Chapter: 11

Bioenergeties

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Objective

1. Chlorophyll a is:

Ⓐ Orange green **Ⓑ Blue green** Ⓒ Yellow green dark Ⓓ Yellow green

2. Correct molecular formula for chlorophyll " a " is:

Ⓐ $C_{55}H_{72}O_4N_5Mg$ **Ⓑ $C_{55}H_{72}O_5N_4Mg$** Ⓒ $C_{55}H_{70}O_5N_4Mg$ Ⓓ $C_{55}H_{70}O_5N_5Mg$

3. Which chloropylls are found in algae and photosynthetic plants?

Ⓐ c and b Ⓑ A and b Ⓒ a and c **Ⓓ a , b , c and d**

4. Which wavelengths are mainly absorbed by chlorophyll?

Ⓐ Green and blue Ⓑ Red and indigo
Ⓒ Violet and orange **Ⓓ Violet blue and orange red**

5. Magnesium is an important nutrient in green plants as it is an essential component of:

Ⓐ Chlorophyll Ⓑ Hemoglobin Ⓒ Protein **Ⓓ Glucose**

6. Magnesium is present in which part of chlorophyll?

Ⓐ Haem portion **Ⓑ Porphyrin ring** Ⓒ Pyrrole ring Ⓓ Phyto tail

7. Which statement about chlorophyll a is not true?

Ⓐ It contains phytol tail Ⓑ It contains magnesium
Ⓒ It contains porphyrin ring **Ⓓ It contains terminal carbonyl group**

8. The colour of chlorophyll b is:

Ⓐ Blue - green Ⓑ Orange - red Ⓒ Orange - green **Ⓓ Yellow - green**

9. Photosyntheis is a ..... process.

Ⓐ Oxidize **Ⓑ Redox** Ⓒ Both A & B Ⓓ None of these

10. The process of photosynthesis consists ..... parts.

Ⓐ 4 Ⓑ 3 **Ⓒ 2** Ⓓ 1

11. Photosystem II has the form of chlorophyll a which absorbs best light of:

Ⓐ 690 nm **Ⓑ 680 nm** Ⓒ 700 nm Ⓓ 670 nm

12. Chlorophyll " a " of photosystem I absorbs maximum light of:

Ⓐ 680 nm Ⓑ 690 nm **Ⓒ 700 nm** Ⓓ 670 nm

13. The products of photosynthetic light reactions are:

Ⓐ ATP and NADPH Ⓑ ATP and NAD
Ⓒ ATP , NADPH and O_2 Ⓓ ATP and NADH

14. Light can work in photosynthesis if only it is:

Ⓐ Transmitted Ⓑ Refracted **Ⓒ Absorbed** Ⓓ Reflected

15. Haem portion of hemoglobin contains an atom of:

Ⓐ Magnesium Mg^{++} **Ⓑ Iron Fe^{++}** Ⓒ Calcium Ca^{++} Ⓓ Phosphorus K^{++}

16. Plastocyanin protein contains:

(A) Iron (B) Potassium
(C) Copper (D) Magnessium

17. Which is stimulus for cyclic phosphorylation?

(A) Low O_2 (B) Low NADPH (C) Low ATP (D) Low CO_2

18. Water splitting process of photosynthesis releasing oxygen is called:

(A) Hydrolysis (B) Photolysis (C) Electrolysis (D) Glycolysis

19. Which of the following is electron carrier?

(A) Plastoquinone (B) All of these (C) Cytochromes (D) Plastocyanin

20. An enzyme NADP reductase transfers electrons from:

(A) Fd to NADPH (B) Fd to ADP (C) Fd to NADP (D) NADP to Fd

21. Each photon of light excites:

(A) 3 electrons (B) Many electrons (C) 2 electrons (D) Single electrons

22. What is not produced during cyclic electron flow?

(A) NADPH (B) Both A & D (C) ATP (D) Oxygen

23. Cyclic phosphorylation happens when the chloroplast runs low on ..... for Calvin cycle:

(A) ATP (B) NADP (C) NADPH (D) ADP

24. Haem portion of haemoglobin is also a porphyrin ring but containing an iron atom instead Of:

(A) Sulpher atom (B) Nitrogen atom
(C) Magnesium atom (D) Potassium atom

25: Which metal atom is present in chlorophyll:

(A) Cu (B) Fe (C) Mg (D) K

26. Calvin cycle is also known as:

(A) C Pathway (B) C Pathway (C) C Pathway (D) C Pathway

27. The dark reaction occurs in:

(A) Gran (B) Chloroplast (C) Cytoplasm (D) Stroma

28. The breaking of terminal phosphate of ATP releases energy of about:

(A) 3.7 Kcal (B) 7.3 Kcal (C) 6.5 Kcal (D) 4.5 Kcal

29. The chemical link between catabolism and anabolism is:

(A) NAD (B) RNA (C) ATP (D) DNA

30. Energy transformation in living system follows the principal of:

(A) Bioenergetics (B) Biochemistry (C) Thermodynamics (D) Biophysics

31. The presence of free oxygen made possible the evolution of:

(A) Photosynthesis (B) Respiration (C) Dark reaction (D) Man

32. Respiration mean to exchange of respiration gases (CO_2 ans O_2) between the organism and its environment . The exchange is called:

(A) External respiration (B) Internal respiration
(C) None (D) Both A and B

33. The most common fuel used by the cell to provide energy is:

Ⓐ Lactic acid Ⓑ Amino acid Ⓒ ATP **Ⓓ Glucose**

34. During aerobic respiration glucose is oxidized to:

Ⓐ CO_2 **Ⓑ All of these** Ⓒ Energy Ⓓ Water

35. Before pyruvate enter the citric acid cycle, it is decarboxylated, oxidized and combined with coenzyme A, forming acetyl CoA, carbon dioxide and one molecule of:

Ⓐ ATP Ⓑ $FADH_2$ **Ⓒ NADH** Ⓓ NAD

36: All are correct for photosynthesis except:

Ⓐ It uses CO_2 Ⓑ It occurs during daytime
Ⓒ It uses oxygen Ⓓ It uses water

37. Photosynthesis is:

Ⓐ Oxidative process **Ⓑ Redox process** Ⓒ Reductive process Ⓓ Catabolic process

38. At this moment there is no net gas exchange between the leaves and the atmosphere. This is termed as:

Ⓐ Respiration Ⓑ Photosyntheis Ⓒ None of these **Ⓓ Compensation**

39. Chlorophylls are insoluble in:

Ⓐ Carbon tetra chloride **Ⓑ Water** Ⓒ Acetone Ⓓ Alcohol

40. Van Neil hypothesized that source of O during photosynthesis in plants is:

Ⓐ NADP Ⓑ Chlorophyll **Ⓒ Water** Ⓓ Carbon dioxide

41. Oxygen released during photosynthesis comes from:

Ⓐ Glucose Ⓑ Chalorophyll **Ⓒ Water** Ⓓ CO_2

42: What is unrelated to light reactions?

Ⓐ ATP is produced in it Ⓑ NADPH is produced in it
Ⓒ It can occur in dark Ⓓ It can occur in light only

43. In respiratory chain NAHD is oxidized by:

Ⓐ Cytochome " b " Ⓑ Cofactor **Ⓒ Coenzyme** Ⓓ Cytochrome " C "

44. During respiratory chain, how many molecules of ATP are produced upon oxidation of one Molecule of $FADH_2$?

Ⓐ 1 Ⓑ 4 Ⓒ 3 **Ⓓ 2**

45. The correct sequence of cytochrome in electron transport chain is:

Ⓐ a , a_3 , b , c **Ⓑ b , c , a , a_3** Ⓒ b , c , a_3 , a Ⓓ a_3 , a , c , b

46. How many molecules of ATP are produced upon oxidation of NADH in respiratory chain?

Ⓐ 1 Ⓑ 2 **Ⓒ 3** Ⓓ 4

47. Engelmann used in his experiment in 1883:

Ⓐ Aerobic bacteria Ⓑ Anaerobic bacteria Ⓒ Spirogyra **Ⓓ Both A & C**

48. The first action spectrum was obtained by:

Ⓐ Ernst Haecket **Ⓑ T.W.Engelmann** Ⓒ Melvin Calvin Ⓓ Van Neil

49. Carbon dioxide enters the leaves through:

(A) Stomata (B) Air spaces (C) Cuticle (D) Epidermis

50. Daily rhythmic opening and closing of stomata is:
(A) External clock (B) Both Internal and External
(C) Internal clack (D) None of these

51. Absorption of blue light is maximum at:
(A) 750 mm (B) 670 mm (C) 430 mm (D) 380 mm

52. In the first step of the citric acid cycle , acetyl CoA reacts with oxaloacetate to form:
(A) ATP (B) NADH (C) Citrate (D) Pyruvate

