

PYQSide

NEET PHOTOSYNTHESIS IN HIGHER PLANTS — PYQs

Max. Marks: 312

Questions: 78

Section A (MCQ)

Q.1 The enzyme required for carboxylation in the Calvin cycle is : [NEET (UG) 2026]

- (1) PEP carboxylase
- (2) RuBP carboxylase – oxygenase
- (3) Carboxypeptidase
- (4) Hexokinase

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Q.2 Find the incorrect statement(s) about photosynthesis from the following :

- A. The water splitting complex is associated with PSI.
- B. C_4 plants use the C_3 pathway of CO_2 fixation as the main biosynthetic pathway.
- C. In C_4 plants, photorespiration does not occur.
- D. C_3 plants exhibit 'Kranz' anatomy.
- E. ATP synthesis in chloroplast occurs through chemiosmosis.

Choose the answer from the options given below :

[NEET (UG) 2026]

- (1) B and C only
- (2) B and E only
- (3) B only
- (4) A and D only

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Q.3 How many ATP and NADPH molecules are required to make one molecule of glucose through the Calvin pathway ? [NEET (UG) 2026]

- (1) 12 ATP and 18 NADPH
- (2) 18 ATP and 12 NADPH
- (3) 6 ATP and 12 NADPH
- (4) 24 ATP and 18 NADPH

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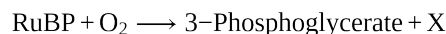
Q.4 How many turns of Calvin cycle are required for the formation of three molecules of glucose? [RE-NEET (UG) 2026]

- (1) 18
- (2) 6
- (3) 3
- (4) 1

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Q.5 Photorespiration reaction catalyzed by RuBisCo is shown below:



Identify "X" from the given options:

[RE-NEET (UG) 2026]

- (1) Malate
- (2) Phosphoenolpyruvate
- (3) 2-Phosphoglycolate
- (4) Oxaloacetate

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Q.6 Which pigment has absorption peak at 700 nm in the photosynthetic reaction centre PS I (P700)? [RE-NEET (UG) 2026]

- (1) Carotenoids
- (2) Chlorophyll b
- (3) Chlorophyll a
- (4) Xanthophylls

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Q.7 Which of the following statements regarding photorespiration are correct?

- A. Does not occur in C_3 plants
- B. CO_2 is consumed and O_2 is generated
- C. Phosphoglycolate is formed
- D. No synthesis of ATP and NADPH

[RE-NEET (UG) 2026]

- (1) (A) and (B) only
- (2) (A) and (D) only
- (3) (C) and (D) only
- (4) (B) and (D) only

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Q.8 Select the correct sequence of experiments that led to a gradual understanding of photosynthesis in green plants. [RE-NEET (UG) 2026]

- (1) Production of glucose $\longrightarrow$ role of air $\longrightarrow$ release of oxygen $\longrightarrow$ absorption spectra of chlorophyll a and b
- (2) Absorption spectra of chlorophyll a and b $\longrightarrow$ production of glucose $\longrightarrow$ release of oxygen $\longrightarrow$ role of air
- (3) Role of air $\longrightarrow$ release of oxygen $\longrightarrow$ production of glucose $\longrightarrow$ absorption spectra of chlorophyll a and b
- (4) Release of oxygen $\longrightarrow$ production of glucose $\longrightarrow$ absorption spectra of chlorophyll a and b $\longrightarrow$ role of air

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Q.9 Which of the following statements about RuBisCO is true? [NEET (UG) 2025]

- (1) It is an enzyme involved in the photolysis of water
- (2) It catalyzes the carboxylation of RuBP
- (3) It is active only in the dark
- (4) It has higher affinity for oxygen than carbon dioxide

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Q.10 Match List-I with List-II

List - I		List - II	
A.	Chlorophyll a	I.	Yellow-green
B.	Chlorophyll b	II.	Yellow
C.	Xanthophylls	III.	Blue-green
D.	Carotenoids	IV.	Yellow to Yellow-orange

Choose the option with all correct matches.

