



BIOLOGY

BOOKS - CENGAGE BIOLOGY (HINGLISH)

PHOTOSYNTHESIS IN HIGHER PLANTS

Exercises

1. Photosynthesis is

A. Anabolic, exergonic, and oxidation-reduction process

B. Catabolic, exergonic, and oxidation-reduction process

C. Anabolic, endergonic, and oxidation-reduction process

D. Catabolic, endogonic, and oxidation-reduction process

Answer: C



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2. At which step oxygen is used in peroxisome ?

- A. Glycolate of glyoxylate
- B. Glyoxylate of glycine
- C. Glycine to serine
- D. Serine to hydroxy pyruvate

Answer: A



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3. Who founded that water is an essential requirement of photosynthesis?

A. J.Prsiestely

B. Saussure

C. Helmont

D. Ingen Housz

Answer: B



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4. The wavelength of PAR (photosynthesis active radiation) is

A. 40-70 nm

B. 400-700 nm

C. 400 – 700Å

D. 40 – 70Å

Answer: B



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5. The bulk fixation of carbon through photosynthesis takes place in

- A. Crop plants
- B. Tropical rain forests
- C. Ocean
- D. Both (1) and (2)

Answer: C



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6. Photosynthesis process was first discovered by

A. Priestley

B. Ingen Housz

C. Engleman

D. Blackman

Answer: B



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7. A tadpole like configuration is found in

- A. Chlorophyll
- B. Carotenoids
- C. Phycobilins
- D. Anthocyanin

Answer: A



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8. Choose the correct statement

A. Chlorophyll-a is soluble in petroleum ether and shows maximum absorption peak at 453 nm and 642 nm.

B. In chlorophyll-b, $-CH_3$ replaces $-CHO$ at 3-C of chlorophyll -a

C. Chlorophyll-b is soluble in methyl alcohol and shows maximum absorption peak in 429 nm and 660 nm.

D. For the biosynthesis of chlorophyll, raw materials required are succinyl Co-A and glycine.

Answer: B



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9. A quantasome consists of 230 chlorophyll molecules and acts as a photosynthetic unit. It was discovered by

A. Park and Biggins

B. Hatch and Slack

C. Pelletier and Cavenrou

D. Blackman

Answer: A



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10. Chlorophyll -c is found in

A. Brown algae a,c

B. Red algae a,d

C. Green algae a,b

D. Green algae and Embryophyta

Answer: A



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11. The first step in photosynthesis is photolysis of water

A. Excitation of chlorophyll by light

B. Ionization

C. ATP synthesis

D. Production of assimilatory power

Answer: A



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12. Electric charge separation or quantum conversion occurs at

A. Antenna molecules

B. Thylakoid membrane

C. Reaction center

D. Stroma

Answer: C



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13. Phycobilins found in blue green algae and red algae are/have

A. Soluble in hot water

B. Found in chromatophores

C. Mg^{2+} and tail

D. Lipoidal in nature

Answer: A



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14. Photo system is composed of

A. Reaction center

B. Light harvesting complex

C. Both (1) and (2)

D. Granum

Answer: C



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15. PS II is found in

A. Stacked part of granum

B. Non-stacked part of granum

C. Stroma thylakoid

D. Stroma

Answer: C



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16. Photosystem concerned with the reduction of NADP is

A. PS-I

B. PS-II

C. Both (1) and (2)

D. Quantasome

Answer: A



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17. Reaction center of Rhodobacterium was crystallized by

A. Arnon

B. Huber et al.

C. Emerson

D. Warburg

Answer: B



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18. If a photosynthesizing plant release oxygen containing more than normal amount of ^{18}O , it is concluded that the plant has been supplied with

A. $\text{C}_6\text{H}_{12}\text{O}_6$ containing ^{18}O

B. H_2O containing $_{18}O$

C. CO_2 containing $_{18}O$

D. Oxygen in the form of ozone

Answer: B



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19. Minerals involved in the photo-oxidation of water is

A. Mn, Cl, Ca

B. Mg, Fe, Mn

C. Mn , Fe, Ca

D. N,P,K

Answer: A



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20. Light reaction produces assimilatory power
in the form of

A. $ATP, NADH_2$

B. ATP, $NADPH_2$

C. NAD

D. NADP

Answer: B



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21. Z-scheme in thylakoid membrane is concerned with

A. Reduction of NAD

B. Reduction of CO_2

C. Electron transfer

D. All of these

Answer: C



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22. Primary electron acceptor of PS-II is

A. Pheophytin

B. Ferredoxin

C. PQ

D. PC

Answer: A



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23. The absorption of radiant energy causes

A. Reduction of chlorophyll

B. Oxidation of Chlorophyll

C. Absorption of CO_2

D. Evolution of O_2

Answer: B



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24. Action spectrum of photosynthesis was discovered by

A. Van Niel

B. Engelman

C. Blackman

D. None of these

Answer: B



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25. The chemiosmotic theory of photophosphorylation was given by

A. P-Mitchell

B. Amon

C. Arnold

D. Anderson

Answer: A



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26. PS-I is located on

A. The inner surface of thylakoid membrane

B. The outer surface of thylakoid
membrane

C. Both surfaces of thylakoid membrane

D. the stroma of chloroplasts

Answer: B



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27. Red drop effect was studied by

A. Van Niel

B. Blink

C. Emeson

D. Calvin

Answer: C



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28. C_3 cycle (reductive pentose phosphate cycle) is basically a

- A. CO_2 reduction cycle
- B. CO_2 oxidation cycle
- C. Photochemical reaction
- D. Both (2) and (3)