53. When deprived of oxygen , yeast cells obtain energy by fermentation producing carbon dioxide , ATP , and:
(A) Lactate (B) Acetyl CoA (C) Ethyl alcohol (D) Pyruvate

54. For the synthesis of one molecule of glucose Calvin cycle operate how many times?
(A) Four times (B) Thrice (C) Twice (D) Once

55. The amount of glucose into ATP during anaerobic respiration is:
(A) 4 % (B) 3 % (C) 1 % (D) 2 %

56. Formula of lactic acid is:
(A) C_3H_5OH (B) $C_3H_5O_3$ (C) $C_3H_6O_3$ (D) $C_3H_4O_3$

57. In the absence of oxygen , yeast cells obtain energy by fermentation , producing CO_2 , ATP And:
(A) Pyruvate (B) Lactate (C) Acetyl . Co - A (D) Ethanol

58: Which of the following occurs in the absence of oxygen?
(A) Aerobic respiration (B) Alcoholic fermentation
(C) Alcoholic & Lactic acid fermentation (D) Lactic acid fermentation

59. In Yeast pyruvic acid is converted to:
(A) Lactic acid (B) Methyl alcohol (C) Ethyl alcohol (D) Acetic acid

60. During fermentation , how much amount of energy present within the glucose is converted into ATP?
(A) 100 % (B) 90 % (C) 2 % (D) 1 %

61. The compound formed during muscle fatigue is:
(A) Lactic acid (B) Citric acid (C) Carbon dioxide (D) Alcohol

62. Glycolysis is the breakdown of glucose up to the formation of:
(A) ATP (B) Sulphuric acid (C) NAD (D) Pyruvic acid

63. Most abundant protein on earth is:
(A) Fibrinogen (B) Rubisco (C) Albimen (D) Haemoglobin

64. Pyruvic acid is produced as a result of:
(A) Glycolysis (B) Phosphorylation (C) Respiratory chain (D) Krebs cycle

65. Glucose molecules split into two molecules of ..... during glycolysis.
(A) Pyruciv acid (B) Acetyl CoA (C) G3P (D) Acetic acid

66: Glycolysis occurs in which part of the cell?

Ⓐ Thylakoid membrane
Ⓑ Stroma
Ⓒ Cytosol
Ⓓ Mitochondrial matrix

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Subjective

Q1: **What is thylakoid?**

Ans: In photosynthetic organisms, chloroplasts have vesicles a wall of which bears photosynthetic pigments, called thylakoid. They vary in form and arrangement in different groups of organisms.

Q2: **What is the function of stomata?**

Ans: Stomata are pores present in the epidermis of plants in large numbers, particularly in leaves, through which gaseous exchange takes place.

Q3: **Define bioenergetics.**

Ans: The study of energy transfer in living beings is called bioenergetics.

Q4: **Give approximate estimate of chloroplasts in a green leaf.**

Ans: The number of chloroplasts is about half a million per square millimeter of the leaf surface.

Q5: **What does the absorption spectrum of a pigment mean?**

Ans: A graph showing the absorption of light of different wavelength by a pigment is called its absorption spectrum.

Q6: **What is the source of energy used on earth?**

Ans: Almost all the energy used on earth comes directly from the sun.

Q7: **How much of the total photosynthesis take place in water and on land?**

Ans: Of the total photo synthesis 90 % takes place in water and 10 % on land.

Q8: **What does a photo system of photosynthesis cell consist of?**

Ans: A photo system consists of a light gathering antenna complex and a reaction center.

Q9: **Give definition of glycolysis.**

Ans: Glycolysis is the conversion of glucose by means of enzymes and co-enzymes till the formation of pyruvic acid.

Q10: **Write down the first step in Krebs cycle?**

Ans: The first step in the Krebs cycle is the union of acetyl CoA with oxaloacetate to form citrate.

Q11: **Name two solvents of chlorophyll?**

Ans: The solvents of chlorophyll are carbon tetrachloride and alcohol.

Q12: **What is FAD abbreviation for?**

Ans: Fad is abbreviation for flavin adenine dinucleotide.

Q13: **What is the net production of ATP during glycolysis?**

Ans: The net production of ATP during glycolysis is two molecules of ATP.

Q14: **Where does Krebs cycle take place in the cell?**

Ans: The Krebs cycle takes place in the mitochondria of the cell.

Q15: **How does light affect opening and closing of stomata?**

Ans: The stomata open in light and close in darkness.