[NEET (UG) 2025]

- (1) A-I, B-II, C-IV, D-III (2) A-I, B-IV, C-III, D-II
(3) A-III, B-IV, C-II, D-I (4) A-III, B-I, C-II, D-IV

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Q.11 How many molecules of ATP and NADPH are required for every molecule of CO_2 fixed in the Calvin cycle? [NEET (UG) 2024]

- (1) 2 molecules of ATP and 3 molecules of NADPH
- (2) 2 molecules of ATP and 2 molecules of NADPH
- (3) 3 molecules of ATP and 3 molecules of NADPH
- (4) 3 molecules of ATP and 2 molecules of NADPH

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Q.12 Which of the following are required for the dark reaction of photosynthesis?

- A. Light B. Chlorophyll
C. CO_2 D. ATP
E. NADPH

Choose the correct answer from the options given below:

[NEET (UG) 2024]

- (1) A, B and C only (2) B, C and D only
(3) C, D and E only (4) D and E only

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Q.13 Given below are two statements:

Statement-I: In C_3 plants, some O_2 binds to RuBisCO, hence CO_2 fixation is decreased.

Statement-II: In C_4 plants, mesophyll cells show very little photorespiration while bundle sheath cells do not show photorespiration.

In the light of the above statements, choose the correct answer from the options given below:

[NEET (UG) 2024]

- (1) Both Statement-I and Statement-II are true
- (2) Both Statement-I and Statement-II are false
- (3) Statement-I is true but Statement-II is false
- (4) Statement-I is false but Statement-II is true

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Q.14 Which of the following are required for the light reaction of Photosynthesis?

- A. CO_2 B. O_2
C. H_2O D. Chlorophyll
E. Light

Choose the correct answer from the options given below:

[RE-NEET (UG) 2024]

- (1) A, C, D and E only (2) C, D and E only
(3) A and B only (4) A, C and E only

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Q.15 Which one of the following products diffuses out of the chloroplast during photosynthesis?

[RE-NEET (UG) 2024]

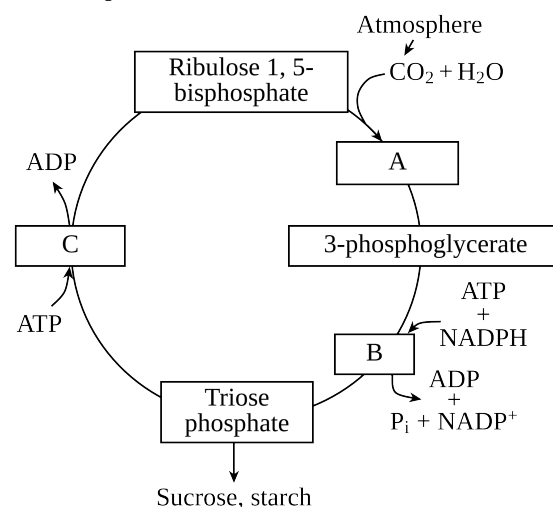
- (1) ADP (2) NADPH (3) O_2 (4) ATP

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Q.16 Observe the given figure. Identify the different stages labelled with alphabets by selecting the correct option.

[RE-NEET (UG) 2024]



- (1) A-Carboxylation, B-Regeneration, C-Reduction
- (2) A-Reduction, B-Decarboxylation, C-Regeneration
- (3) A-Carboxylation, B-Reduction, C-Regeneration
- (4) A-Reduction, B-Carboxylation, C-Regeneration

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Q.17 How many ATP and NADPH are required for the synthesis of one molecule of Glucose during Calvin cycle? [NEET (UG) 2023]

- (1) 18 ATP and 12 NADPH
- (2) 12 ATP and 16 NADPH
- (3) 18 ATP and 16 NADPH
- (4) 12 ATP and 12 NADPH

