DPP - Daily Practice Problems

Chapter-wise Sheets

Date : Start Time : End Time : BIOLOGY SYLLABUS : Photosynthesis in Higher Plants Max. Marks: 180 Marking Scheme : + 4 for correct & (-1) for incorrect Time: 60 min. INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page. (a) $C_6H_{12}O_6 + 6O_2 \longrightarrow 6CO_2 + 6H_2O + energy$ 1. Quantasomes are present in (b) $C_6H_{12}O_6 + 6O_2 + 6H_2O \longrightarrow 6CO_2 + 12H_2O + energy$ (c) $6CO_2 + 6H_2O \longrightarrow 6H_2O + C_6H_{12}O_6$ (a) chloroplast (b) mitochondria (c) golgi body (d) lysosome 2. The C_4 plants are photosynthetically more efficient than C_3 (d) $6CO_2 + 12H_2O \xrightarrow{\text{Light}} 6O_2 + C_6H_{12}O_6 + 6H_2O$ plants because: (a) the CO_2 compensation point is more C_4 acid, formed in the mesophyll of C_4 plants leaf during (b) CO_2 generated during photorespiration is trapped photosynthesis is and recycled through PEP carboxylase (a) OAA or malic acid or aspartic acid (c) the CO_2 efflux is not prevented (b) pyruvic acid (d) they have more chloroplasts (c) succinic acid 3. Photorespiration is favoured by (d) fumaric acid (a) high O_2 and low CO_2 6 The organelles which take part in photo-respiration are (b) low light and high O_2 (a) chloroplast, mitochondria, nucleus (c) low temperature and high O_2 (b) chloroplast, mitochondria, lysosome (d) low O_2 and high CO_2 (c) mitochondria, chloroplast, peroxisome 4. Which one is the correct summary equation of mitochondria, lysosomes, peroxisome (d) photosynthesis? 1. @b©d 2. (a)(b)(c)(d) 3. (a)(b)(c)(d) 4. (a)(b)(c)(d) 5. (a)(b)(c)(d) **Response Grid** 6. (a)b)©(d) Space for Rough Work

Get More Learning Materials Here :





в-50

7. Grana are present inside the :

- (a) mitochondria (b) chloroplast
- (c) endoplasmic reticulum (d) ribosome
- 8. Photosynthetically active radiation is represented by the range of wavelength of
 - (a) 340-450 nm (b) 400 - 700 nm
 - (d) 400-950 nm (c) $500-600 \,\mathrm{nm}$
- 9. Which of the following statement is incorrect?
 - (a) C_3 plants respond to higher temperature, show higher photosynthetic rate while C4 plants have lower optimum temperature.
 - (b) Tropical plants have higher temperature optimum than the plants adapted to temperate climate.
 - (c) Light reaction is less temperature sensitive than dark reaction.
 - (d) The effect of water as a factor is more through its effect on plant, rather than directly on photosynthesis.
- 10. Chemiosmotic hypothesis given by Peter Mitchell proposes the mechanism of
 - (a) synthesis of ATP (b) synthesis of $FADH_2$
 - (c) synthesis of NADH (d) synthesis of NADPH
- **11.** RuBisCO stands for
 - (a) Ribulose Biphosphate Carboxylase Oxygenase
 - (b) Ribulose Phosphate Carboxylase Oxygenase
 - (c) Ribulose Phosphate Carboxylic Oxygenase
 - (d) None of the above
- 12. Which enzyme is most abundantly found on earth?
 - (b) RuBisCo (a) Catalase
 - (c) Nitrogenase (d) Invertase
- 13. The first carbon dioxide acceptor in C₄-plants is
 - (a) Phosphoenol-pyruvate
 - Ribulose 1, 5-diphosphate (b)
 - (c) Oxalo-acetic acid
 - (d) Phosphoglyceric acid
- 14. Which one of the following is essential for photolysis of water?
 - (a) Manganese Zinc (b)
 - (c) Copper (d) Boron
- 15. Which element is required in the germination of pollen grain? (b) Potassium
 - (a) Chlorine
 - (c) Boron (d) Calcium

- 16. In a CAM plant, the concentration of organic acid
 - (a) increases during the day.
 - (b) decreases during the day.
 - (c) increases during night.
 - (d) decreases or increases during day.
- 17. Which of the following statements regarding photorespiration are true?
 - (a)Photorespiration is a metabolically expensive pathway.

