Exercise-1

>>> Marked Questions are for Revision Questions.

ONLY ONE OPTION CORRECT TYPE

SECTION - A # Introduction (Early experiments), site of photosynthesis and photosynthetic pigments

1.	Two pigment system theory of photosynthesis was proposed by or concept of evidence for existence two photosystems in photosynthesis was given by			ept of evidence for existence of
	(1) Hill	(2) Blackman	(3) Emerson	(4) Arnon
2.	Who received the Nobe	el Prize for working out th	e early carbon pathway	of photosynthesis
	(1) Calvin	(2) Krebs	(3) Khorana	(4) Watson
3.	The process of photoph	nosphorylation was disco	vered by	
	(1) Calvin	(2) Arnon	(3) Priestley	(4) Warburg
4.	Most of the plants cor pigment was named ch	ntain a green colouring lorophyll by	pigment which is respo	nsible for photosynthesis. This
	(1) Melvin Calvin	(2) Jean Senebier	(3) Julius Robert Mayer	⁻ (4) Pelletier Caventou
5.2	The scientist who prove	ed that bacteria use H_2S	gas and CO ₂ to synthesiz	ze carbohydrate is
	(1) Van Niel	(2) Ruben	(3) Jean Senebier	(4) Julius Robert Mayer
6.	What plant is used in oxygen in photosynthes	an experiment common sis	ly performed in laborate	bry to demonstrate evolution of
	(1) Sunflower	(2) Hydrilla	(3) Croton	(4) Balsam
7.2a	Two plants A and B and following plants release	re supplied with CO_2 with CO_2 with O_2 with O	th H_2O^{18} and CO_2^{18} with prosynthesis	H_2O respectively. Which of the
	(1) A plant	(2) B plant	(3) Both (1) and (2)	(4) First (1) and then (2)
8.2	Isotopes popularly know	wn to have been used in	the study of photosynthe	sis are -
	(1) C ¹⁴ and O ¹⁸	(2) C ¹¹ and C ³²	(3) C^{16} and N^{15}	(4) P ³² andC ¹⁵
9.	During photosynthesis,	the oxygen in glucose c	omes from	
	(1) Water		(2) Carbon dioxide	
	(3) Both from CO_2 and v	water	(4) Oxygen in air	
10.	Molls experiment shows	S		
	(1) Unequal transpiration	on from two surfaces of le	eaf	
	(2) Relation between tra	anspiration and absorption	n	
	(3) CO_2 is required for μ	ntial for photosynthesis		
11.	(1) Etiolation	iark snow yellowing leave (2) Chlorosis	es and elongated interno (3) Dechlorosis	(4) Dark effect

12.	Which of the following r	epresents the correct mo	blecular formula of chloro	phyll-b
	(1) $C_{55}H_{72}O_6N_4Mg$	(2) $C_{55}H_{72}O_5N_4Mg$	(3) $C_{55}H_{72}O_4N_4Mg$	(4) $C_{55}H_{70}O_6N_4Mg$
13.	Which organelle contair	n vitamin E and K?		
	(1) Golgi bodies	(2) ER in nerve cell	(3) Chloroplast	(4) Mitochondria
14.১	The role of chlorophyll i	n photosynthesis is		
	(1) Photolysis of water		(2) To absorb light	
	(3) Photo Chemical con	version	(4) Dark assimilation	
15.๖	Which of the following e	equation can be more ap	propriate for photosynthe	esis
	(1) $6CO_2 + 6H_2O \frac{\text{Light}}{\text{Chlorophy}}$	\rightarrow C ₂ H ₁₂ O ₆ + 6O ₂	(2) $6CO_2 + 12H_2O \frac{Lig}{Chlore}$	$\xrightarrow{\text{ht}} C_6H_{12}O_6 + 6H_2O + 6O_2$
	(3) $12CO_2 + 6H_2O \frac{Lighted{Lighted{Chloro}}{Chloro}$	$\stackrel{\text{nt}}{\longrightarrow} 2\text{C}_{6}\text{H}_{12}\text{O}_{6} + 6\text{O}_{2}$	(4) None of these	
16.	How much percentage	of absorbed water is use	d in photosynthesis?	
	(1) 1%	(2) 5%	(3) 10%	(4) 90%
17.	The balance between C	O_2 and O_2 is brought abo	ut by	
	(1) Transpiration	(2) Photosynthesis	(3) C ₄ Pathway	(4) Photorespiration
18.১	During photosynthesis			
	(1) Both CO, and water	get oxidized		
	(2) Both CO, and water	get reduced		
	(3) Water is reduced an	d CO ₂ is oxidized		
	(4) Carbon dioxide get i	reduced and water get o	kidised	
19.	Grana refers to			
-	(1) Stacks of thylakoids	in plastids of higher plar	nts	
	(2) A constant in quantu	um equation		
	(3) Glycolysis of glucos	е		
	(4) By product of photos	synthesis		
20.	Assimilatory power refe	rs to		
	(1) Generation of ATP a	and NADPH ₂	(2) Reduction of CO_2	
	(3) Splitting of water		(4) Disintegration of pla	stids
21.	Leaves appear green b	ecause they		
	(1) Reflect green light		(2) Absorb green light	
	(3) Both reflect and abs	orb green light	(4) None of the above	
22.	Quantasomes contain			
	(1) 200 chlorophyll mole	ecules	(2) 230 chlorophyll mole	ecules
	(3) 250 chlorophyll mole	ecules	(4) 300 chlorophyll mole	ecules
23.১	Two chief functions of le	eaves are		
	(1) Photosynthesis and	respiration	(2) Photosynthesis and	transpiration
	(3) Transpiration and re	spiration	(4) Respiration and dige	estion