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Q.18 The reaction centre in PS II has an absorption maximum at [NEET (UG) 2023]

- (1) 700 nm (2) 660 nm (3) 780 nm (4) 680 nm

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Q.19 Which of the following combinations is required for chemiosmosis? [NEET (UG) 2023]

- (1) Membrane, proton pump, proton gradient, NADP synthase
- (2) Proton pump, electron gradient, ATP synthase
- (3) Proton pump, electron gradient, NADP synthase
- (4) Membrane, proton pump, proton gradient, ATP synthase

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Q.20 Given below are two statements:

Statement-I: The primary CO_2 acceptor in C_4 plants is phosphoenolpyruvate and is found in the mesophyll cells.

Statement-II: Mesophyll cells of C_4 plants lack RuBisCO enzyme.

In the light of the above statements, choose the correct answer from the options given below :

[NEET (UG) 2022]

- (1) Both Statement-I and Statement-II are correct
- (2) Both Statement-I and Statement-II are incorrect
- (3) Statement-I is correct but Statement-II is incorrect
- (4) Statement-I is incorrect but Statement-II is correct

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Q.21 Which one of the following is not true regarding the release of energy during ATP synthesis through chemiosmosis? It involves: [NEET (UG) 2022]

- (1) Breakdown of proton gradient
- (2) Breakdown of electron gradient
- (3) Movement of protons across the membrane to the stroma
- (4) Reduction of NADP to NADPH_2 on the stroma side of the membrane

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Q.22 What is the role of large bundle sheath cells found around the vascular bundles in C_4 plants? [NEET (UG) 2022]

- (1) To provide the site for photorespiratory pathway
- (2) To increase the number of chloroplast for the operation of Calvin cycle
- (3) To enable the plant to tolerate high temperature
- (4) To protect the vascular tissue from high light intensity

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Q.23 When one CO_2 molecule is fixed as one molecule of triose phosphate, which of the following photochemically made, high energy chemical intermediates are used in the reduction phase? [NEET (UG) 2022 (Phase 2)]

- (1) 2 ATP + 2 NADPH (2) 1 ATP + 1 NADPH
- (3) 1 ATP + 2 NADPH (4) 2 ATP + 1 NADPH

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Q.24 Identify the correct statements regarding chemiosmotic hypothesis:

Choose the correct answer from the options given below:

- A. Splitting of the water molecule takes place on the inner side of the membrane.
- B. Protons accumulate within the lumen of the thylakoids.
- C. Primary acceptor of electron transfers the electrons to an electron carrier.
- D. NADP reductase enzyme is located on the stroma side of the membrane.
- E. Protons increase in number in stroma.

[NEET (UG) 2022 (Phase 2)]

- (1) B, C and E only (2) A, B and E only
- (3) A, B and D only (4) B, C and D only

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Q.25 The first stable product of CO_2 fixation in *Sorghum* is [NEET (UG) 2021]

- (1) Phosphoglyceric acid (2) Pyruvic acid
- (3) Oxaloacetic acid (4) Succinic acid

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Q.26 Which of the following statements is incorrect?

[NEET (UG) 2021]

- (1) Cyclic photophosphorylation involves both PS I and PS II
- (2) Both ATP and NADPH + H^+ are synthesized during non-cyclic photophosphorylation.
- (3) Stroma lamellae have PS I only and lack NADP reductase
- (4) Grana lamellae have both PS I and PS II

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Q.27 In light reaction, plastoquinone facilitates the transfer of electrons from

[NEET (UG) 2020]

- (1) PS-I to ATP synthase
- (2) Cytb₆f complex to PS-I
- (3) PS-I to NADP⁺
- (4) PS-II to Cytb₆f complex

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Q.28 The oxygenation activity of RuBisCO enzyme in photorespiration leads to the formation of

[NEET (UG) 2020]

- (1) 1 molecule of 3-C compound and 1 molecule of 2-C compound
- (2) 1 molecule of 3-C compound
- (3) 1 molecule of 6-C compound
- (4) 2 molecules of 3-C compound

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Q.29 Oxygen is not produced during photosynthesis by

[NEET 2018]

- (1) *Cycas*
- (2) Green sulphur bacteria
- (3) *Chara*
- (4) *Nostoc*

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Q.30 Which of the following is not a product of light reaction of photosynthesis?