Answer: A



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29. To reduce $1CO_2$ molecules in C_3 cycle ,
assimilatory power needed is

A. $3ATP, 2NADPH_2$

B. $2ATP, 2NADPH_2$

C. $5ATP, 2NADPH_2$

D. $6.5ATP, 2NADPH_2$

Answer: A



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30. Q_{10} of light reaction is

A. temperature coefficient

B. water coefficient

C. respiratory coefficient

D. none

Answer: A



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31. CO_2 acceptor and carboxylating enzyme in C_3 plants are , respectively,

- A. PEP, PEPCO
- B. RuBP, RuBisCO
- C. OAA, RuBisCO
- D. 3 PGA, RuBisCO

Answer: B



32. A bifunctional enzyme is

A. Phosphoglycerate kinase

B. PEPCO

C. RuBisCO

D. Phosphoglyceraldehyde dehydrogenase

Answer: C



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33. Which is not a step in Calvin cycle ?

- A. Carboxylation
- B. Glycolytic reversal
- C. Regeneration
- D. Photophosphorylation

Answer: D



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34. Cyclic photophosphorylation releases

A. ATP and $NADPH_2$

B. ATP , $NADPH_2$ and oxygen

C. ATP only

D. $NADPH_2$ only

Answer: C



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35. Which of the following is a copper - containing protein acting as a mobile electron carrier electron in thylakoid membran ?

A. Plastocyanin

B. Plastoquinone

C. Pheophytin

D. Cytochrome b_6

Answer: A



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36. Reducing agent for CO_2 fixation in bacterial photosynthesis is

A. $NADH_2$

B. $NADPH_2$

C. $FMNH_2$

D. All of these

Answer: A



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37. A wasteful light-induced respiratory process releasing CO_2 is called

- A. Warberg effect
- B. Kutusky effect
- C. Photorespiration
- D. CAM

Answer: C



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38. In photorespiration , release of CO_2 occurs in

A. Mitochondria

B. Chloroplast

C. Peroxisomes

D. All of these

Answer: A



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39. Inhibition of photosynthesis in high concentration of O_2 is called

A. Warberg effect

B. Kutusky effect

C. Pasteur effect

D. Emerson effect

Answer: A



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40. Substrate of photorespiration is

A. OAA

B. Glycolic acid

C. 3-PGA

D. PEP

Answer: B



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41. Photorespiration occurs

A. During day time

B. In C_3 plants

C. In co-operation with chloroplasts,
peroxisomes and mitochondria

D. All of these

Answer: D



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42. DCMU, (3,4-dichlorophenyl , 1-dimethyl urea, also called diuron) a potent herbicide , inhibits

- A. O_2 evolution
- B. Photophosphorylation
- C. Both (1) and (2)
- D. oxidative phosphorylation

Answer: C



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43. An oxidative phosphorylation is the formation of

- A. $NADPH_2$ in respiration
- B. $NADPH_2$ in photosynthesis
- C. ATP in respiration
- D. ATP in photosynthesis

Answer: C



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44. CO_2 concentrating steps are found in

A. C_3 plant

B. C_4 plants

C. CAM plants

D. Temperate plants

Answer: B



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45. Number of carboxylations in the photosynthesis in sorghum and maize is

A. 1

B. 2

C. 3

D. 4

Answer: B



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46. Kranz anatomy is

- A. Having peripheral reticulum in chloroplast
- B. Presence of distinct bundle sheath
- C. Dimorphic chloroplast
- D. Large vacuoles in mesophyll cells

Answer: B



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47. In C_4 plants, the first product is

A. 3-PGA

B. OAA

C. Malic acid

D. Glutamic acid

Answer: B



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48. In C_4 plants , mesophyll cells and bundle sheath cells are specialized to perform, respectively,

- A. Light reaction and dark reaction
- B. Dark reaction with light reaction
- C. Light reaction and photorespiration
- D. Photorespiration and dark reaction

Answer: A



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49. Low -temperature sensitivity of C_4 plants
aer due to

A. PEP synthetase

B. PEPCO

C. RuBisCO

D. Malate dehydrogenase

Answer: A



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50. The members of which of the following families shows krazn anatomy ?

- A. Compositae and Amaranthacease
- B. Chenopodiaceae and Euphorbiaceae
- C. Gramineae
- D. All of these

Answer: D



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51. The initial CO_2 acceptor in C_4 plants is

A. PEP

B. PGA

C. RuBP

D. Pyruvate

Answer: A



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52. Agranal chloroplasts are found in the

- A. Mesophyll of pea leaves
- B. Bundle sheath of mango leaves
- C. Mesophyll of maize leaves
- D. Bundle sheath of sugarcane leaves

Answer: D



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53. Which technique has helped in investigation of calvin cycle ?

A. Radioactive isotope technique

B. Biotechnology technique

C. Photometric technique

D. Flash light experimental technique

Answer: A



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54. Which is not true for CAM plants ?

A. Scotoactive opening of stomata

B. Dark acidification of cytoplasm

C. Separation of cytopasm

D. Separation of Hatch-Slack and O_3 cycle
in time

Answer: D



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55. CAM pathway operates in

- A. Drought-escaping xerophytes
- B. Drought-resisting xerophytes
- C. Drought-enduring xerophytes
- D. Drought-enduring xerophytes

Answer: B



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56. Photosynthesis in green algae and bacteria is, respectively,

A. Oxygenic and anoxygenic

B. Anoxygenic and oxygenic

C. Oxygenic in both

D. Anoxygenic in both

Answer: A



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57. Law of limiting factors in photosynthesis was given by:

A. Liebig

B. Arnon

C. Blackman

D. Wilstatter

Answer: C



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58. Find the odd one (w.r.t double carboxylation).