DPP/CB13

- Photorespiration is avoided when CO_2 is abundant. (b)
- Photorespiration results in a loss of usable carbon (c) dioxide.
- (d) All of the above
- 18. The Z-scheme refers to
 - (a) the type of photosynthesis occurs in plants found in areas with minimal precipitation.
 - (b) the pattern of grana within the chloroplasts of photosynthetic plants.
 - the carbon-fixation process which is also known as the (c) Calvin cycle.
 - (d) an energy diagram for the transfer of electrons in the light reactions of photosynthesis in plants.
- 19. Which one is a C_4 -plant?
 - (a) Papaya (b) Pea
 - (c) Potato (d) Maize/Corn
- 20. In an experiment, mature leaves on the plant were enclosed for a fixed amount of time in a transparent bag that had radioactive CO2. In which part of the plant will maximum radioactivity be found after some time?
 - (a) Actively growing leaves.
 - Guard cells of all the leaves. (b)
 - (c) In mature leaves.
 - (d) Senescing leaves and roots.
- When a photosynthetic plant is transferred to an atmosphere 21. of enriched O_2 , its rate of
 - (a) photosynthesis would increase.
 - photosynthesis would decrease. (b)
 - respiration would decrease. (c)
 - (d) osmosis would increase.

	7. @bCd	8. @bCd	9. abcd	10. @bCd	11. @bCd
Response	12.@bCd	13.@b©d	14. @bCd	15.@b©d	16. @b©d
Grid	17.@bCd	18.@b©d	19. @bcd	20. @bcd	21. @bCd

Space for Rough Work .

Get More Learning Materials Here :

DPP/CB13

- 22. In C_4 plants, agranal chloroplasts are found in
 - (a) mesophyll cells
 - (b) epidermal cell chloroplasts of green stem
 - (c) bundle sheath cells
 - (d) chloroplasts of guard cells
- **23.** Oxysomes or $F_0 F_1$ particles occur on
 - (a) thylakoids
 - (b) mitochondrial surface
 - (c) inner mitochondrial membrane
 - (d) chloroplast surface
- 24. Photorespiration is favoured by
 - (a) high O_2 and low CO_2
 - (b) low light and high O_2
 - (c) low temperature and high O_2
 - (d) low O_2 and high CO_2
- 25. In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of
 - (a) bundle sheath (b) phloem
 - (c) epidermis (d) mesophyll
- **26.** The graph shows the relation between light intensity and the giving off and taking up of carbon dioxide by the leaves of a plant. Why is most carbon dioxide given off when the light intensity is zero units ?



- (a) Because it is just the start of the experiment.
- (b) Only respiration is taking place at this intensity of light.
- (c) Only photosynthesis is taking place at this intensity of light.
- (d) The rate of photosynthesis is equivalent to the rate of respiration.
- 27. In photosystem-I the first electron acceptor is
 - (a) cytochrome (b) plastocyanin
 - (c) an iron-sulphur protein (d) ferredoxin

- 28. Which of the following statement is false?
 - (a) H_2S , not H_2O , is involved in photosynthesis of purple sulphur bacteria.
 - (b) Light and dark reactions are stopped in the absence of light.
 - (c) Calvin cycle occurs in the grana of chloroplast.
 - (d) ATP is produced during light reaction *via* chemiosmosis.
- **29.** Given below is the pathway of light reaction. Identify the given blanks indicated by A, B, C, D and E.



	Α	В	С	D
(a)	P 700	H^{+}	P680	$NADP^+$
		acceptor		
(b)	Photosystem I	e	Photosystem	NADPH2 ⁺
		acceptor	Π	ATP
(c)	Photosystem	H^{+}	P700	NADPH
	Π	acceptor		
(d)	Photosystem	e	Photosystem	NADPH +
	П	acceptor	Ι	H^{+}

- **30.** Warburg effect refers to
 - (a) decreased photosynthetic rate at very high O₂ concentration
 - (b) increased photosynthetic rate at very high O₂ concentration
 - (c) decreased photosynthetic rate at very low O₂ concentration
 - (d) increased photosynthetic rate at very low O₂ concentration