[NEET 2018]

- (1) Oxygen
- (2) NADH
- (3) ATP
- (4) NADPH

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Q.31 With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct?

[NEET 2017]

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

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Q.32 Phosphoenol pyruvate (PEP) is the primary CO₂ acceptor in

[NEET 2017]

- (1) C₄ plants
- (2) C₂ plants
- (3) C₃ and C₄ plants
- (4) C₃ plants

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Q.33 In a chloroplast the highest number of protons are found in

[NEET 2016 (Phase 1)]

- (1) intermembrane space
- (2) antennae complex
- (3) stroma
- (4) lumen of thylakoids.

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Q.34 Emerson's enhancement effect and Red drop have been instrumental in the discovery of

[NEET 2016 (Phase 1)]

- (1) photophosphorylation and cyclic electron transport
- (2) oxidative phosphorylation
- (3) photophosphorylation and non-cyclic electron transport
- (4) two photosystems operating simultaneously.

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Q.35 A plant in your garden avoids photorespiratory losses, has improved water use efficiency, shows high rates of photosynthesis at high temperatures and has improved efficiency of nitrogen utilisation. In which of the following physiological groups would you assign this plant?

[NEET 2016 (Phase 1)]

- (1) CAM
- (2) Nitrogen fixer
- (3) C₃
- (4) C₄

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Q.36 The process which makes major difference between C₃ and C₄ plants is

[NEET 2016 (Phase 2)]

- (1) glycolysis
- (2) Calvin cycle
- (3) photorespiration
- (4) respiration.

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Q.37 In photosynthesis, the light-independent reactions take place at [AIPMT 2015]

- (1) photosystem II (2) stromal matrix
(3) thylakoid lumen (4) photosystem I.

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Q.38 Bundle sheath cells : [NEET 2013 (Karnataka)]

- (1) lack both RuBisCo and PEP carboxylase
(2) are rich in PEP carboxylase
(3) are rich in RuBisCo
(4) lack RuBisCo

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Q.39 Read the following four statements (A – D). How many of the above statements are right?

- A. Both photophosphorylation and oxidative phosphorylation involve uphill transport of protons across the membrane.
B. In dicot stems, a new cambium originates from cells of pericycle at the time of secondary growth.
C. Stamens in flowers of *Gloriosa* and *Petunia* are polyandrous.
D. Symbiotic nitrogen fixers occur in free-living state also in soil. [AIPMT 2012 (Mains)]

- (1) Two (2) Three (3) Four (4) One

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Q.40 A process that makes important difference between C_3 and C_4 plants is [AIPMT 2012 (Prelims)]

- (1) transpiration (2) glycolysis
(3) photosynthesis (4) photorespiration.

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Q.41 The correct sequence of cell organelles during photorespiration is [AIPMT 2012 (Prelims)]

- (1) chloroplast, Golgi-bodies, mitochondria
(2) chloroplast, rough endoplasmic reticulum, dictyosomes
(3) chloroplast, peroxisome, mitochondria
(4) chloroplast, vacuole, peroxisome.

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Q.42 In Kranz anatomy, the bundle sheath cells have

[AIPMT 2011 (Mains)]

- (1) thin walls, many intercellular spaces and no chloroplasts
(2) thick walls, no intercellular spaces and large number of chloroplasts
(3) thin walls, no intercellular spaces and several chloroplasts
(4) thick walls, many intercellular spaces and few chloroplasts.