A. Zea mays

B. Euphorbia maculata

C. Pisum sativum

D. Amaranthus

Answer: C



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59. The process in which organisms do not require light and pigment and synthesize their food utilizing energy released by the oxidation of inorganic and organic substance , is

A. Photoautotrophism

B. Heterotrophism

C. Chemosynthesis

D. Saprophytism

Answer: C





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60. Essentiality of light in photosynthesis can be demonstrated by

A. Molles half leaf experiment

B. Ganong screen

C. Inverted funnel experiment

D. KOH solution

Answer: B



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61. Photochemical reactions in the chloroplasts are directly involved in the

A. Fixation of carbon dioxide

B. Synthesis of glycucose and starch

C. Formation of phosphoglyceric starch

D. Photolysis of water and phosphorylation of ADP to ATP

Answer: D





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62. Which of the following elements are essential for the photolysis of water ?

A. Ca and Cl

B. Mn and Cl

C. Zn and I

D. Cu and Fe

Answer: B



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63. Which of the following is involved in the transfer of electrons in photosynthesis ?

A. Phytochrome

B. Cytochrome

C. Photohormone

D. Desmosome

Answer: B



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64. The substrate for photorespiration is

A. Glycolate

B. Glucose

C. Lipid

D. Sucrose

Answer: A



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65. In aquaria, green plants are grown for

- A. CO_2 production
- B. Starch production
- C. O_2 production
- D. increase beauty

Answer: C



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66. In plant cells, peroxisomes are associated with

A. Photosynthesis

B. Respiration

C. Photorespiration

D. Photophosphorylation

Answer: C



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67. In the mesophyll cells of CAM plants, CO_2 fixation during the night day occurs through

A. RuBP oxygenase

B. PEP carboxylase

C. RuBP carboxylase

D. Both RuBP carboxylase and PEP carboxylase

Answer: B



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68. The first electron acceptor in photosystem-I of cyclic photophosphorylation is

- A. Cytochrome
- B. Plastocyanin
- C. Ferredoxin
- D. Plastoquinone

Answer: C



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69. Kranz anatomy is found in

A. C_3 plant

B. C_4 plants

C. Both C_3 and C_4 plants

D. None of these

Answer: B



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70. In bacterial photosynthesis,

A. PS I is present

B. PS II is present who does work of PS (II)

C. Both PS I and PS II present

D. None of these are present

Answer: A



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71. Which chlorophyll does not possess phytol

A. Chl a

B. Chl b

C. chl c

D. chl d

Answer: C



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72. Calvin used algae in his experiment for tracing out the path of carbon. The algae used were

A. Chlorella and Chlamydomonas

B. Chlorella and Scenedesmus

C. Chlorococcum and Chlorella

D. Chlorococcum and Scenedesmus

Answer: B



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73. Element essential for photolysis of water is

A. Nitrogen

B. Chlorine

C. Carbon

D. Oxygen

Answer: B



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74. In C_4 plants , initial CO_2 fixation takes place in the chloroplasts of

A. Guard cells

B. Mesophyll cells

C. Spongy tissue

D. Bundle sheath

Answer: B



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75. which one of the following elements is required for photosynthesis oxygen evolution

A. Copper

B. Iron

C. Manganese

D. Zinc

Answer: C



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76. Agranal chloroplasts are found in some

A. Succulents

B. C_3 plants

C. C_4 plants

D. Hydrophytes

Answer: C



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77. The wavelength of light most absorbed by chlorophyll-a during photosynthesis is

A. 400 nm

B. 550 nm

C. 660 nm

D. 700 nm

Answer: A



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78. Which are related with photorespiration ?

A. Spherosome

B. Lysosomes

C. Glyoxysomes

D. Peroxisomes

Answer: D



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79. Which of the followig is C_4 plant ?

A. sugarcane

B. Mango

C. Apple

D. Tomato

Answer: A



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80. The first stable compound formed in photosynthesis of C_3 plants is

A. Phosphoglyceric acid

B. Starch

C. Pyruvic acid

D. Ribulose diphosphate

Answer: A



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81. Ferredoxin e^- acceptor is a component of

A. PS-I

B. PS-II

C. Hill reaction

D. P_{680}

Answer: C



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82. The correct percentage of CO_2 in atmosphere is

A. 0.03 %

B. 0.3 %

C. 1 %

D. C^{14} and O^{18}

Answer: A



83. Isotopes used in photosynthesis were

A. PS -I

B. PS-II

C. Calvin cycle

D. None-cyclic ETS

Answer: D



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84. P_{680} is related with

A. Light

B. Dark

C. Both

D. None

Answer: B



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85. NADP reduces to $NADPH_2$ in

A. Hatch and Slack

B. Robert Hill

C. Hens kerbs

D. Melvin kelvin

Answer: B



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86. Hills reaction completes in

A. presence of light

B. absence of light

C. absence of water

D. all the above

Answer: A



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87. Who described C_4 pathway for the first time ?