24.	For photosynthesis (i.e.	for synthesis of organic r (2) Chlorophyll	natter) the green plants i (3) CO_ and water	need only (4) All of these	
			$(0) OO_2$ and water		
25.১	 (1) Burning of sugar (3) Photosynthesis by p 	he following except	(2) Respiration in plants(4) On heating of limest	stone	
26.	In angiosperms, synthe (1) Phytochrome	sis of chlorophyll occurs (2) Light	in presence of (3) Cytochrome	(4) None of the above	
27.	Quantasomes are foun (1) Surface of cristae (3) surface of nuclear m	d in nembrane	(2) surface of plasma m(4) surface of thylakoids	nembrane S	
28.2	How many molecules reduced 6 molecules of	of water are needed by ${}^{2}CO_{2}$	ed by a green plant to produce one molecule of hexose		
	(1) 6	(2) 12	(3) 24	(4) One only	
29.	Number of thylakoids ir (1) 5-10	n a granum is (2) 2-100	(3) 100-150	(4) 150-200	
30.	Solarization is (1) Formation of chlorophyll (3) Utilization of sunlight		(2) Destruction of chlorophyll(4) Effects of solar light		
31.	Which of the following is photophosphorylation (1) Production of ATP from ADP (3) Synthesis of ADP from ATP		(2) Production of NADP (4) Production of PGA		
32. 33.	Phytol chain is present (1) Carotenoids Chlorophyll a and b sho (1) Blue region (3) Blue and red region	in (2) haemoglobin ows maximum absorption s	 (3) Chlorophyll in (2) Red region (4) Yellow and violet reg 	(4) Phycocyanin gions	
34.	Photosynthetic unit is (1) Glyoxysome	(2) Sphaerosome	(3) Microsome	(4) Quantasome	
35.≿	Which pigment is prese (1) Chlorophyll-a	ent universally in all greer (2) Chlorophyll-b	plants (3) Chlorophyll-c	(4) Chlorophyll-d	
36.24	Chl a absorbs max of (1) Red light	(2) Blue light	(3) Green light	(4) Yellow light	
37.	In bacteria, photosynthe (1) Cytoplasm	etic lamellae are situated (2) Chromoplast	in (3) Leucoplast	(4) Cell	
38.	Which of the following ((1) Violet	colours of light is maximu (2) Red	m used in photosynthesi (3) Green	s? (4) Yellow	
39.	The algae which is use	d in researches of photos	synthesis		

2.2

3.2

	(1) Chlorella	(2) Fucus	(3) Acetabularia	(4) Chlamydomonas	
40.	Which of the following p (1) Phytochrome	pigments inhibit the phote (2) Phytohormones	o-oxidation of chlorophyl (3) Phytocyanin	l (4) Phytocarotene	
41.	The bulk fixation of carl (1) Crop plants	bon through photosynthe (2) Tropical rain forests	esis takes place in 6 (3) Ocean	(4) Both (1) & (2)	
42.	The process in which energy released by oxid (1) Photoautotrophism	organisms do not requi dation of inorganic and o (2) Heterotrophism	re light and pigment and rganic substances is (3) Chemosvnthesis	d synthesize their food utilising (4) Saprophytism	
43.	Which of these is a motion of the set of th	lecule of bacteriochlorop (2) C ₅₅ H ₇₀ O ₆ N ₄ Mg	hyll -a (3) C ₅₅ H ₇₄ O ₆ N ₄ Mg	(4) C ₅₅ H ₇₂ O ₆ N ₄ Mg	
44.	Where is phytol group a (1) At 7–C	attached to chlorophyll? (2) At 5–C	(3) At 3–C	(4) At 9–C	
45.	Carbon dioxide is nece from entering a control (1) Distilled water (3) Calcium oxide	essary for photosynthesis apparatus is	 The chemical used to r (2) Sodium carbonate (4) Potassium hydroxid 	remove this gas most effectively le solution	
46.	For normal photosynthe (1) Phycocyanin and ch (3) Phycoerythrin and c	etic process in red algae hlorophyll –a chlorophyll –a	, the pigments are (2) Phycocyanin and c (4) Phycoerythrin and	hlorophyll –b chlorophyll –b	
47.	Match the Column Column I (Scientists) A. Peter Mitchell B. J. W. Gibbs C. Danial Arnon D. Melvin Calvin (1) $A = s, B = r, C = q, I$ (3) $A = s, B = t, C = r, D$	D = p D = q	Column II (Contributions) P. Steps of dark reaction q. Photosynthetic phose r. Concept of free ener s. Chemiosmotic hypothesis (2) $A = r$, $B = s$, $C = p$, (4) $A = s$, $B = r$, $C = p$,	on of photosynthesis sphorylation rgy hesis s D = q D = q	
	SECTION - B # Light reaction and ETS				

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

(1) Cytochrome	(2) iron -sulphur protein
(3) Ferredoxin	(4) Phaeophytin
DCMU	
(1) Inhibits PS-I	(2) Inhibits PS-II
(3) Destroy chloroplast	(4) Inhibits oxidative phosphorylation
NADPH ₂ is generated through	

	 (1) Glycolysis (3) Non-Cyclic photoph 	nosphorylation	(2) Cyclic photophosph (4) Anaerobic respiration	norylation on
4.	Photolysis of each wat (1) 2 electrons and 4 p (3)4 electrons and 3 pr	er molecule in light reacti rotons rotons	ion will yield (2) 4 electrons and 4 p (4) 2 electrons and 2 p	rotons rotons
5.	Photosystem-II occurs (1) Stroma (3) On surface of mitod	in chondria	(2) Grana (4) On cytochrome	
6.	Pigment system -I whic (1) Chlorophyll-683	ch receives radiant energ (2) Chlorophyll-673	y and releases electron (3) Chlorophyll-695	is (4) P-700
7.	During photochemical (1) Liberation of oxyge (2) Formation of ATP a (3) Liberation of O_2 and (4) Assimilation of CO_2	reactions of photosynthe n takes place and NADPH ₂ take place d formation of ATP and N takes place	sis IADPH ₂ take place	
8.#>	PS II C	$2H_2 \propto 4e^{-2}$ $4H^{+}+O_2$ c diagram, which is plasto	ocyanin (3) A	(4) B
9.	The 'Z' scheme of phot (1) Hill and Bendall	tosynthesis was propose (2) Emerson	d by (3) Arnon	(4) Rabinowitch and Govind ji
10.๖	Pigment(s) of PS-II are (1) P ₇₀₀ , chl 'a' and 'b' (3) P ₇₀₀ , chl 'a' and car	rotenoids	(2) P ₆₈₀ , chl'b' and phy (4) P ₆₈₀ , chl'a'	rcobilins
11.24	Minerals involved in ph (1) Mn, Cl, Ca	noto oxidation of water is (2) Mg, Fe, Mn	(3) Mn, Fe, Ca	(4) N, P, K
12.	Z-scheme in thylakoid (1) Reduction of NAD	membrane is concerned (2) Reduction of CO ₂	with (3) Electron transfer	(4) All of these
13.æ	Absorption of radiant e (1) Reduction of chloro (3) Absorption of CO ₂	nergy causes phyll	(2) Oxidation of chloro (4) Evolution of O ₂	phyll