Scan or tap for the full solution



Q.43 CAM helps the plants in [AIPMT 2011 (Prelims)]

- (1) conserving water (2) secondary growth
(3) disease resistance (4) reproduction.

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Q.44 Read the following four statements, (i), (ii), (iii) and (iv) and select the right option having both correct statements.

Statements : [AIPMT 2010 (Mains)]

- (i) Z scheme of light reaction takes place in presence of PS I only.
(ii) Only PS I is functional in cyclic photophosphorylation.
(iii) Cyclic photophosphorylation results into synthesis of ATP and $NADPH_2$.
(iv) Stroma lamellae lack PS II as well as NADP reductase.

- (1) (ii) and (iv) (2) (i) and (ii)
(3) (ii) and (iii) (4) (iii) and (iv)

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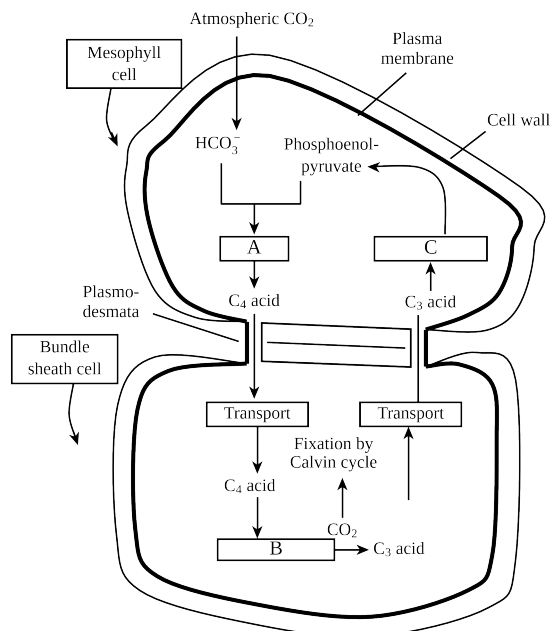
Q.45 Kranz anatomy is one of the characteristics of the leaves of [AIPMT 2010 (Mains)]

- (1) potato (2) wheat
(3) sugarcane (4) mustard

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Q.46 Study the pathway given below:



In which of the following options correct words for all the three blanks A, B and C are indicated?

[AIPMT 2010 (Mains)]

- (1) A → Fixation, B → Transamination, C → Regeneration
- (2) A → Decarboxylation, B → Reduction, C → Regeneration
- (3) A → Carboxylation, B → Decarboxylation, C → Reduction
- (4) A → Fixation, B → Decarboxylation, C → Regeneration

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Q.47 PGA as the first CO_2 fixation product was discovered in photosynthesis of

[AIPMT 2010 (Prelims)]

- (1) bryophyte (2) gymnosperm
- (3) angiosperm (4) alga

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Q.48 C_4 plants are more efficient in photosynthesis than C_3 plants due to

[AIPMT 2010 (Prelims)]

- (1) higher leaf area
- (2) presence of larger number of chloroplasts in the leaf cells
- (3) presence of thin cuticle
- (4) lower rate of photorespiration

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Q.49 Cyclic photophosphorylation results in the formation of

[AIPMT 2009]

- (1) ATP and NADPH (2) ATP, NADPH and O_2
- (3) ATP (4) NADPH.

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Q.50 Stroma in the chloroplasts of higher plants contains

[AIPMT 2009]

- (1) light-dependent reaction enzymes
- (2) ribosomes
- (3) chlorophyll
- (4) light-independent reaction enzymes.