____ Space for Rough Work



DPP/ CB13

в-52

- **31.** Read the following statements and select the correct ones.
 - PS I is involved in non-cyclic photophosphorylation only. (i)
 - (ii) PS II is involved in both cyclic and non-cyclic photophosphorylation
 - (iii) Stroma lamellae membranes possess PS I only, whereas grana lamellae membranes possess both PS I and PS II.
 - (a) (i) only (b) (ii) only
 - (c) (iii) only (d) (i), (ii) and (iii)
- 32. Which is not correct for cyclic photophosporylation?
 - (a) No O_2 given off
 - (b) No water consumed
 - (c) No NADPH₂ synthesized
 - (d) PS-I and PS-II are involved
- 33. Calvin cycle expends the following for fixation of 3-molecules of CO_2
 - (a) $9\bar{A}TP$ and $6NADPH_{2}$ (b) 8 ATP and 6 NADPH₂
 - (c) $9ATP and 3 NADPH_{2}$ (d) 6 ATP and 9 NADPH₂
- 34. In a classic experiment on photosynthesis, R. L. Hill demonstrated that an illuminated in vitro suspension of isolated chloroplasts could produce oxygen in the presence of a hydrogen acceptor such as methylene blue. In this case methylene blue is reduced. Which one of the following compounds replaces methylene blue in the intact photosynthesising plant?
 - (a) adenosine triphosphate (ATP)
 - (b) carbon dioxide
 - (c) nicotinamide adenine dinucleotide phosphate (NADP)
 - (d) phosphoglyceric acid (PGA)
- 35. The key compound of Calvin cycle is
 - (a) PGA (b) PGAL
 - (c) DHAP (d) DPGA
- 36. Which one of the following is a correct outline of the main events in photosynthesis?
 - (a) Oxygen reacts with a carbohydrate to produce water and carbon dioxide in the presence of light.
 - (b) Light joins carbon dioxide to an acceptor compound which is then reduced by hydrogen obtained from water.
 - (c) Light splits water and the resulting hydroxyl group combines with a compound which has incorporated carbon dioxide
 - (d) Carbon dioxide combines with an acceptor compound and this is reduced by hydrogen split from water by light.

- 37. Who used prism, white light, green alga, Cladophora and aerobic bacteria and plotted the action spectra for photosynthesis?
 - (a) Sachs (b) Arnon
 - (c) Arnold (d) Englemann
- 38. Which one of the following pigment does not occur in the chloroplast? (b) Xanthophyll
 - (a) Carotene

(a) Chlorophyll

- (c) Chlorophyll'b' (d) Anthocyanin
- 39. Which pigment is water soluble?
 - (b) Carotene
 - (d) Xanthophyll
- (c) Anthocyanin 40. Generally CO₂ is not limiting for hydrophytes -
 - (a) Mesophytes plants fix H_2S in their photosynthesis.
 - (b) These plants also CO_2 have from water in the form of HCO_3 .
 - Glucose is not required for their respiration (c)
 - (d) All of the above
- 41. Suspension of isolated thylakoids in culture medium containing CO₂ and H₂O does not produce hexose due to absence of
 - (a) ATP (b) Enzyme
 - (c) Proteins (d) Hill reagent
- Stroma in the chloroplasts of higher plant contains 42. (a) Light-independent reaction enzymes
 - (b) Light-dependent reaction enzymes
 - (c) Ribosomes
 - (d) Chlorophyll
- 43. The light harvesting complex (LHC) is made up of
 - (a) one molecule of chl a.
 - (b) very few molecules of chl *a*.
 - (c) hundreds of pigment molecules bound to proteins.
 - (d) $\operatorname{Chl} a + \operatorname{Chl} c + \operatorname{protein} + \operatorname{DNA}$.
- 44. Hatch and Slack pathway (HSK pathway) is otherwise known as C_4 -cycle because
 - the first stable product is oxaloacetic acid / OAA which (a) is a C_4 -compound.
 - the primary CO_2 acceptor is OAA, a C_4 -compounds. (b)
 - all intermediate metabolites are C_4 -compound. (c)
 - (d) at one time 4CO₂ molecules take part in carboxylation pathway.

(b) Cytochrome

- **45**. The first acceptor of electrons from an excited chlorophyll molecule of photosystem II is -
 - Ouinone (a)

(c)

Iron-sulphur protein (d) Ferredoxin

			-	-	
	31.@bCd	32.@bcd	33. @bcd	34. @bCd	35. @bCd
Response	36.@bCd	37.@bCd	38. @bCd	39. @bCd	40. @bcd
Grid	41.@bCd	42.@b©d	43. @bCd	44. @bCd	45. @bCd

Space for Rough Work

DAILY PRACTICE PROBLEM DPP CHAPTERWISE 13 - BIOLOGY				
Total Questions	45	Total Marks	180	
Attempted		Correct		
Incorrect		Net Score		
Cut-off Score	45	Qualifying Score	60	
Success Gap = Net Score – Qualifying Score				
Net Score = (Correct × 4) – (Incorrect × 1)				

