BIOLOGY

BOOKS - NCERT BIOLOGY (ENGLISH)

PHOTOSYNTHESIS IN HIGHER PLANTS

Multiple Choice Question Mcqs

1. Which metal ion is a constituent of chlorophyll?

A. Iron

B. Copper

C. Magnesium

D. Zinc

Answer: C

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2. Which pigment acts directly to convert light energy to chemical energy?

A. Chlorophyll-a

B. Chlorophyll-b

C. Xanthophyll

D. Carotenoid

Answer: A

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3. Which range of wavelenght (in nm) is called photosyntehtically active radiation (PAR)?

A. 100-390

B. 390-430

C. 400-700

D. 760-100,00

Answer: C

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4. The most effective wavelength of visible light in photosynthesis is in the region of

A. Blue

B. Green

C. Red

D. Violet

Answer: C

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5. Chemosynthetic bacteria obtain energy from

A. sun

B. infrared ray

C. organic substances

D. inorganic chemicals

Answer: D

6. Energy required for ATP synthesis in PSII comes from

A. proton gradient

B. electron gradient

C. reduction of glucose

D. oxidation of glucose

Answer: A

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7. During light reaction in photosynthesis the following are formed.

A. ATP and sugar

B. hydrogen, O_2 and sugar

C. ATP, hydrogen donor and O_2

D. ATP, hydrogen and O_2 donor

Answer: C

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8. Dark reaction in photosynthesis is called so because

A. it can occur in dark also

B. it does not depend on light energy

C. it cannot occur during day light

D. it occurs more rapidly at night

Answer: B

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9. PEP is primary CO_2 acceptor in

A. C_4 plants

B. C_3 plant

C. C_2 plants

D. both C_3 and C_4 plants

Answer: A

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10. Splitting of water is associated with

A. photosystem I

B. lumen of thylakoid

C. both photosystem I and II

D. inner surface of thylakoid membrane

Answer: D

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11. The correct sequency of flow of electons in the light reaction is

A. PS II, plastoquinone, cytochromes, PS I, ferredoxin

B. PS I, plastoquinone, cytochromes, PS II, ferredoxin

C. PS I, ferredoxin,PS II

D. PS I, plastoquinone, cytochromes, PS II, ferredoxin

Answer: A

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12. The enzyme that is not found in a C_3 plant is

A. RuBP carboxylase

B. PEP carboxylase

C. NADP reductase

D. ATP synthase

Answer: B

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13. The reaction that is responsible for the primary fixation of CO_2 is catalysed by

A. RuBP carboxylase

B. PEP carboxylase

C. RuBP carboxylase and PEP carboxylase

D. PGA synthase

Answer: C

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14. When CO_2 is added to PEP. The first stabel product synthesised is

A. pyruvate

B. glyceraldehyde-3-phosphate

C. phosphoglycerate

D. oxaloacetate

Answer: D

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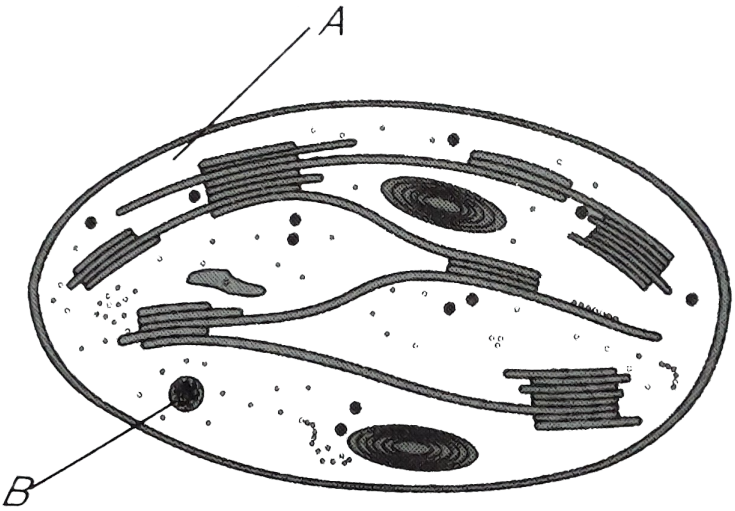
Very Short Answer Type Questions

1. Examine the figure



(a) Is this structure present in animal cell of plant cell ?