A. Hatch and Slack

B. Robert hill

C. Calvin

D. Watson and Crick

Answer: A



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88. In photosynthesis , for synthesis of one mole of glucose number of ATP and $NADPH_2$ required is

A. 10 and 20

B. 18 and 12

C. 8 and 6

D. 12 and 15

Answer: B



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89. The first acceptor of CO_2 in C_4 plant is

A. RuBp

B. PEP

C. OAA

D. water

Answer: B



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90. Insectivorous plants usually survive in

A. water

B. nitrogen deficient

C. nitrogen rich

D. marshy area

Answer: B



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91. In the process of photosynthesis , water molecules break is

A. Plasmolysis

B. Photolysis of H_2O

C. hydrolysis

D. Hemolysis

Answer: B



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92. Who demonstrated for the first time that in photosynthesis, oxygen is evolved from water

A. Spirogyra

B. Volvox

C. Chlamydomonas

D. Chlorella

Answer: D



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93. The process in which water is split during photosynthesis is

A. RuBP carboxylase

B. Hexokinase

C. Phosphatase

D. Nuclease

Answer: B



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94. Which of the following is used during the discovery of Calvin ?

A. CO_2

B. Water

C. Sugar

D. Pyruvic acid

Answer: D



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95. Which of the following is maximum in chloroplast ?

A. RuBP carboxylase

B. Hexokinase

C. Phosphatase

D. Nulcease

Answer: A



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96. O_2 released in the process of photosynthesis comes from

A. CO_2

B. Water

C. Sugar

D. Pyruvic acid

Answer: B



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97. The first carbon dioxide accptor in C_4 plants is

- A. Phosphoenol pyruvate
- B. Oxaloacetic acid
- C. Phosphoglyceric acid
- D. Ribulose 1,5-diphosphate

Answer: A



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98. The C_4 -plants are different from the C_3 -plants with reference to the

A. Type of pigments involved in photosynthesis

B. The number of NADPH that are consumed

C. End product

D. The substance that accepts CO_2 in carbon assimilation and first stable product

Answer: D



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99. Calvin cycle occurs in

A. Cytoplasm

B. Chloroplast

C. Mitochondria

D. Glyoxysomes

Answer: B



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100. Oxygen liberated during photosynthesis comes from

A. CO_2

B. H_2O

C. Phosphoglyceric

D. Chlorophyll

Answer: B



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101. Which one is produced during cyclic photo phosphorylation ?

A. ATP and $NADPH_2$

B. ATP only

C. ATP and O_2

D. $NADPH_2$

Answer: B



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102. A student sets up an experiment on photoynthesis as follows :

He takes soda water in a glass tumbler and adds chlorophyll into the contents and keeps the tumbler exposed to sunlight hoping that he has provided necessary ingredients for photosynthesis to proceed (viz. CO_2 , H_2O , chlorophyll, and light). What do you think what happens after, say a few hours of exposure of light ?

A. Photosynthesis will take place and glucose will be produced

B. Photosynthesis will take place and starch will be produced which turn the mixture turbid.

C. Photosynthesis will not take place because CO_2 dissolved in soda water escapes into the atmosphere

D. Photosynthesis will not take place because intact chloroplasts are needed for the process.

Answer: D



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103. The first reaction in photorespiration is

- A. Carboxylation
- B. Decarboxylation
- C. Oxygenation
- D. Phosphorylation

Answer: C



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104. Law of limiting factors in photosynthesis was given by:

A. R.Hill

B. Calvin

C. Blackman

D. Amon

Answer: C



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105. The carbon dioxide acceptor in Calvin cycle/ C_3 - plants is

A. PEP

B. RuBP

C. PGA

D. NADP

Answer: B



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106. Insectivorous plants usually grow in soils which are deficient in

A. Nitrogen

B. Calcium

C. Magnesium

D. Carbohydrate

Answer: A



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107. Quantasomes are found in

A. Mitochondria

B. Chloroplast

C. Lysosome

D. Endoplasmic reticulum

Answer: B



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108. During photosynthesis

A. O_2 evolved comes from CO_2

B. ATP is formed

C. ATP is not formed

D. Water is required as medium but it does
not take part in photosynthesis

Answer: B



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109. Cu is present in

- A. Plasmalemma
- B. Plastoquinone
- C. Plastocyanin
- D. Ferredoxin

Answer: C



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110. Which one of the following categories of organisms do not evolve oxygen during Photosynthesis

- A. Photosynthetic red algae
- B. Photosynthetic green algae
- C. Photosynthetic green algae
- D. Photosynthetic bacteria

Answer: D



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111. In the process of photosynthesis,

- A. O_2 is taken and CO_2 is evolved
- B. O_2 is taken and CO_2 is not evolved
- C. CO_2 is taken and O_2 is evolved
- D. CO_2 is taken and NO_2 is evolved

Answer: C



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112. Cuscuta is

- A. Parasitic plant
- B. Symbiotic plant
- C. Predator
- D. Decomposer

Answer: A



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113. In photosynthesis , there is

A. Reduction of H_2O

B. Oxidation of H_2O

C. Oxidation of CO_2

D. Oxidation of NO_2

Answer: B



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114. The initial CO_2 acceptor in C_4 plants is

- A. Phosphoglyceraldehyde
- B. Ribulose monophosphate
- C. Phosphonol pyruvate
- D. Ribulose diphosphate

Answer: C



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115. The first step in the light reaction of photosynthesis is

A. Formation of ATP

B. Ionization of water

C. Attachment of CO_2 to a pentose sugar

D. Excitement of electron of chlorophyll by a photon of light.

Answer: A



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116. Sugarcane show high efficiency of CO_2 fixation because of

- A. Calvin cycle
- B. hatch and Slack cycle
- C. TCA cycle
- D. Greater sunlight

Answer: B



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117. Source of CO_2 for photosynthesis during day in CAM plant is

A. 3-PGA

B. Malic acid

C. Oxaloacetic acid

D. Pyruvate

Answer: B



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118. Chlorophyll has _____ in its center.