Q16: **Define grana.**

Ans: In chloroplasts group of disc-shaped, flattened vesicles stacked like coins in a pile, vesicle membranes bearing photosynthetic pigments are called grana. They are most highly developed in chloroplasts of higher plants.

Q17: **Name the chain of acids which are formed in a cycle, starting from the citrate, during the Krebs cycle of respiration.**

Ans: The chain is from citrate to a-ketoglutorate to succinate to fumarate to malate and finally to oxaloacetate.

Q18: **Who and when was awarded Nobel Prize for his work on dark reactions in photosynthesis?**

Ans: Melvin Calvin was awarded Nobel Prize in 1961 for his work on dark reactions on photosynthesis.

Q19: **What is chemiosmosis in photosynthesis?**

Ans: The synthesis of ATP by obtaining the energy through electrons of the electron transport chain is called chemiosmosis.

Q20: **What is Z.scheme in photosynthesis?**

Ans: The path of electrons through the photo systems during non-cyclic photo-phosphorylation is known as Z-scheme from its shape.

Q21: **Who obtained first action spectrum and when?**

Ans: A German biologist T.W. Engelmam obtained first action spectrum in 1883 using spirogyra.

Q22: **What is the role of accessory pigments in light absorption?**

Ans: The accessory pigments absorb light and transfer the energy to chlorophyll "a" which then initiates the light reactions.

Q23: **What are the colors of chlorophylls 'a' and 'b'?**

Ans: The colors of chlorophyll 'a' is blue-green while that of chlorophyll 'b' is yellow-green.

Q24: **Which wavelength of the light spectrum are least absorbed by the chlorophyll?**

Ans: Green and yellow wavelength are least absorbed by the chlorophylls.

Q25: **What is the approximate number of chloroplasts in each mesophyll cell of the leaf?**

Ans: It is about 20 to 1000 per mesophyll cell.

Q26: **What are the different kinds of chlorophyll and where are these found?**

Ans: Chlorophyll a,b,c and d are found in eukaryotic photosynthetic plants and algae while the other found in photosynthetic bacteria are known as bacteria chlorophylls.

Q27: **What are the end products of light reactions?**

Ans: These are ATP and NADPH.

Q28: **Write down molecular formula of chlorophyll's 'a' and 'b'.**

Ans: Molecular formula of chlorophyll's 'a' and 'b':

- Chlorophyll 'a' $C_{55}H_{72}O_5N_4Mg$
- Chlorophyll 'b' $C5_5H_{70}O_6N_4Mg$

Q29: **What is the source of oxygen released during photosynthesis in plants?**

Ans: The source of oxygen released during photosynthesis in plants is the water.

Q30: **Write down the summarized equation for photosynthesis.**

Ans:

$$_6CO_2 + _{12}H2_O \xrightarrow{\text{Light}} C_6H1_2O_6 + _6O_2 + _6H_2O$$

Q31: **Write difference between Chlorophyll a and Chlorophyll b.**

Ans: Difference between Chlorophyll a and Chlorophyll b:

	Chlorophyll A	**Chlorophyll B**
Molecular formula **Functional group** **Occurrence**	$C_{55}H_{72}O_5N_4Mg$ $-CH_3$ All photosynthetic organism except photosynthetic bacteria	$C_{55}H_{70}O_6N4Mg$ –CHO In association with chlorophyll a in all green plants and green algae
Forms	Differ slightly in their red absorbing peaks e.g., 670,680,690,700 nm	No such different forms
Color	Blue-green	Yellow-green

Q32: **How does absorption spectrum of chlorophyll a differ from that of chlorophyll b?**

Ans: The molecular formula fro chlorophyll a and b are:

- Chlorophyll A $C_{55}H_{72}O_5N_4Mg$
- Chlorophyll B $C_{55}H_{70}O_6N_4Mg$

Due to this slight difference in their structure, the two chlorophylls show slightly different absorption spectra and hence different colors. Some wave length not absorbed by chlorophyll a are very effectively absorbed by chlorophyll b and vice-versa.

Such differences in structure of different pigments increase the range of wavelength of the light absorbed. Chlorophyll a is blue- green while chlorophyll b is yellow-green.

Q33: **How did the evolution of photosynthesis affect the metabolic pathway?**

Ans: With the emergence of photosynthesis on earth, molecular oxygen began to accumulate slowly in the atmosphere. The presence of free oxygen made possible the evolution of respiration.

Respiration releases great deal of energy, and some of this energy is used in the formation of adenosine triphosphate (ATP) molecules. ATP is a kind of chemical link between catabolism and anabolism.