14. What is called the red drop

(1) Rapid fall in quantum yield in light of more than 680 nm

(2) Rapid increased in quantum yield in light of less than 700 nm (3) Increase in quantum yield in light of more than 680 nm (4) None of the above 15. From which source charged molecule of P-680 gets the electron (1) From P-700 (3) From NADPH₂ (2) From water (4) None of the above 16.24 Assimilatory power produced during photosynthesis are (1) RuDP and RuMP (2) H_2O and O_2 (3) ATP and NADPH₂ (4) $C_6H_{12}O_6$ and PGAL SECTION - C # Dark Reaction C_3 -cycle, C_4 cycle, Photorespiration, **CAM - cycle and Factors** 1.28 Dimorphic chloroplasts are present in (1) Sugarcane (2) Cotton (3) Pea (4) Mango 2. Make suitable pair (A) Emerson effect (p) C₄ cycle (B) Hill reaction (q) Photolysis (C) Calvin's cycle (r) C_3 cycle (D) Hatch and slack cycle (s) Photosystem -I and II (1) Ap, Bq, Cr, Ds (2) Ap,Br,Cs,Dq (3) Ar, Bs, Cp, Dq (4) As, Bq, Cr, Dp 3. Plants adapted to low light intensity have (1) More extended root system (2) Leaves modified to spines (3) Larger photosynthetic unit size than sun plants (4) Higher rate of CO₂ fixation than the sun plants 4.2 The Calvin cycle proceeds in three stages 1. Reduction, during which carbohydrate is formed at the expense of the photochemically made ATP and NADPH₂ 2. Regeneration, during which the carbon dioxide acceptor ribulose-1, 5- biphosphate is formed 3. Carboxylation, during which carbon dioxide combines with ribuolse-1, 5-biphosphate Identify the correct sequence (3) 1 - 2 - 3(1) 3 - 1 - 2(2) 3 - 2 - 1(4) 2 - 1 - 35. First stable product of Calvin cycle has (1) 2 carbon atoms (2) 3 carbon atoms (3) 4 carbon atoms (4) 6 carbon atoms $\mathrm{CO}_{\scriptscriptstyle 2}$ joins the photosynthetic pathway during 6. (1) Light reaction (2) Dark reaction (3) Photosystem – I (4) Photosystem - II 7. Dark reaction of photosynthesis is called so because (1) It can also occur in dark (2) It does not require light (3) Cannot occur during day time (4) It occurs more rapidly in night The initial enzyme of Calvin cycle is 8.2 (1) Ribulose 1, 5 – diphosphate carboxylase (2) Triose phosphate dehyrogenase

(3) Phosphopentokinase

(4) Cytochrome oxidase

- 9. Calvin cycle occur in
 - (1) Chloroplasts (2) Cytoplasm

(3) Mitochondria

(4) Glyoxysomes

10.#> Choose the correct combinations of labelling of the carbohydrate molecules involved in the Calvin cycle.



(1)	(i) RuBP	(ii) Triose phosphate	(iii) PGA
(2)	(i) PGA	(ii) RuBP	(iii) Triose phosphate
(3)	(i) PGA	(ii) Triose phosphate	(iii) RuBP
(4)	(i) RuBP	(ii) PGA	(iii) Triose phosphate

- 11.How many Calvin cycles form one hexose molecule
(1) 2(2) 6(3) 4(4) 812.Number of carboxylation occur in calvin cycle, is
(1) 0(2) 1(3) 2(4) 3
- **13.** The family in which many plants are C_4 type

	(1) Malvaceae	(2) Solanaceae	(3) Crucifereae	(4) Gramineae
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14. The first carbon dioxide fixation in C_4 pathway occurs in chloroplasts of

(1) Guard cells (2) Mesophyll cells (3) Bundle sheath cells (4) Epidermal cells

- 15. In photorespiration , what is the role of peroxisome
 - (1) Help in oxidation of glycolate (2) Help in synthesis of serine
 - (3) Help in synthesis of PGA (4) Help in reduction of glyoxylate
- **16.** In C_4 plants, Calvin cycle occurs in
 - (1) Stroma of bundle sheath chloroplast
 - (2) Mesophyll chloroplast
 - (3) Grana of bundle sheath chloroplast
 - (4) Does not occur as CO_2 is fixed mainly by PEP and no CO_2 is left for Calvin cycle
- 17. Photorespiration is characteristic of

(1) CAM Plants (2) C_3 Plants (3) C_4 Plants (4) None of the a	(1) CAM Plants	(2) C_{3} Plants	(3) C_4 Plants	(4) None of the above
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18. Which of the following cycle shows oxaloacetic acid as first stable product(1) Calvin cycle(2) Hatch and Slack cycle