A. Iron

B. Magnesium

C. Copper

D. Sulfur

Answer: B



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119. In C_4 plants, Calvin cycle operates in

- A. Grana of mesophyll chloroplasts
- B. Stroma of chloroplasts in mesophyll cells
- C. Bundle sheath cells chloroplasts
- D. Wrong statements wrong

Answer: C



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120. Photorespiration take place is

- A. Choroplast, mitochondria

B. Mitrochondria, peroxisome

C. Bundle sheath chloroplasts

D. Chloroplast, peroxisome , mitochondria

Answer: D



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121. Which one is false about kranz anatomy

A. Bundle sheath cells have large

chloroplast and less developed grana.

B. Mesophyll cells have large chloroplast and more developed grana.

C. It is found in Atriplex, sugarcane, and maize.

D. Plants having it have better photosynthesizing power than C_3 plants.

Answer: B



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122. Who discovered that CO_2 is taken in and O_2 is released by green plants ?

A. Meyer

B. Ijugen Housz

C. Senebier

D. Priestly

Answer: D



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123. Primitive photosynthetic plants utilize solar energy by

- A. Cyclic photophosphorylation
- B. Z-scheme
- C. Both (1) and (2)
- D. Calvin cycle

Answer: A



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124. Which one of the following is a wastefull process ?

A. Photorespiration

B. Respiration

C. Photosynthesis

D. ETS

Answer: A



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125. DCMU

- A. Inhibits PS-I
- B. Inhibites PS-II
- C. Destroys chloroplast
- D. Inhibits oxidative phosphorylation

Answer: B



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126. NH_3 released from

A. Photorespiration

B. Dark respiration

C. CAM

D. All of these

Answer: A



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127. Photosystem I and Photosystem II are found in

A. Stroma of chloroplast

B. Grana of chloroplast

C. Matrix of mitochondria

D. Inner membrane of mitochondria

Answer: B



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128. Cell organelle taking part in photorespiration is

A. Ribosome

B. Dictyosome

C. Peroxisome

D. Glyoxisome

Answer: C



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129. In which of the following the rate of transpiration is high

A. CAM Plant

B. C_3 plants

C. C_3 and C_4

D. C_4 plants

Answer: B



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130. Of which cell organelle is grana a part ?

A. Mitochondria

B. Chloroplast

C. Aleurone grain

D. Starch grain

Answer: B



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131. The substrate for photorespiration is

A. Glycolate

B. Glucose

C. Pyruvic acid

D. Acetyl CoA

Answer: A



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132. The wavelength of light most absorbed by chlorophyll-a during photosynthesis is

A. 460 nm

B. 500 nm

C. 600 nm

D. 660 nm

Answer: A



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133. The source of oxygen evolved during photosynthesis is

A. H_2S

B. H_2O

C. CO_2

D. HCO_3

Answer: B



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134. Which of the following acts as electron carrier in both photosynthesis and respiration ?

A. Ferredoxin

B. Phytochrome

C. Cytochrome

D. Cryptochrome

Answer: C



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135. The photosynthetic unit is

A. Glyoxysome

B. Spherosome

C. Microsome

D. Quantasome

Answer: D



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136. Warburg effect is related with

A. Concentration of O_2

B. Concentration of N_2

C. Concentration of H_2

D. Concentration of Cl

Answer: A



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137. Stroma is the ground matrix of

A. Endoplasmic reticulum

B. Mitochondria

C. Nucleolus

D. Chloroplast

Answer: D



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138. In plant cells, peroxisomes are associated with

A. Photorespiration

B. Photosynthesis

C. Photoperiodism

D. Phototropism

Answer: B



139. In C_3 plants, the first stable product of photosynthesis during dark reaction is

- A. Malic acid
- B. Oxaloacetic acid
- C. Phosphoglyceric acid (PGA)
- D. Phosphoglyceraldehyde (PGAL)

Answer: C



140. The process of taking in CO_2 by plants and releasing O_2 is component of

A. Photosynthesis

B. Endosomosis

C. Transpiration

D. Respiration

Answer: A



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141. In photosynthesis, ATP is synthesized during

- A. Cyclic photophosphorylation
- B. Non-cyclic photophosphorylation
- C. Both (1) and (2)
- D. In the photolysis of water

Answer: C



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142. Which of the following elements is essential for the photosynthesis of water ?

A. Fe

B. Mg

C. Mn

D. Cu

Answer: C



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143. Peroxisomes are connerned with

- A. Respiration
- B. Photorespiration
- C. Photosynthesis
- D. Flowering

Answer: B



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144. The reduction process of CO_2 and ATP formation in plants has relationship. In this reaction, ATP is

- A. Formed
- B. Utilized
- C. Not utilized
- D. None of these

Answer: B



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145. ATP synthesis during photosynthesis is termed as

- A. Phosphorylation
- B. Oxidative phosphorylation
- C. Photophosphorylation
- D. Photorespiration

Answer: C



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146. Which of the following is used during the discovery of Calvin ?