(b) Can these be passed on to the progeny? How ?

(c) Name the metabolic processes taking place in the places marked (A) and (B).

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2. $2H_2O \rightarrow 4H^+ + O_2 + 4e^-$

Based on the above equation, answer the following questions

(a) Where does this reaction take place in plants ?

(b) What is the significance of this reaction ?

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3. Cynobacteria and some other photosynthesis bacteria don't have chloroplasts. How do they conduct photosynthesis ?

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4. (a) NADP reductase enzymes is located on .....

(b) Breakdown of proton gradient leads to release of .....

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5. Can girdling experiments be done in monocots ? If yes, How ? If no, why not ?

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6. $3CO_2$+9ATP+6NADPH+ water $\rightarrow$ Glyceraldehyde 3-phosphate +9ADP+6NADP+8Pi.

Analyse the above reaction and answer the

following question.

(a) How many molecules of ATP and NADPH are required to fix one molecule of CO_2 ?

(b) Where in the chloroplast does this process occur ?

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7. Does moonlight support photosynthesis ? Find out .

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8. Some of these terms/chemicals are associated with the C_4 cycle. Explain.

(a) Hatch Slack pathway

(b) Calvin cycle

(c) PEP carboxylase ltbegt (d) Bundle shelth cells

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9. Where is NADP reductase enzyme located in the chloroplast ? What is the role of this enzyme in proton gradient development ?

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10. ATPase enzyme consists of two parts. What are those parts ? How are they arranged in the thylakoid membrane ? Conformational change occur in which part of the enzyme ?

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11. Which products formed during the light reaction of photosynthesis are used to drive

the dark reaction ?

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12. What is the basis for designating C_3 and C_4 pathways of photosynthesis ?

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Short Answer Type Question

1. Succulents are known to keep their stomata closed during the day to check transpiration. How do they meet their photosynthetic CO_2 requirements ?

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2. Chlorophyll-'a' is primary pigment for the light reaction. What are accessory pigments ? What is their role in photosynthesis ?

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3. Do reaction of photosynthesis called ,as 'Dark Reaction' need light ? Explain

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4. How are photosynthesis and respiration related to each other ?

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5. If a green plant is kept in dark with proper ventilation, can this plant carry out photosynthesis ? Can anything be given as supplement to maintain its growth or survival ?

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6. Photosynthetic organisms occur at different depths in the ocean. Do they receive qualitatively and quantitatively the same light

? How do they adapt to carry out photosynthesis under these conditions.

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7. In tropical rain forests, the canopy is thick and shorter plants growing below it, receive filtered light. How are they able to carry out phtosynthesis ?

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8. What conditions enable RuBisCO to function as an oxygenase ? Explain the ensuing process.

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9. Why does the rate of photosynthesis decrease at higher temperatures ?

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10. Explain how during light reaction of photosynthesis, ATP synthesis is a chemiosmotic phenomenon.

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11. Find out how Melvin Calvin worked out the complete biosynthetic pathway for synthesis of sugar.

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12. Six turns of Calvin cycle are required to generate one mole of glucose. Explain.

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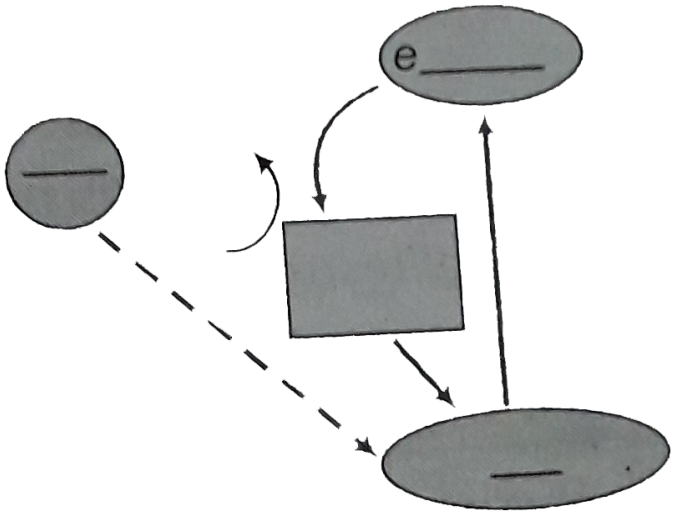
13. Complete the flow chart for cyclic photosphorylation of the photosystme -I.