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Q.51 Electrons from excited chlorophyll molecule of photosystem II are accepted first by

[AIPMT 2008]

- (1) quinone (2) ferredoxin
- (3) cytochrome-b (4) cytochrome-f

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Q.52 The C_4 plants are photosynthetically more efficient than C_3 plants because

[AIPMT 2008]

- (1) the CO_2 efflux is not prevented
- (2) they have more chloroplasts
- (3) the CO_2 compensation point is more
- (4) CO_2 generated during photorespiration is trapped and recycled through PEP carboxylase

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Q.53 In leaves of C_4 plants malic acid synthesis during CO_2 fixation occurs in

[AIPMT 2008]

- (1) bundle sheath (2) guard cells
- (3) epidermal cells (4) mesophyll cells

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Q.54 In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of

[AIPMT 2007]

- (1) bundle sheath (2) phloem
- (3) epidermis (4) mesophyll

Scan or tap for the full solution



Q.55 The first acceptor of electrons from an excited chlorophyll molecule of photosystem II is

[AIPMT 2007]

- (1) iron-sulphur protein (2) ferredoxin
- (3) quinone (4) cytochrome

Scan or tap for the full solution



Q.56 During photorespiration, the oxygen consuming reaction(s) occur in

[AIPMT 2006]

- (1) stroma of chloroplasts
- (2) stroma of chloroplasts and mitochondria
- (3) stroma of chloroplasts and peroxisomes
- (4) grana of chloroplasts and peroxisomes

Scan or tap for the full solution



Q.57 In photosystem I, the first electron acceptor is [AIPMT 2006]

- (1) an iron-sulphur protein
- (2) ferredoxin
- (3) cytochrome
- (4) plastocyanin

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Q.58 As compared to a C_3 -plant, how many additional molecules of ATP are needed for net production of one molecule of hexose sugar by C_4 -plants?

[AIPMT 2005]

- (1) Two (2) Six (3) Twelve (4) Zero

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Q.59 Photosynthetic Active Radiation (PAR) has the following range of wavelengths. [AIPMT 2005]

- (1) 340–450 nm (2) 400–700 nm
- (3) 500–600 nm (4) 450–950 nm

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Q.60 Photosynthesis in C_4 plants is relatively less limited by atmospheric CO_2 levels because [AIPMT 2005]

- (1) effective pumping of CO_2 into bundle sheath cells
- (2) RuBisCo in C_4 plants has higher affinity for CO_2
- (3) four carbon acids are the primary initial CO_2 fixation products
- (4) the primary fixation of CO_2 is mediated via PEP carboxylase.

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Q.61 Chlorophyll in chloroplasts is located in [AIPMT 2005]

- (1) Stroma (2) Grana
- (3) Pyrenoid (4) Both (1) and (3)

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Q.62 Chemiosmotic theory of ATP synthesis in the chloroplasts and mitochondria is based on [AIPMT 2005]

- (1) Proton gradient
- (2) Membrane potential
- (3) Accumulation of Na^+ ions
- (4) Accumulation of K^+ ions

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Q.63 In C_3 plants, the first stable product of photosynthesis during the dark reaction is [AIPMT 2004]

- (1) malic acid
- (2) oxaloacetic acid
- (3) 3-phosphoglyceric acid
- (4) phosphoglyceraldehyde

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Q.64 Plants adapted to low light intensity have [AIPMT 2004]

- (1) larger photosynthetic unit size than the sun plants
- (2) higher rate of CO_2 fixation than the sun plants
- (3) more extended root system
- (4) leaves modified to spines.

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Q.65 Which fractions of the visible spectrum of solar radiations are primarily absorbed by carotenoids of the higher plants? [AIPMT 2003]

- (1) Blue and green (2) Green and red
- (3) Red and violet (4) Violet and blue.

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Q.66 Which one of the following is wrong in relation to photorespiration? [AIPMT 2003]

- (1) It occurs in chloroplast
- (2) It occurs in day time only
- (3) It is a characteristic of C_4 plants
- (4) It is a characteristic of C_3 plants.