A. Spirogyra

B. Volvox

C. Chlamydomonas

D. Chlorella

Answer: D



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147. The primary receptor of CO_2 in photosynthesis is

- A. Phosphoric acid
- B. Ribulose phosphate
- C. Glucose
- D. Ribulose 1,5-bisphosphate

Answer: D



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148. Photorespiration in C_3 plants starts from

A. Phosphoglycerate

B. Glycerate

C. Glycine

D. Phosphoglycolate

Answer: A



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149. The substrate for photorespiration is

A. Glycolate

B. Glucose

C. Pyruvic acid

D. Acetyl CoA

Answer: A



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150. Tracer elements are

A. Micro-elements

B. Macro-elements

C. Radio-isotopes

D. Vitamins

Answer: C



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151. Which one of the following categories of organisms do not evolve oxygen during Photosynthesis

A. Red algae

B. Photosynthetic bacteria

C. C_4 plants with Kranz anatomy

D. Blue green algae

Answer: B



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152. Oxygen liberated during photosynthesis comes from

A. Water

B. CO_2

C. Soil

D. Atmosphere

Answer: A



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153. The products of light reaction of photosynthesis is

A. Carbohydrate

B. ATP

C. NADP and O_2

D. $NADPH_2$, ATP and O_2

Answer: D



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154. Photosynthesis is most active in

A. Sunlight

B. Yellow light

C. Red light

D. Green light

Answer: C



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155. Besides water and light which is more essential as a raw material for food formation

A. CO_2

B. O_2

C. NADP

D. Mineral salts

Answer: A



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156. The concentration of CO_2 in the atmosphere is approximately

A. 0.003 %

B. 0.03 %

C. 0.30 %

D. 3.00 %

Answer: B



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157. In the CO_2 content of the atmosphere is as high as 300 parts per million

A. All plants would get killed.

B. The plants would you grow properly.

C. Plants would grow for some time and
then die

D. The plants would thrive well.

Answer: D



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158. Hill used dye for his famous Hill reaction

A. Dichlorophenol Indophenol (DCPIP)

B. Sulphur green

C. Methylene blue

D. Eosine

Answer: A



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159. The isotope of carbon used extensively for studies in photosynthesis is

A. C^{13}

B. C^{14}

C. C^{15}

D. C^{16}

Answer: B



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160. Which is the evidence to show that O_2 is released in photosynthesis comes from water

A. Isotopic oxygen (O^{18}) supplied as H_2O appears in the O_2 released in photosynthesis.

B. Activated chloroplast in water released O_2 if supplied potassium ferrocyanide or some other reducing agent in the absence of CO_2

C. Photosynthetic bacteria use H_2S and CO_2 to make carbohydrates, H_2O and sulphur.

D. All of the above

Answer: A



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161. The path of CO_2 in the dark reaction of photosynthesis was successfully traced by the use of the following or The dark reaction is traced by

A. O_2^{18}

B. $C^{14}O_2$

C. P^{32}

D. X-rays

Answer: B



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162. Discovery of Emerson effect has already shown in existence of

A. Two distinct photosystems

B. Light and dark reactions of
photosynthesis

C. Photophosphorylation

D. Photorespiration

Answer: A



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163. The colour of light not utilized during
photosynthesis is

A. Violet

B. Green

C. Red

D. Blue

Answer: B



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164. During the process of photosynthesis the raw material used are

A. Glucose

B. Chlorophyll

C. Starch

D. CO_2 and H_2O

Answer: D



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165. Products of photosynthesis are

A. Carbon dioxide and food material

B. Carbohydrates and oxygen

C. Carbon dioxide and oxygen

D. Formaldehyde and nitrogen

Answer: B



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166. Usually the process of photosynthesis is :

A. Slower than respiration

B. Faster than respiration

C. Equal to respiration

D. Any of the above is possible

Answer: B



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167. Name the scientist, who first pointed out that plants purify foul air by bell jar experiment .

A. Willstatter

B. Robert Hooke

C. Priestley

D. Jean Senebier

Answer: C



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168. Of the total amount of water absorbed by the plants, its actual percentage used during photosynthesis is

A. 50 %

B. 90 %

C. 1 %

D. 25 %

Answer: C



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169. It is only the green part of the plant,
which takes part in

A. Respiration

B. Transpiration

C. Photosynthesis

D. Osmosis

Answer: C



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170. Moll's experiment explains that

A. Carbon dioxide is essential for
photosynthesis

B. Chlorophyll dioxide is essential for
photosynthesis

C. Light and water are essential for
photosynthesis

D. All the above are correct

Answer: C



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171. Which of the following is not a significance of photosynthesis ?

A. Glucose synthesis for most of consumer

B. Increase in green house effect

C. Provides O_2 for synthesis of ozone umbrella

D. Provides O_2 for cell respiration.

Answer: B



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172. Oxygen during photosynthesis comes from water was proved by O^{18} experiment

A. Ruben and Kamen

B. Hill

C. Warburg

D. Blackman

Answer: B



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173. Which pair is wrong

A. C_3 plant-Maize

B. Calvin cycle-PGA

C. Hatch-Slack cycle -OAA

D. C_4 plant-Kranz anatomy

Answer: B



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174. In sugarcane plant $^{14}CO_2$ is fixed in malic acid, in which the enzyme that fixes CO_2 is

- A. Ribulose biphosphate carboxylase
- B. Phosphoenol pyruvic acid carboxylase
(PEP -case)
- C. Ribulose phosphate kinase
- D. Fructose phosphatase

Answer: C





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175. Choose the correct match.

Bladderwort , sundew, venus, flytrap

A. Nepenthes, Dionaea, Drosera

B. Nepenthes, Utricularia , vanda

C. Utricularia, Drosera, Dionaea

D. Dionaea, Trapa , Vanda

Answer: C



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176. Which one of the following is wrong in relation to photorespiration

- A. It occurs in chloroplasts.
- B. It occurs in daytime only.
- C. It is a characteristic of C_4 plants
- D. It is a characteristic of C_3 plants.