	(3) C_2 cycle		(4) None of the above	
19.১	Kranz type of anatomy (1) C. plants	is found in (2) C. plants	(3) C. plants	(4) CAM plants
20. ๖	 C₄ plants are adapted to (1) Hot and dry climate (3) Cold and dry climate 	e	(2) Temperate climate(4) Hot and humid climate	ate
21.	Dimorphism of chloropl	ast is found in		
	(1) C_4 plants	(2) C_{3} plants	(3) CAM plants	(4) All the above
22.১	In CAM cycle, during fo (1) Open	rmation of malic acid, sto (2) Closed	omata remains (3) Semi open	(4) Always closed
23.๖	Chloroplasts without gr (1) Bundle sheath cells (3) Bundle sheath cells	ana are known to occur i of C ₃ plants of C ₄ plants	n (2) Mesophyll cells of C (4) Mesophyll cells of a	C₄ plants Il plants
24.	Which crop utilizes sola (1) Potato	ar energy most efficiently (2) Sugarcane	? (3) Wheat	(4) Rice
25.	Which of the following i (1) Phosphoglycerate	s the main product in the (2) Phosphoglycolate	photorespiration of C_{3} p (3) Glycerate	lants (4) Glycolate
26.2	Which of the following p (1) CAM cycle	process shows light deac (2) C_3 cycle	idification and night acid (3) C_4 cycle	ification (4) All the above
27.	The first reaction in pho (1) Carboxylation	otorespiration is (2) Decarboxylation	(3) Oxygenation	(4) Phosphorylation
28.24	 Which one is false about Kranz anatomy (1) Bundle sheath have large chloroplast and no intercellular spaces (2) Mesophyll cells have large and more chloroplast (3) It is found in Atriplex, sugarcane, maize (4) Plant having it have better photosynthesizing power than C₃ plants 			
29.	Which factor is not limit (1) Temperature	ing in normal conditions (2) CO_2	for photosynthesis? (3) Water	(4) Chlorophyll
30.	Compensation point is (1) Where there is neith (2) When rate of photos (3) When entire food sy (4) When there is enou	ner photosynthesis nor re synthesis is equal to the r rnthesized in photosynthe gh water just to meet the	spiration rate of respiration esis is utilized requirements of plant	
31.2a	Q ₁₀ refers to (1) Quality quotient (Q. (3) Respiratory quotien	Q.) t (R.Q.)	(2) Temperature quotie (4) Quantum constant (ent (T.Q.) (Q.C.)

32.24	The isotope of carbon (1) C ¹⁴	used extensively for stud (2) C ¹⁶	ies on photosynthesis is (3) C ¹³	(4) C ¹⁵
33.	The C ₄ plants are differ (1) In consumption of A (2) In first product (3) The substrate that a (4) All the above	rent from the C ₃ plants w ATP molecules accept CO ₂ in carbon ass	ith reference to the	
34.æ	CO ₂ fixing enzyme in ((1) PEP carboxylase	C ₄ plants is (2) RUDP carboxylase	(3) RUDP oxidase	(4) Hydrogenase
35.>	Reducing agent for CC), fixation in bacterial pho	otosvnthesis is	
	(1) NADH ₂	(2) NADPH ₂	(3) FMNH ₂	(4) All of these
36.2	In photorespiration, rel	ease of CO ₂ occurs in		
	(1) Mitochondria	(2) Chloroplasts	(3) Peroxisomes	(4) All of these
37.	Inhibition of photosynth	nesis at high concentratio	n of O_2 is called	
	(1) Warburg effect	(2) Kutusky effect	(3) Pasteur effect	(4) Emerson effect
38.	Number of carboxylatio	on in photosynthesis in So (2) 2	orghum and Maize is	(4) 4
30	Where CO is fixed an	ain in Cuplants	(-) -	
55.	(1) Bundle sheath cell	s (2) Phloem cells	(3) Mesophyll cells	(4) All the above
40 ๖	Which of these can be	rform photosynthesis effe	ctively at high temperatu	re and low CO. concentration
-v. (3	(1) C_3 plant	(2) C_4 plant	(3) Both of above	(4) None of these
41.	The process in whicl peroxisome and oxidis	h excess molecule of g ed, is called-	glycolate passes out of	the chloroplast and enter in
	(1) Respiration	(2) Photosynthesis	(3) Photorespiration	(4) All of the above
		MISCELLANEO	US QUESTIONS	
1.	Maximum photosynthe	sis takes place in		
	(1) Phytoplanktons	(2) Zooplanktons	(3) Marshy plants	(4) Woody plants
2.	Products of photosynth	nesis are		
	(1) ATP	(2) NADPH ₂	(3) O ₂	(4) All the above
3.	In Maize, mesophyll ce	ells perform photosyntheti	c cycle	
	(1) C ₄	(2) C ₃	(3) C ₂	(4) C ₁
4.	Green plants do not gi	ve out CO ₂ during day tim	ne because they	
	(1) Store the same(3) Do not respire		(2) Respire very slowly(4) Consume it in photo	osynthesis.

5.2	Light energy performs f (1) Photolysis of water (3) Formation of ATP	ollowing function in PS-	II (2) Excitation of chlorop (4) Formation of NADP	bhyll H ₂
6.	During light reaction, It (1) Electron transfer	does not takes place (2) Liberation of O ₂	(3) Photolysis of water	(4) Liberation of H ₂
7.	Calvin cycle was discov (1) Spirogyra	vered in which plant (2) Volvox	(3) Chlamydomonas	(4) Chlorella
8.24	Electron acceptor of PS (1) Cyt b	S-II is (2) FRS	(3) PQ	(4) NADP+
9.	How many molecules o (1) One	f glycine are required to (2) Two	release one molecule of (3) Three	CO ₂ in photorespiration? (4) Four
10.๖	Which one is a CAM pla (1) Maize	ant (2) Pineapple	(3) Onion	(4) Pea
11.๖	Respiration initiated in chloroplasts and occurri (1) Aerobic respiration (3) Fermentation		ng in light is called (2) Anaerobic respiration (4) Photorespiration	
12.	Which one is a C_4 PLA	NT?		
	(1) Potato	(2) Mustard	(3) Onion	(4) Wheat.
13.	Solarisation is (1) Formation of chlorophyll (3) Utilisation of sunlight		(2) Destruction of chlorophyll(4) Effect of solar light.	
14.	Carbon assimilation oc	curs in bundle sheath cel	lls of (3) Caplants	(4) All the above
15	How much ovurgen is fo	$(2) \circ_4 \cdot iante$	and 216 g of H O	
15.	(1) 96 g	(2) 216 g	(3) 264 g	(4) 192 g.
16.	CAM plants belong to fa (1) Malvaceae	amily (2) Crassulaceae	(3) Trapaceae	(4) Orchidaceae.
17.æ	DCMU inhibits (1) PSII (3) Destroys chloroplas	t	(2) PSI (4) Inhibits oxidative ph	osphorylation.
18.	Chlorophyll a and chlorophyll has -CHO g (1) CH_3 in chl a and CH (3) Chl a had both CHC	prphyll b is distinguished proup and which has CH_3 (O in chl. b, D) and CH_3 group	 ed by the presence of -CHO and -CH₃ group. White group? (2) CHO in chl a and CH₃ in chl. b (4) None of the above 	