HINTS & SOLUTIONS

DPP/CB13

1. (a)

- 2. (c) The C_4 pathway allows photosynthesis to occur at very low concentrations of carbon dioxide as PEP carboxylase has an extremely high affinity for carbon dioxide. This pathway also works well at high temperatures and light intensity, enabling efficient photosynthesis in tropical plants.
- (a) Photorespiratory loss of CO₂ occurs when RuBisCo starts functioning as an oxygenase instead of carboxylase under conditions of high O₂ and low CO₂. It involves three organelles chloroplast, mitochondria and peroxisomes. Half of the photosynthetically fixed carbon (in the form of RuBP) may be lost into the atmosphere through this process and no ATP formation occurs.
- 4. (d) 5. (a)
- 6. (c) The process of photorespiration requires 3 cell organellesmitochondria, chloroplasts and peroxisomes. In chloroplasts glycolate is formed from ribulose biphosphate which passes into peroxisomes to be changed into glyoxylate. In this reaction H_2O_2 is evolved. Glyoxylate is changed to glycine which now enters mitochondria. Two molecules of glycine combine to form one molecule of serine with the evolution of CO.
- 7. (b) Grana are present inside the chloroplasts. Each granum may contain 10 100 thylakoids. Thylakoids or baggy trousers are membrane lined flattened sacs. Thylokoids (or granna) contain chloroplast proteins, photosynthetic pigments and other factors required for photosynthesis.
- (b) Photosynthesis takes place only in the visible part (400 700 nm wavelength) of electromagnetic radiations. Hence, this component comprises the photo-synthetically active radiation.
- 9. (a) 10. (a) 11. (a)
- (b) RuBisCo is the enzyme involved in Calvin cycle. Nitrogenase catalyses nitrogenation. Invertase catalyses breaking of sucrose to glucose and fructose.
- 13. (a) The primary acceptor of CO_2 in C_4 plants is phosphoenol pyruvate or PEP. PEP in mesophyll cells combine with CO_2 and is converted into 4 carbon compound oxaloacetic acid by PEP carboxylase. In C_3 plant, Ribulose 1, 5-diphosphate is primary acceptor of CO_2 .
- (a) Photolysis is catalysed by the protein-bound inorganic complex containing manganese ions (oxygen evolving complex) of photosystem II.
- 15. (c) 16. (c) 17. (d) 18. (d) 19. (d) 20. (a) 21. **(b)** 22. (c) 23. (c) 24. (a) 25. (d) 26. (b)
- 27. (c) 28. (c) 29. (d)
 30. (a) Oxygen is a product of photosynthesis. A small quantity of
- O₂ is essential for photosynthesis to take place. But as O concentration rises, rate of photosynthesis decreases. It may be because (i) Oxygen takes part in oxidation of photosynthetic pigments, intermediates and enzymes in the presnce of strong light (photo-oxidation), (ii) Oxygen is a strong quencher of excited state of chlorophyll. Oxygen competes with CO₂ for reducing power. It converts RuBP-carboxylase to RuBP-oxygenase. At very high oxygen concentration, the rate of photosynthesis begins to decline in all plants. This phenomenon is referred to as Warburg effect.
- **31.** (c) PS I is involved in both cyclic and non-cyclic photophosphorylation. PS II is involved only in non-cyclic photophosphorylation. PS II is present in the appressed (linner) part of grana thylakoids. PS I is located in the non-appresed (outer) part of grana thylakoids as well as stroma thylakoids.
- 32. (d) In cyclic photophosphorylation, only PS-I is involved.

- **33.** (a) In Calvin cycle, three molecules of CO_2 will require $3 \times 3 = 9$ ATP and $2 \times 3 = 6$ NADPH₂.
- 34. (c) In photosynthesis, light energy trapped by chlorophyll is used to excite electrons in the chlorophyll. (An electron extracted from water by photolysis fills the electron hole.) The excited electrons are then transferred through the electron transport chain in the thylakoid membrane to NADP⁺, forming NADPH in the stroma.
- **35.** (b) The key compound of C-3 cycle or Calvin cycle is 3-PGAL as it is starting point for many other metabolic pathways in the plant.
- 36. (d) Photosynthesis is the process by which plants manufacture food. This occurs when CO_2 combines with ribulose 1,5-bisphosphate (RuBP) to form the products of photosynthesis.
- 37. (d) 38. (d) 39. (c) 40. (b) 41. (b) 42. (a) 43. (c) 44. (a) 45. (a)

Get More Learning Materials Here : 📕