Answer: C



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177. Photosynthetically active radiation (PAR) represents the following range of wavelength

A. 400-700 nm

B. 500-600 nm

C. 450-950 nm

D. 340-450 nm

Answer: A



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178. In C_3 plants, the first stable product of photosynthesis during dark reaction is

- A. Phosphoglyceraldehyde PGL
- B. Malic acid
- C. Oxaloacetic acid
- D. 3-Phosphoglyceric acid

Answer: D



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179. Plants adapted to low light intensity have

A. Leaves modified to spines

B. Large photosynthetic unit size than the
sun plants

C. Higher rate of CO_2 fixation than the sun
plants

D. More extended root system

Answer: B



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180. Chlorophyll occurs in chloroplast

- A. Stroma
- B. Outer membrane
- C. Inner membrane
- D. Thylakoids

Answer: D



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181. Photosynthesis in C_4 plants is relatively less limited by atmospheric CO_2 levels because

A. Four carbon acids are the primary initial

CO_2 fixation products

B. the primary fixation CO_2 is mediated via

PEP carboxylase

C. Effective pumping of CO_2 into bundle

sheath cells

D. RuBisCO in C_4 plants has higher affinity
for CO_2

Answer: C



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182. In chloroplasts the chlorophyll is located
in

A. Grana

B. Pyrenoid

C. Stroma

D. Both grana and stroma

Answer: A



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

A. Two

B. Six

C. Zero

D. Twelve

Answer: D



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184. Carbohydrates, the most abundant biomolecules on earth, are produced by

A. All bacteria , fungi and algae

B. Fungi, algae, and green plant cells

C. Some bacteria , algae, and green plants
cells

D. Viruses, fungi and bacteria

Answer: C



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185. The deficiencies of micronutrients not only affects growth of plants, but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below, which group of three elements shall affect the most, both photosynthetic and mitochondrial electron transport ?

A. Cu, Mn, Fe

B. Co, Ni, Mo

C. Mn, Co, Ca

D. Ca, K, Na

Answer: A



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186. Chemiosmotic theory of ATP synthesis in the chloroplasts and mitochondria is based on

A. Proton gradient

B. Accumulation of K ions

C. Accumulation of Na ions

D. Membrane potential

Answer: A



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187. Photosynthetically active radiation (PAR) represents the following range of wavelength

A. 400-700 nm

B. 450-920 nm

C. 340-450 nm

D. 500-600 nm

Answer: A



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188. In photosystem-I the first electron acceptor is

A. Plastocyanin

B. An iron-sulfur protein

C. Ferredoxin

D. Cytochorme

Answer: B



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189. The translocation of organic solutes in sieve tube members is supported by

A. Mass flow involving a carrier and ATP

B. Cytoplasmic streaming

C. Root pressure and transpiration pull

D. P-protein

Answer: A



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

- A. Grana of chloroplasts and peroxisomes
- B. Stroma of chloroplasts

C. Stroma of chloroplasts and mitochondria

D. Stroma of chloroplasts and peroxisomes

Answer: D



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Assertion Reasoning Questions

1. Assertion :In C_4 plants, the chloroplasts of bundle sheath cells are granal.

Reason: PS II is mostly found in the appressed part of granum.

A. If both Assertion and Reason are true and the Reason is the correct explanation

B. If both Assertion and Reason are true, but the Reason is not the correct explanation of the Assertion.

C. If Assertion is true, but Reason is false.

D. If both Assertion and Reason are false.

Answer: D



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2. Assertion : Dark reactions of photosynthesis are temperature -controlled processes.

Reason : Most of the reactions are enzymatic in nature.

A. If both Assertion and Reason are true
and the Reason is the correct
explanation

B. If both Assertion and Reason are true,
but the Reason is not the correct
explanation of the Assertion.

C. If Assertion is true, but Reason is false.

D. If both Assertion and Reason are false.

Answer: B



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3. Assertion : Dark acidification of cytoplasm occurs in CAM plants.

Reason : Organic acids are decarboxylated during night.

A. If both Assertion and Reason are true and the Reason is the correct explanation

B. If both Assertion and Reason are true, but the Reason is not the correct explanation of the Assertion.

C. If Assertion is true, but Reason is false.

D. If both Assertion and Reason are false.

Answer: C



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4. Assertion: Assimilatory power in photosynthesis is generated in ETS occurring in thylakoid membrane .

Reason : They are needed for CO_2 reduction.

A. If both Assertion and Reason are true and the Reason is the correct explanation

B. If both Assertion and Reason are true, but the Reason is not the correct explanation of the Assertion.

C. If Assertion is true, but Reason is false.

D. If both Assertion and Reason are false.

Answer: B



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5. Assertion: Light-harvesting complexes (LHC) on thylakoid membrane broaden the range of light absorption:

Reason: They transfer electrons to reaction center.