Exercise-2

 (1) Inner membrane of chloroplast (3) Thylakoid membrane 2. In an experimental setup, a group of C₃ and double the amount of CO₂ concentration. Wh 	 (2) Thylakoid space (4) Stroma a group of C₄ plants ich group of plants with (2) C₄ plants will be (4) None of these 	e were grown in an environment with ould grow better and be more water (FINBO)							
2. In an experimental setup, a group of C_3 and double the amount of CO_2 concentration. Wh	a group of C_4 plants ich group of plants we (2) C_4 plants will be th (4) None of these	were grown in an environment with ould grow better and be more water (FINBO)							
efficient?	(2) C_4 plants will be								
(1) C_3 plants will be better than C_4 plants	(1) C_3 plants will be better than C_4 plants (2) C_4 plants will be better than (3) Both C_3 and C_4 plants will show equal growth (4) None of these								
(3) Both $C_{_3}$ and $C_{_4}$ plants will show equal growth (4) None of these									
 Rubisco is an enzyme required for photosynth (i) C₃ Plants (ii) C₄ Plants (iii) CAM (Crassulacean Acid Metabolism) plants 	Rubisco is an enzyme required for photosynthesis in which of the following plants (i) C_3 Plants (ii) C_4 Plants								
(1) (i) only	(2) (i) and (ii) only								
(3) (i), (ii) and (iii)	(4) Neither (i), (ii) a	(4) Neither (i), (ii) and (iii)							
4. Which of the following are found in C, plants?		(4 th ABO)							
(i) Stomata (ii) The enzyme Rubis	co(iii) Bundle sheath cells								
(1) (i) only (2) (iii) only	(3) (i) and (ii) only	(4) (i), (ii) and (iii)							
5. The graph represents an		(1 st NSEB)							
Chlo	rophyll b irotenoids hlorophyll a								
(1) Absorption spectrum	(2) Action spectrum								
(3) Interference pattern	(4) Spectroscope								
6. The pigment found outside the chloroplast is		(NSEB 2010-2011)							
(1) anthocyanin (2) xanthophyll	(3) chlorophyll	(4) phycoerythrin							
 7. Carotenoids are generally long chain unsa correlate/s with the structures. i. They can absorb light of higher wavelength ii. It allows carotenoids to transfer energy to ch iii. To reduce free radicals iv. Long hydrocarbon chain allows carotenoids 	Carotenoids are generally long chain unsaturated hyrocarbons. Which of the following function/s correlate/s with the structures. (NSEB 2010-2011) i. They can absorb light of higher wavelength ii. It allows carotenoids to transfer energy to chlorophyll a molecule iii. To reduce free radicals								
excess light energy. (1) Only i (2) iii and iv	(3) Only ii	(4) i and iii							

PLANT PHYSIOLOGY - II

8.	A plant biochemist received a specimen from a fellow scientist who noticed that the plant's stomata are closed during the day. The biochemist observed that radioactive carbon supplied in the form of carbon dioxide fed to the plant at night was first found in organic acids that accumulated in the vacuole. During the day: the label moved to sugars being manufactured in the chloroplast. What was the conclusion of								
	the day; the label move the biochemist?	ed to sugars being man	utactured in the chloropla	ast. What was the (NSE	E conclusion of B 2010-2011)				
	(1) It is a CAM plant		(2) It is a C_4 plant						
	(3) It is a $C_{_3}$ plant		(4) It is a plant showing	g pentose phosph	ate pathway				
9.	A student wants to test the correct order:	t the presence of starch	in a leaf. Select the requ	a leaf. Select the required steps and arrange them in (NSEB 2010-2011)					
	(i) Boiling the leaf in eth	nanol (90%)	(ii) Keeping the plant in	n dark					
	(iii) Washing the leaf w	ith hot water	(iv) Addition of iodine s	olution					
	(1) (ii) \rightarrow (i) \rightarrow (iii) \rightarrow (iv)	(2) (ii) \rightarrow (i) \rightarrow (iv) \rightarrow (i	ii)					
	(3) (ii) \rightarrow (iii) \rightarrow (iv) \rightarrow ((i)	(4) (iii) \rightarrow (i) \rightarrow (ii) \rightarrow (iv)						
10.	Of the following pigments found in plants which one are not concerned with photosynthesis?								
				(NSE	EB 2011-2012)				
	(1) chlorophylls .	(2) anthocyanins	(3) phycobilins	(4) carotenoids					
11.	During photosynthesis,	light energy :			(KVPY 2007)				
	(1) Is converted to cher	nical energy	(2) Is converted to kine	tic energy					
	(3) Is the catalyst		(4) Dissociates CO ₂ dir	ectly					
12.	On a normal sunny day	v, rate of photosynthesis	(per unit time) is maximu	ım during:	(KVPY 2007)				
	(1) Early morning		(2) Between late morning to before noon						
	(3) Midday		(4) Late evening						
13.	The amount of CO_2 in p	plant is greater at night t	han during the day becau	ISE:	(KVPY 2008)				
	(1) The rate of respirati	on is higher at night.							
	(2) More CO ₂ is produc	ed because it is colder o	during the night.						
	(3) Photosynthesis duri	ing the day uses up som	ne of the CO, produced by	v respiration.					
	(4) More glucose is ava	ailable for respiration du	ring the night						
14	Which one of the follow	ing colors is the LEAST	useful for plant life?		(KVPY 2011)				
	(1) red	(2) blue	(3) green	(4) violet					