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14. In what kind of plants do you come across ' Kranz anatomy ' ? To which condition are those plants better adapted ? How are these

plants better adapted than the plants, which lack this anatomy ?

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15. A process is occurring throughout the day, in 'X' organis. Cells are participating in this process. During this process ATP, CO_2 and water are evolved. It is not a light dependent process.

(a) Name the process

(b) Is it a catabolic or an anabolic process ?

(c) What could be the raw material of this process ?

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16. Tomatoes, carrot and chillies are red in colour due to the presence of one pigment. Name the pigment. Is it a photosynthetic pigments ?

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17. Why do we believe chloroplasts and mitochondria to be semi-autonomous organelle ?

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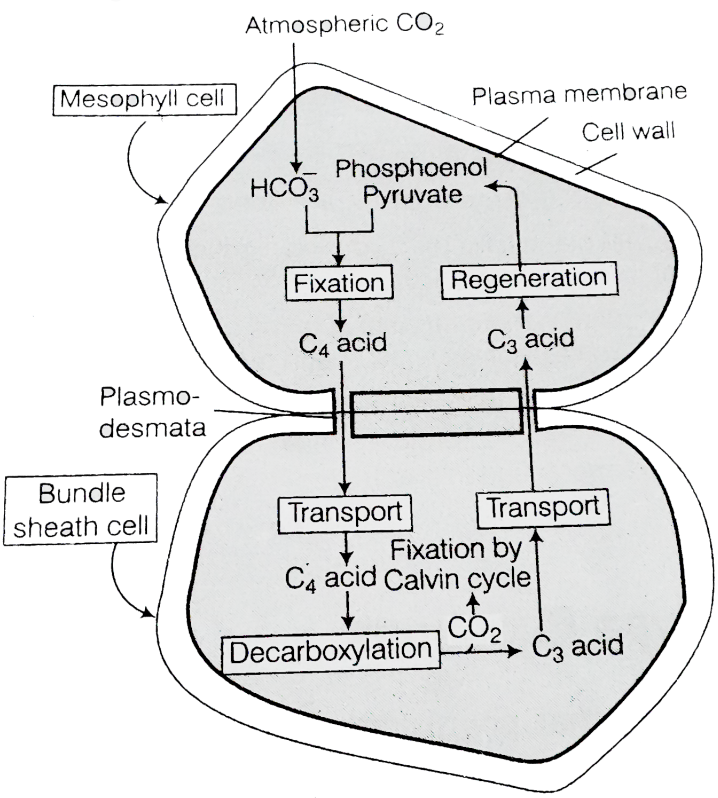
18. Observe the diagram and answer the following .



(a) Which group of plants exhibit these two type cells ?

(b) What is the first product of C_4 cycle ?

(c) Which enzyme is there is bundle sheath cells and mesophyll cells ?

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19. A cyclic process is occurring in C_3 plant, which is light dependent and needs O_2. This process energy rather it consumes energy ltbegt (a) Can you name the given process ?

(b) Is it essential for survival ?

(c) What are the end products of this process ?

(d) Where does it occur ?

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20. Suppose Euphorbia and maize are grown in the tropical area.

(a) Which one of them do you think will be able to survive under such conditions ?

(b) Which one of them is more efficient in terms of photosynthetic activity ?

(c) What different do you think are there in their leaf anatomy ?

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Long Answer Type Question

1. Is it correct to say that photosynthesis occurs only in leave of a plant ? Besides leaves, what are the other parts that may be capable of carrying out photosynthesis ? Justify.