Scan or tap for the full solution



Q.67 In sugarcane plant $^{14}CO_2$ is fixed to malic acid, in which the enzyme that fixes CO_2 is [AIPMT 2003]

- (1) ribulose biphosphate carboxylase
- (2) phosphoenolpyruvic acid carboxylase
- (3) ribulose phosphate kinase
- (4) fructose phosphate.

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- Q.68** Stomata of CAM plants [AIPMT 2003]
 (1) are always open
 (2) open during the day and close at night
 (3) open during the night and close during the day
 (4) never open.

Scan or tap for the full solution



- Q.69** Which element is located at the centre of the porphyrin ring in chlorophyll? [AIPMT 2003]
 (1) Calcium (2) Magnesium
 (3) Potassium (4) Manganese

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- Q.70** Which one of the following concerns photophosphorylation? [AIPMT 2003]
 (1) $\text{ADP} + \text{AMP} \xrightarrow{\text{Light energy}} \text{ATP}$
 (2) $\text{ADP} + \text{Inorganic PO}_4 \xrightarrow{\text{Light energy}} \text{ATP}$
 (3) $\text{ADP} + \text{Inorganic PO}_4 \longrightarrow \text{ATP}$
 (4) $\text{AMP} + \text{Inorganic PO}_4 \xrightarrow{\text{Light energy}} \text{ATP}$

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- Q.71** Which of the following absorbs light energy for photosynthesis? [AIPMT 2002]
 (1) Chlorophyll (2) Water molecule
 (3) O_2 (4) RuBP

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- Q.72** In photosynthesis energy from light reaction to dark reaction is transferred in the form of [AIPMT 2002]
 (1) ADP (2) ATP
 (3) RuDP (4) chlorophyll

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- Q.73** Which pigment system is inactivated in red drop? [AIPMT 2001]
 (1) PS-I and PS-II (2) PS-I
 (3) PS-II (4) None of the above

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- Q.74** Which pair is wrong? [AIPMT 2001]
 (1) C_3 -maize
 (2) C_4 -Kranz anatomy
 (3) Calvin cycle-PGA
 (4) Hatch and Slack cycle-OAA

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- Q.75** Which is the first CO_2 acceptor enzyme in C_4 plants? [AIPMT 2000]
 (1) RuDP carboxylase (2) Phosphoric acid
 (3) RuBisCO (4) PEP- carboxylase

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- Q.76** For assimilation of one CO_2 molecule, the energy required in form of ATP and NADPH_2 are [AIPMT 2000]
 (1) 2 ATP and 2 NADPH_2
 (2) 5 ATP and 3 NADPH_2
 (3) 3 ATP and 2 NADPH_2
 (4) 18 ATP and 12 NADPH_2

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- Q.77** For the synthesis of one glucose molecule the Calvin cycle operates for [AIPMT 2000]
 (1) 2 times (2) 4 times (3) 6 times (4) 8 times

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- Q.78** The first step for initiation of photosynthesis will be [AIPMT 2000]
 (1) photolysis of water
 (2) excitation of chlorophyll molecules due to absorption of light
 (3) ATP formation
 (4) glucose formation

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ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	4	2	1	3	3	3	3	2	4	4
Ques.	12	13	14	15	16	17	18	19	20	21	22
Ans.	3	3	2	3	3	1	4	4	1	2	2
Ques.	23	24	25	26	27	28	29	30	31	32	33
Ans.	1	3	3	1	4	1	2	2	2	1	4
Ques.	34	35	36	37	38	39	40	41	42	43	44
Ans.	4	4	3	2	3	1	4	3	2	1	1
Ques.	45	46	47	48	49	50	51	52	53	54	55
Ans.	3	4	4	4	3	4	1	2	4	4	3
Ques.	56	57	58	59	60	61	62	63	64	65	66
Ans.	3	1	3	2	4	2	1	3	1	4	3
Ques.	67	68	69	70	71	72	73	74	75	76	77
Ans.	2	3	2	2	1	2	3	1	4	3	3
Ques.	78										
Ans.	2										