	Exercise	.3			
	PART - I : N	 EET / AIPMT QUI	ESTION (PREVIO		5)
1.24	For fixing one molecule (1) 3 ATP + 1 NADPH ₂	e of CO ₂ in Calvin cycle, a $_2$ (2) 3 ATP + 2NADPH ₂	are required (3) 2ATP + 3NADPH ₂	(4) 3 ATP + 3	(AIPMT-2000) NADPH ₂
2.	First reaction in photos (1) Photolysis of water (3) Formation of ATP	ynthesis is	(2) Excitation of chlorop (4) Fixation of CO ₂	(AIPMT-2000)	
3.	Energy from light react (1) ADP	ion is transferred to dark (2) ATP	reaction is the one that is (3) Chlorophyll	s absorbed by (4) RuBP	(AIPMT-2002)
4.	Which fractions of the higher plants (1) Blue & green	visible spectrum of solar (2) Green & red	radiations are primarily (3) Red & violet	absorbed by ca (4) Violet & blu	arotenoids of the (AIPMT-2003) Je
5.24	Stomata of CAM plants (1) Are always open (3) Open during night a	s and close during day	(2) Open during day an (4) Never open.	d close at night	(AIPMT-2003)
6.24	Which one of the follow (1) ADP + AMP <u>Light</u>	ving concerns photophos ^{energy} → ATP	phorylation (2) ADP + Inorganic PC	D_4 Lightenergy \rightarrow	(AIPMT-2003) ATP
	(3) ADP + Inorganic PC	$D_4 \longrightarrow ATP$	(4) AMP + Inorganic PC	D ₄ Lightenergy	ATP
7.	Which one is wrong in (1) It occurs in chloropl (3) It is characteristic o	photorespiration lasts f C ₄ plants	(2) It occurs in day time (4) It is characteristic o	(AIPMT-2003)	
8.	Which element is locate (1) Calcium	ed at the centre of the po (2) Magnesium	rphyrin ring in chlorophy (3) Potassium	ll (4) Manganes	(AIPMT-2003) e
9.	In sugarcane plant ¹⁴ C	O ₂ is fixed in malic acid,	during which the enzyme	e that fixes CO ₂	is
	(1) RUBP carboxylase (3) Ribulose phosphate	e kinase	(2) PEP carboxylase (4) Fructose phosphata	ase	(AIPMT-2003)
10. 🕿	The first step in dark re (1) Formation of ATP (2) Attachment of carbo (3) Excitement of an el- (4) Ionisation of water.	(AIPMT-2004)			
11.	In C_3 plants, the first st	able product of photosyn	thesis during the dark re	action is	(AIPMT-2004)
16	(1) Malic acid(3) 3-phosphoglyceric a	acid	(2) Oxaloacetic acid(4) Phosphoglyceraldel	hyde	
12.	In chloroplasts, chlorop	onyll is present in			(AIPMT-2004)

	(1) outer membrane	(2) inner membrane	(3) thylakoids	(4) stroma				
13.	As compared to sun pla (1) High rate of CO ₂ fix (3) More extended root	ants, plants adapted to lo ation system	w light intensity possess (2) Larger photosynthe (4) Spiny leaves.	(AIPMT-2004)				
14.æ	During photo respiratio (1) Stroma of chloropla (3) Stroma of chloropla	n oxygen consuming read sts sts and peroxisomes	ction (s) occur in (2) Stroma of chloropla (4) Grana of chloroplas	(AIPMT-2005) ndria mes.				
15.	Carbohydrates, the mo (1) Some bacteria, alga (3) All bacteria, fungi an	st abundant biomolecules ae and green plants nd algae	s on earth are produced (2) Fungi, algae and gro (4) Viruses, fungi and b	by een plants acteria.	(AIPMT-2005)			
16.	Malic acid is formed in	C_4 plants in the cells of			(AIPMT-2007)			
	(1) Epidermis	(2) Bundle sheath	(3) Phloem	(4) Mesophyll				
17.	In leaves of C ₄ plants n (1) Bundle sheath (3) Guard cells		(AIPMT-2008)					
18.๖	The C_4 plants are photo (1) The CO_2 efflux is no (2) They have more chi (3) The CO_2 compensation (4) CO_2 compensation	se	(AIPMT-2008)					
	(4) CO_2 generated duri	ng photorespiration is tra	pped and recycled throu	gn PEP carboxy	lase.			
19.	Electrons from excited (1) Quinone	chlorophyll molecule of p (2) Cytochrome-b	hotosystem II are accept (3) Ferredoxin	ted first by (4) Cytochrom	(AIPMT-2008) e-f			
20.১	Cyclic photophosphory (1) ATP	lation results in the forma (2) NADPH	ation of (3) ATP and NADPH	(4) ATP, NADI	(AIPMT-2009) PH and O ₂			
21.24	 C₄ plants are more efficient in photosynthesis than C₃ plants due to (1) Presence of larger number of chloroplasts in the leaf cells (2) Presence of thin cuticle (3) Lower rate of photorespiration (4) Higher leaf area 							
22.	PGA as the first CO ₂ fix	kation product was discov	vered in photosynthesis of	of	(AIPMT-2010)			
	(1) Gymnosperm	(2) Angiosperm	(3) Alga	(4) Bryophyte				
23.2	Kranz anatomy can be (1) Sorghum	observed in leaves of (2) Spinach	(3) Mustard	(4) Tulip	(AIPMT-2011)			
24.	Light reaction in stroma	a lamellae of the chloropla (2) ATP + NADPH	ast results in the formatic	on of (4) O	(AIPMT-2011)			
25.	In leaves of C_4 plants m	··/ ···2	(AIPMT-2011)					

