photosynthesis have 3 stages.
(a)Identify the three stages of Calvin cycle.
(b)Which is the primary CO_2 acceptor in Calvin cycle ? *2021 Imp.*

33. List out any two characteristic features of C_4 plants. *2021 Imp.*

34. Given below are some features of cyclic and non-cyclic photophosphorylation. List out the features of non-cyclic photophosphorylation from the hints provided.
(a) NADPH and ATP formed.
(b) Only one photo system involved.
(c) Splitting of water occurs.
(d) Both photosystems involved.
(e) Only ATP is formed.
(f) Oxygen is evolved. *2021 Imp.*

35. Accessory pigments are involved in the process of photosynthesis.
(a)Name any two accessory pigments.
(b)Write any one function of accessory pigment. *2021 Imp.*

36. List out any four external factors affecting photosynthesis. *2022 Model*

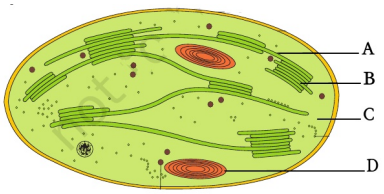
3 Marks Questions

1. Light reaction of photosynthesis is divided into two processes.In one process the electrons emitted will return to the place from where it is emitted.
a) What are the names of these two processes?
b) What happens to the electrons in the second phase?
c)Explain it with schematic representation. *2013 Imp.*

2. 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?



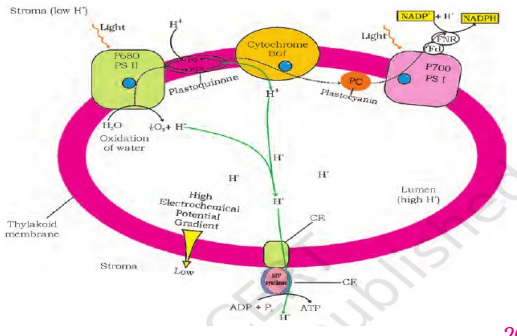
c) Label the parts A, B, C, D in the given diagram.

2013 Imp.

3. The light reaction of photosynthesis is divided into two reactions. They are cyclic and non-cyclic photophosphorylation. Mention any three difference between cyclic and non-cyclic reactions. *2014 Imp.*

4. a) Name the special type of leaf anatomy shown by C_4 plants.
   b) Illustrate the major advantages of C_4 plants over C_3 plants. *2016 March*

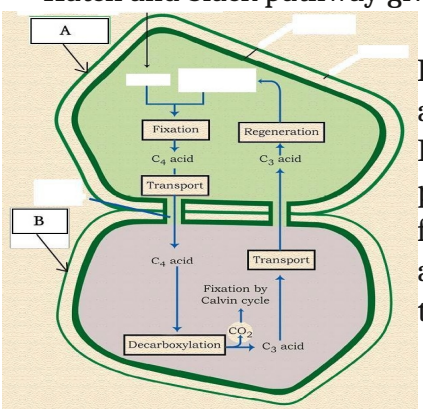
5. Observe the given figure and describe the process of ATP synthesis



2017 Imp.

6. Photophosphorylation takes place during photosynthesis.
   a)Name the types of photophosphorylation.
   b) Distinguish between them.
   (**Hint**: Any two differences) *2017 Imp.*

7. 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

8. Photosynthesis is a process influenced by environmental factors as well as plant factors. Mention three factors under each category. *2018 March*

9. Arrange the following events in the appropriate boxes.
   a) Formation of *ATP* and $NADPH_2$.
   b) Only photosystem I is functional.
   c) Formation of *ATP* only.
   d) Both photosystem I and photosystem II are involved.
   e) Splitting of water.
   f) No oxygen release.

Cyclic photophosphorylation	Non-cyclic photophosphorylation

2018 Imp.

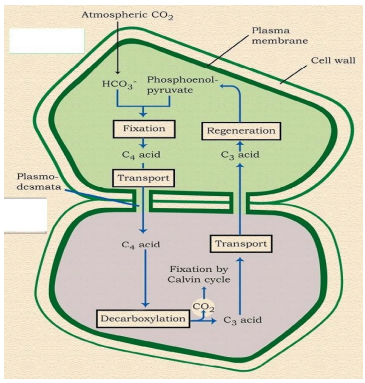
10. Name and explain the structure of cell organelle that is involved in photosynthesis.
    (Hint : Write four structural features) *2018 Imp.*

11. Salient features of light reaction and dark reaction of photosynthesis are given below. Arrange them in corresponding columns.
    Take place in Stroma.
    Photochemical phase.
    ATP and NADPH are utilised.
    Biosynthetic phase.
    ATP and NADPH are produced.
    Take place in Grana.

Light reaction	Dark reaction

2019 Model

12. 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 C_4 pants.
(c) Name two plants which show Hatch and Slack pathway.

2019 Model

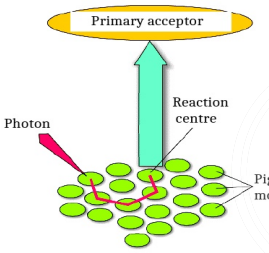
13. Transport of electrons through ETS of the chloroplast results photophosphorylation. Write any three differences between cyclic and non-cyclic photophosphorylations.
2019 Imp.

14. C_4 plants have large cells around the vascular bundles of leaves called bundle sheath cells.
    (a) What is this anatomy called?
    (b) Write any two features of bundle-sheath cells.
2020 Model

15. Melvin Calvin discovered CO_2 fixation in green plants.
    (a) Which are the three main stages of Calvin cycle?
    (b) Name the enzyme catalysing first stage of this cycle.
    (c) What is the peculiarity of this enzyme?
2020 Imp.

16. 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

4 Marks Questions

1. Light reaction and dark reaction are the two stages of photosynthesis.
    a) Where does light reaction occurs?
    b) What are its end products?
    c) Comment on their roles in dark reaction.
2012 Imp.

2. C_4 plants are adapted to overcome a wasteful process found in C_3 plants and hence productivity and yields are better in these plants.
    a) Name the wasteful process found in C_3 plants.
    b) Identify the cells involved in C_4 pathway.
    c) Write any two differences between C_3 plants and C_4 plants.
2013 March

3. Light reaction is otherwise called photophosphorylation.
    a) Justify the statement.
    b) Locate the site of this reaction.
    c) Write any two differences between cyclic photophosphorylation and non-cyclic photophosphorylation.
2013 March

4. Plants that are adapted to dry tropical regions have a special type of CO_2 fixation in addition to C_3 cycle.
    a) Name this pathway.
    b) Can you identify any speciality in the leaf anatomy of such plants? If so, what is this anatomy called?
    c) Which is the primary CO_2 acceptor in this pathway?
    d) Write any one advantage of such plants over C_3 plants.
2014 March

5. The use of radioactive C^{14} by Melvin Calvin in algal photosynthesis studies led to the discovery of CO_2 fixation in green plants.
    a) Identify the first stable product in this CO_2 fixation cycle.
    b) Which are the three main stages of this cycle?
    c) Workout how many ATP and NADPH molecules will be required to make one molecule of glucose.
2014 March