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2. The entire process of photosynthesis consists of a number of reactions. Where in the cell do each of these take place ?

(a) Synthesis of ATP and NADPH.....

(b) Photolysis of water .....

(c) fixation of CO_2.....

(d) Synthesis of sugar molecule .....

(e) Synthesis of starch.....

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3. Which property of the pigment is responsible for its ability to initiate the process of photosynthesis ? Why is the rate of photosynthesis higher in the red and blue regions of the spectrum of light ?

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4. What can we conclude from the statement that the action and absorption spectrum of phtosynthetic overlaps? At which wavelength do they show peaks. ?

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5. Under what condition are C_4 plants superior to C_3

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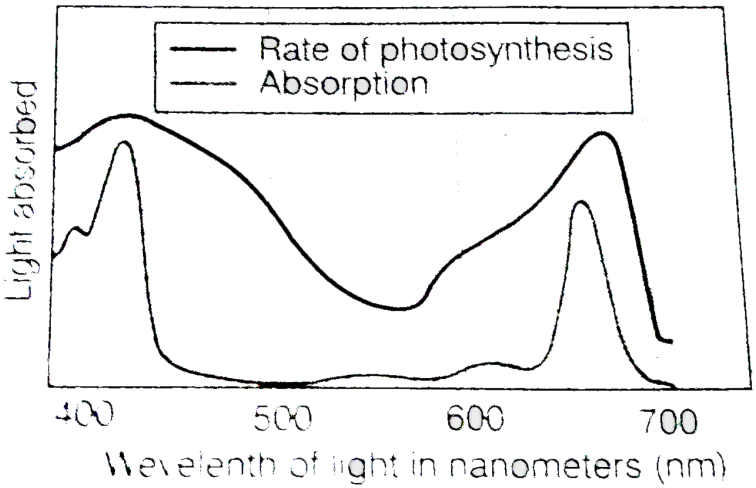
6. In the figure given below, the black line (upper) indicates action spectrum for photosynthesis and the lighter line (lower) indicates the absorption spectrum of chlorophyll-a, answer the following



(a) What does the action spectrum indicate?

How can we plot an action spectrum ? Explain with an example.

(b) How can we drive an absorption spectrum for any substance ?

(c) If chlorophyll-a is responsible for light reaction of photosynthesis, why do the action spectrum and absorption spectrum not overlaps ?

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7. What are the important events and end products of the light reactions?

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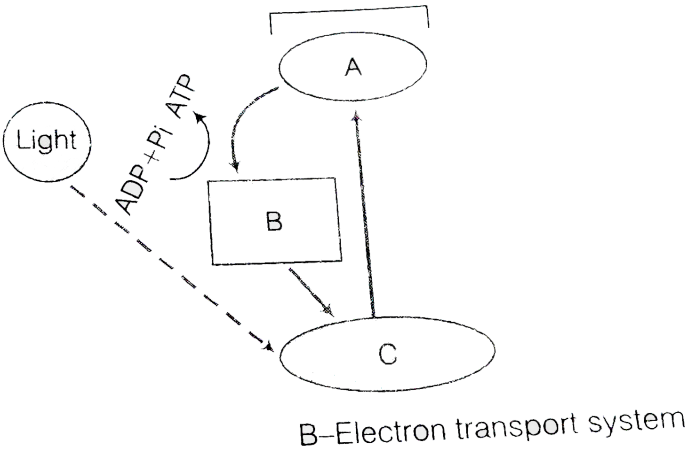
8. In the diagram shown below label A,B,C . What type of phosphorylation is possible in

this ?



B–Electron transport system

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9. Why is the RuBisCo enzyme more appropriately called RUBP carboxylase-oxygenase and what important role does it play in photosynthesis ?

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10. What special anatomical features are displayed by leaves of C_4 plants ?

How do they provide advantage over the structure of C_3 plants ?

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11. Name the two important enzymes of C_3 and C_4 pathway, respectively. What important

role do they play in fixing CO_2 ?

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12. Why is RuBisCo enzyme the most abundant enzyme in the world ?

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13. Why does not photorespiration take place in C_4 plants ?

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