PLANT PHYSIOLOGY - II

	(1) Bundle sheath	(2) Mesophyll	(3) Epidermis	(4) Guard cells				
26.	Of the total incident sol (1) About 70%	ar radiation the proportio (2) About 60%	n of PAR is: (3) Less than 50%	(AIPMT Pre2011) (4) More than 80%				
27. ๖	In Kranz anatomy, the I (1) Thin walls, many int (2) Thick walls, no inter (3) Thin walls, no inter (4) Thick walls, many in	(AIPMT mains-2011)						
28.	Which one of the follow (1) Manganese	lysis of water? (3) Copper	(AIPMT mains-2011) (4) Boron					
29.	CAM helps the plants in (1) Conserving water (3) Disease resistance	n:	(2) Secondary growth (4) Reproduction	(AIPMT Pre2011)				
30.১	Best defined function o (1) Photolysis of water	f Manganese in green pla (2) Calvin cycle	ants is: (3) Nitrogen fixation	(AIPMT-2012) (4) Water absorption				
31.	A process that makes i (1)Transpiration	mportant difference betw (2) Glycolysis	een C_3 and C_4 plants is: (3) Photosynthesis	(AIPMT-2012) (4) Photorespiration				
32.১	Anoxygenic photosyntl (1) <i>Rhodospirillum</i>	nesis is characteristic of: (2) <i>Spirogyra</i>	(3) Chlamydomonas	(AIPMT-2014) (4) <i>Ulva</i>				
33.24	A few normal seedling become white- coloure	of tomato were kept in d like albions, which of th	a dark room.After few te following terms will you	days they were found to have u use to describe them? (AIPMT-2014)				
	(1) Mutated	(2) Embolised	(3) Etiolated	(4) Defoliated				
34.	Chromatophores take p (1) Growth (3) Respiration	part in :	(2) Movement (4) Photosynthesis	(Re-AIPMT-2015)				
35.	The oxygen evolved during photosynthesis comes from water molecules. Which one of the follow pairs of elements is involved in this reaction? (Re-AIPMT-201 (1) Manganese and Potassium (2) Magnesium and Molybdenum (3) Magnesium and Chloring (4) Manganese and Chloring							
36.	Photosynthesis the ligh (1) Photosystem-I	take place at : (3) Stromal matrix	(Re-AIPMT-2015) (4) Thylakoid lumen					
37.	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?							
	(1) Nitrogen fixer	(2) C ₃	(3) C ₄	(4) CAM				
38.	Emerson's enhanceme (1) Oxidative phosphor	nt effect and Red drop h	ave been instrumental in	the discovery of: (NEET-I-2016)				

	 (2) Photophosphorylation and non-cyclic electron transport (3) Two photosystems operating simultaneously (4) Photophosphorylation and cyclic electron transport 									
39.	(4) PhotophosphoryIn a chloroplast the h(1) Antennae completion(3) Lumen of thylako	ation and cyclic electron highest number of proton ex ids	(2) Stroma (4) Inter membrane s	are found in: (2) Stroma (4) Inter membrane space						
40.	The process which n (1) respiration	nakes major difference b (2) glycolysis	etween C_3 and C_4 plants (3) Calvin cycle	is (4) photores	(NEET-II-2016)					
41.	Oxidative phosphorylation is (NEET-II-2016) (1) formation of ATP energy released from electrons removed during substrate oxidation (2) formation of ATP by transfer of phosphate group from a substrate to ADP. (3) oxidation of phosphate group in ATP (4) addition of phosphate group to ATP									
42	Phosphoenol pyruva (1) C₃ plants	te (PEP) is the primary ((2) C4 plants	CO ₂ acceptor in: (3) C ₂ plants	(4) C₃ and C	(NEET-2017) 4 plants					
43	 With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct? (NEET-2017) (1) Light saturation for CO₂ fixation occurs at 10% of full sunlight. (2) Increasing atmospheric CO₂ concentration up to 0.05% can enhance CO₂ fixation rate (3) C₃ plants respond to higher temperatures with enhanced photosynthesis while C₄ plants have much lower temperature optimum. (4) Tempto is a greenbourge group which can be grown in CO₃ enriched atmosphere for higher yield 									
44	Which of the followin	g is <i>not</i> a product of ligh	t reaction of photosynthe	sis?	(NEET-2018)					
45	 (1) ATF Oxygen is <i>not</i> prodution (1) Green sulphur bat (3) <i>Cycas</i> 	ced during photosynthes	(3) NADPH sis by (2) Chara (4) Nostoc	(4) NADU	(NEET-2018)					
	PART	- II : AIIMS QUES		S YEARS)						
1.	Chemical which abso (1) Xanthophyll	orbs light energy and cha (2) Chlorophyll a	anges it to chemical ener (3) Chlorophyll b	gy is (4) Chloroph	(AIIMS-2000) yll c.					
2.	Photorespiration in C	$C_{_3}$ plants starts from			(AIIMS-2003)					

(1) phosphoglycerate (2) phosphoglycolate (3) glycerate (4) glycine
 3. Hill reaction occurs in (AIIMS-2003)
 (1) high altitude plants (2) total darkness
 (3) absence of water (4) presence of ferricyanide

4. Which one of the following categories of organisms do not evolve oxygen during photosynthesis?

(AIIMS-2004)

	(1) red algae (3) C_4 plants with Kranz anatomy				ıy	(2) photosynthetic bacteria(4) blue green algae			
5.	What i (1) 200	s PAR ra 0 nm - 80	ange? 00 nm	(2) 400) nm - 700 nm	(3) 350 nm - 550 nm	(4) 600 nm - 1	(AIIMS-2007) 00 nm	
6.	What i (1) Ab (3) Sto	s commo ility to m prage of a	on betwe ultiply a f starch, p	en chlor fission-lil roteins a	roplasts, chromo ke process and lipids	noplasts and leucoplasts(AIIMS-200(2) Presence of pigments(4) Possession of thylakoids and grana.			
7.	Which (1) It is (2) Th (3) PS (4) PS	of the fo s active o e reactio -I is redu -I is invo	ollowing i only upto n centre uced by t lved in n	s the ch 680 nm of PS- I he elect on-cyclio	aracteristic of PS of light is P680 rons released in c photophosphoi	S-I. photolysis of water rylation.		(AIIMS-2009)	
8.	 The enzyme decarboxylase catalyses the following step (1) conversion of citric acid to cis aconitic acid (2) fumaric acid to malic acid (3) oxalosuccinic acid to α-ketoglutaric acid (4) malic acid to oxaloacetic acid 							(AIIMS-2009)	
9.24	Match the columns. Column I (Scientists) A. Stephen Hales B. Ingen Housz C. Von Mohl D. Sach				(AIIMS-2 Column II (Discoveries) i. Importance of light and chlorophyll ii. Presence of chlorophyll in plants iii. Product of photosynthesis is starch iv. Air and light control plant growth				
10 >=	(1) (2) (3) (4)	A iv iii ii iv	B i ii iii iii	C ii iv ii	D iii iv i i			(AIIMS-2010)	
10.24	(1) PS	І	losphory	(2) PS	ll	(3) PS I and PS II	(4) P ₆₈₀	(AIIIVI3-2010)	
11.	The first stable product of Calvin (1) 3-phosphoglycerate (3) glyceraldehyde - 3 phosphat				n cycle is te	(2) 1, 3 biphosphoglyc (4) ribulose - 5- phosp	erate hate	(AIIMS-2010)	
12.	Photos (1) pig (3) Bo	synthetic ment sys th (1) an	: bacteria stem I d (2)	a have		(2) pigment system II (4) some other kind of	pigments, B ₈₉₀	(AIIMS-2011)	
13.	Consid (A) AT	der the fo P forma	ollowing tion durir	statemei ng photo	nts regarding phosynthesis is term	otosynthesis. ned as photophosphoryl	ation.	(AIIMS-2015)	