A. If both Assertion and Reason are true and the Reason is the correct explanation

B. If both Assertion and Reason are true,
but the Reason is not the correct
explanation of the Assertion.

C. If Assertion is true, but Reason is false.

D. If both Assertion and Reason are false.

Answer: B



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Archives

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

A. Quinone

B. Cytochrome

C. Iron-sulfur protein

D. Ferredoxin

Answer: A



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

- A. Quinone
- B. Cytochrome
- C. Iron-sulfur protein
- D. Ferredoxin

Answer: A



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3. The wavelength of light absorbed by Pr form of phytochrome is

A. 620 nm

B. 640 nm

C. 680 nm

D. 720 nm

Answer: C



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4. Importance of day length (photoperiodism)
in flowering of plants was first shown in

A. Cotton

B. Petunia

C. Lemna

D. Tobacco

Answer: D



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

A. Epidermis

B. Mesophyll

C. Bundle sheath

D. Phloem

Answer: B



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6. The C_4 plants are photosynthesis more efficient than C_3 plant because

A. The CO_2 efflux is not prevented

B. They have more chloroplasts

C. The CO_2 compensation point is more.

D. CO_2 generated during photorespiration is trapped and recycled through PEP carboxylase

Answer: D



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

A. Quinone

B. Ferredoxin

C. Cytochrome-b

D. Cytochrome-f

Answer: A



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8. Stroma in the chloroplasts of higher plant contains

A. Chlorophyll

B. Light-independent reaction enzymes

C. Light-independent reaction enzymes

D. Ribosomes

Answer: C



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9. Oxygenic photosynthesis occurs in

- A. Chlorobium
- B. Chromatium
- C. Oscillatoria
- D. Rhodospirillum

Answer: C



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10. Non-cyclic photophosphorylation results in production of

A. ATP

B. NADPH

C. ATP and NADPH

D. ATP, NADPH , and O_2

Answer: D



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

- A. Angiosperm
- B. Alga
- C. Bryophyte
- D. Gymnosperm

Answer: B



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

A. Presence of thin cuticle

B. Lower rate of photorespiration

C. Higher leaf area

D. Presence of larger number of chloroplasts in the leaf cells

Answer: B



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13. Kranz anatomy is one of the characteristics of the leaves of

A. Wheat

B. Sugarcane

C. Mustard

D. Potato

Answer: B



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14. Read the following four statement A,B,C and D and select the right option having both correct statements.

statements

(a) Z scheme of light reaction takes place in presence of PS I only .

(B) Only PS I is functional in cyclic photosporylation

(c) Cyclic photophosphorylation results into synthesis of ATP and $NADPH_2$

(D) Stroma lamllae lack PSII as welll as NADP

A. A and B

B. B and C

C. C and D

D. B and D

Answer: D



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15. Photoperiodism was first characterised in

A. Tobacco

B. Potato

C. Tomato

D. Cotton

Answer: A



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16. CAM helps the plants in

A. Reproduction

B. Conservation water

C. Secondary growth

D. Disease resistance

Answer: B



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17. Of the total incident solar radiation the proportion of PAR is:

A. More than 80 %

B. About 70 %

C. About 60 %

D. Less than 50 %

Answer: D



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18. A process that makes important difference between C_3 and C_4 plants is

A. Glycolysis

B. Photosynthesis

C. Photorespiration

D. Transpiration

Answer: C



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19. The correct sequence of cell organelles during photorespiration is

A. Chloroplast, Peroxisome, mitochondria

B. Chloroplast, vacuole, peroxisome

C. Chloroplast, Golgibodies, mitochondria

D. Chloroplast , Rough Endoplasmic
reticulum, Dictyosomes

Answer: A



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20. Which one of the following organisms is correctly matched with its three characteristics

A. Pea : C_3 pathways, Non endosp,

Endospermic seed, Vexillary aestivation

B. Tomato : Twisted aestivation , Axile

placentation , Berry

C. Onion: Bulb, Imbricate aestivation, Axile

placentation

D. Maize: C_3 pathway, Closed vascular

bundles , Scutellum

Answer: C



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21. Pigment-containing membranous extensions in some cyanobacteria are

- A. Heterocysts
- B. Basal bodies
- C. Pneumatophores
- D. Chromatophores

Answer: D



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22. Anoxygenic photosynthesis is characteristic of

- A. Rhodospirillum
- B. Spirogyra
- C. Chlamydomonas
- D. Ulva

Answer: A



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23. The structures that are formed by stacking of organized flattened membranes sacs in the chloroplasts are

A. Stroma

B. Cristae

C. Grana

D. Stroma lamellae

Answer: C



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24. In photosynthesis, light independent reactions take place at

- A. Stromal matrix
- B. Thylakoid lumen
- C. Photosystem-I
- D. Photosystem-II

Answer: A



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25. The oxygen evolved during photosynthesis comes from water molecules . Which one of the following pairs of elements is involved in this reaction ?

A. Magnesium and Chlorine

B. Manganese and Chlorine

C. Manganese and Potassium

D. Magnesium and Molybdenum

Answer: B



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26. Emerson's enhancement effect and red drop have been instrumental in the discovery of

A. Photophosphorylation and non-cyclic electrotransport

B. Two photosystems operating simultaneously

C. Photophosphorylation and cyclic electron transport

D. oxidative phosphorylation

Answer: B



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27. In chloroplast, the highest number of protons are found in

A. Stroma

B. Lumen of thylakoids

C. Inter membrane space

D. Antennae complex

Answer: B



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28. 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

A. C-3

B. C-4

C. CAM

D. Nitrogen fixer

Answer: B



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29. Water vapour comes out from the plant leaf through the stomatal opening. Through the same stomatal opening carbon dioxide diffuses into the plant during photosynthesis. Reason out the above statements using the following options.

A. Both processes cannot happen simultaneously.

B. Both processes can happen together because the diffusion coefficient of

water of CO_2 is different.

C. The above processes happen only during night time.

D. One process occurs during day time, and the other at night.

Answer: B



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30. The process which makes major difference between C_3 and C_4 plants is

A. Photorespiration

B. Respiration

C. Glycolysis

D. Calvin cycle

Answer: A



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