	(B) Kranz anatomy pertains to leaf								
	(C) Reduction of NAD	P⁺ to NADPH occurs du	ring Calvin cycle.						
	(D) In a chlorophyll mc	ecule magnesium is pr	esent in phytol tail. Of the	e above statemer	nts				
	(1) A and B are correct	t	(2) C and D are corre	ct					
	(3) A and C are correc	t	(4) A and D are corre	ct					
14.	How much portion of the	ne Photosynthetically A	ctive Radiation (PAR) is o	captured by the p	lants?				
					(AIIMS-2016)				
	(1) 5-10 %	(2) 7-10%	(3) 8-10 %	(4) 2-10%					
15.	Photosynthesis in C_4 p	lants is relatively less lir	mited by atmospheric CC	D_{2} levels because					
		ertains to leaf DP+ to NADPH occurs during Calvin cycle. nolecule magnesium is present in phytol tail. Of the above statements ct (2) C and D are correct ect (4) A and D are correct the Photosynthetically Active Radiation (PAR) is captured by the plants? (AIIMS-2016) (2) 7-10% (3) 8-10% (4) 2-10% plants is relatively less limited by atmospheric CO ₂ levels because (AIIMS-2016) pumping of CO ₂ into bundle sheath cells ants has higher affinity for CO ₂ e the primary initial CO ₂ fixation products on of CO ₂ mediated <i>via</i> PEP carboxylase powing complex, proton is pumped to reach ATP synthase, to participate in ATP							
	(1) There is effective p	umping of CO ₂ into bun	dle sheath cells						
	(2) RuBisCO in C_4 plar	nts has higher affinity for	r CO ₂						
	(3) 6-carbon acids are	the primary initial CO ₂ f	ixation products						
	(4) The primary fixation	n of CO ₂ mediated <i>via</i> P	EP carboxylase						
16.	By which of the follow	ving complex, proton is	s pumped to reach ATP	synthase, to pa	articipate in ATP				

- synthesis?
- (1) Cytochrome $b_6 f$ (2) Cytochrome c oxidase
- (3) Cytochrome $a a_3$ (4) Cytochrome bc

(AIIMS-2016)

Answers													
						FXFR		. 1					
SECTION - A													
1. 8. 15. 22. 29. 36. 43.	 (3) (1) (2) (2) (2) (2) (3) 	2. 9. 16. 23. 30. 37. 44.	 (1) (2) (1) (2) (2) (1) (1) 	3. 10. 17. 24. 31. 38. 45.	 (2) (3) (2) (4) (1) (2) (4) 	4. 11. 25. 32. 39. 46.	 (4) (1) (4) (3) (3) (1) (3) 	5. 12. 19. 26. 33. 40. 47.	 (1) (4) (1) (2) (3) (4) (1) 	6. 13. 20. 27. 34. 41.	 (2) (3) (1) (4) (4) (3) 	7. 14. 21. 28. 35. 42.	(1) (3) (1) (2) (1) (3)
SECT	ION - B	•	(0)	•	(0)		(4)	-		•	(4)	-	(0)
1. 8. 15.	(4) (2) (2)	2. 9. 16.	(2) (1) (3)	3. 10.	(3) (4)	4. 11.	(4) (1)	5. 12.	(2) (3)	ь. 13.	(4) (2)	7. 14.	(3) (1)
SECT	ION - C												
1. 8. 15. 22. 29. 36.	(1) (1) (1) (1) (4) (1)	2. 9. 16. 23. 30. 37.	 (4) (1) (1) (3) (2) (1) 	3. 10. 17. 24. 31. 38.	 (3) (4) (2) (2) (2) (2) 	4. 11. 18. 25. 32. 39.	 (1) (2) (2) (4) (1) (1) 	5. 12. 19. 26. 33. 40.	(2) (2) (3) (1) (4) (2)	6. 13. 20. 27. 34. 41.	(2) (4) (1) (3) (1) (3)	7. 14. 21. 28. 35.	(2) (2) (1) (2) (1)
				Ν	NISCEL	LANE	OUS Q	UESTI	ONS				
1. 8. 15.	(1) (3) (4)	2. 9. 16.	(4) (2) (2)	3. 10. 17.	(1) (2) (1)	4. 11. 18.	(4) (4) (1)	5. 12.	(2) (3)	6. 13.	(4) (2)	7. 14.	(4) (2)
						EXER	CISE -	- 2					
1. 8.	(3) (1)	2. 9.	(2) (1)	3. 10.	(3) (2)	4. 11.	(4) (1)	5. 12.	(1) (3)	6. 13.	(1) (3)	7. 14.	(2) (3)
						EXER	CISE -	3					
						PA	ART- I						
1. 8. 15. 22. 29. 36. 43.	(2) (2) (1) (3) (1) (3) (3)	2. 9. 16. 23. 30. 37. 44.	(2) (2) (4) (1) (1) (3) (4)	3. 10. 17. 24. 31. 38. 45.	(2) (2) (3) (4) (3) (1)	4. 11. 18. 25. 32. 39.	 (4) (3) (2) (2) (1) (3) 	5. 12. 19. 26. 33. 40.	 (3) (3) (1) (3) (3) (4) 	6. 13. 20. 27. 34. 41.	(2) (2) (1) (2) (4) (1)	7. 14. 21. 28. 35. 42.	 (3) (1) (1) (4) (2)
		•		•		PA	ART- II	-		•		-	
1. 8. 15.	(2) (3) (4)	2. 9. 16.	(2) (1) (1)	3. 10.	(4) (1)	4. 11.	(2) (1)	5. 12.	(2) (4)	ь. 13.	(1) (1)	7. 14.	(4) (4)