Q34: **What is the location of ETC and chemiosmosis in photosynthesis and cellular respiration?**

Ans: Thylakoid membranes in photosynthesis, and mitochondrial membranes in cellular respiration.

Q35: **What is the main difference between photo-phosphorylation and oxidative phosphorylation?**

Ans: Synthesis of ATP in the presence of light is called photo-phosphorylation while synthesis of ATP int the presence of oxygen is called oxidative phosphorylation.

Q36: **What is the net production of ATP during glycolysis?**

Ans: 10 ATP are produced but 2 ATP are used in the beginning so there is a net gain of 8 ATP molecules.

Q37: **What is the difference between an action spectrum and absorption spectrum?**

Ans: Difference between an action spectrum and absorption spectrum:

Action Spectrum:

- Different wavelengths are not only differently absorbed by photosynthetic pigments but are also differently effective in photosynthesis. Plot showing relative effectiveness of different wavelengths of light in arriving photosynthesis is called action spectrum of photosynthesis.

Absorption Spectrum:

- A graph plotting absorption of light of different wavelength by a pigment is called absorption spectrum of the pigment. The peaks represent the light that is absorbed by the pigment, while the valleys represent the light that is reflected or transmitted.

Q38: **Trace the fate of hydrogen atoms removed from glucose during glycolysis when oxygen is present in muscle; compare this to the fate of hydrogen atoms removed from glucose when the amount of the available oxygen is insufficient to support aerobic respiration.**

Ans: When oxygen is present in muscle cells, the hydrogen atoms removed from glucose during glycolysis are carried to respiratory chain but in the absence of oxygen they are used in alcoholic or lactic acid fermentation.

Q39: **Sum up how much energy (as ATP) is made available to cell from a single glucose molecule by the operation of glycolysis, the formation of acetyl CoA the citric acid cycle, and the electron transport chain.**

Ans: For each glucose molecule that is completely broken down to CO_2 and H_2O molecules by the sequential actions of glycolysis, the Krebs cycle, and respiratory electron transport, 38 ATP molecules can be formed.

2 ATP molecules are obtained during glycolysis, 2 during Krebs cycle and 34 during respiratory chain.

Q40: **Explain the roles of the following in aerobic respiration: (a) NAD and FAD (b) Oxygen.**

Ans: NAD and FAD are the co-enzymes which help enzymes to carry out the reactions during aerobic respiration, whereas oxygen accepts the H atoms and make water in the last step of respiratory chain.

Q41: **How is the formation of Vitamin A linked with eating of carrot?**

Ans: Carrots contain carotenoids which are the precursors of vitamin A. This is why the formation of vitamin A is linked with eating of carrot.

Q42: **Why are the carotenoids usually not obvious in the leaves? They can be seen in the leaves before leaf fall. Why?**

Ans: The carotenoids are usually not obvious in the leaves as their yellowish color is covered by dark green color of chlorophyll. But just before leaf fall, the chlorophyll is destroyed and carotenoids can be seen.

Q43: **Define organismic and cellular respiration.**

Ans: **Organismic Respiration:**

It is also known as breathing or ventilation during which moist surface absorbs oxygen from the surrounding and carbon dioxide is removed. Organismic respiration in fact provides the basis of cellular respiration.

Cellular Respiration:

The cellular respiration is directly involved in the production of energy, necessary for all living activities. Cellular respiration is the process by which cell utilizes oxygen, produce carbon dioxide, extracts and conserves the energy from food molecules in biologically useful form such as ATP.

Cellular respiration in cells consists of three steps i.e., glycolysis, Krebs cycle and electron transport chain.The glycolysis takes place in the cytoplasm while other two steps are carried out in the mitochondria.

Q44: **Compare Haemoglobin with Myoglobin?**

Ans: Comparison between Haemoglobin with Myoglobin:

Hemoglobin	Myoglobin
➢ It is found in blood.	➢ It is found in muscles.
➢ It transfers oxygen from lungs to blood then to tissues.	➢ It transfers oxygen from hemoglobin to and aerobic respiring muscle cells.
➢ It cannot store oxygen.	➢ It can store oxygen.
➢ It consists of four polypeptide chains associated with an iron containing ring structure.	➢ It consists of one polypeptide chains associated with an iron containing ring structure.

Q45: **Write down the differences between light and dark reaction.**

Ans: Difference between Light and Dark Reaction:

Light Reaction	Dark Reaction
➢ Occur in grana of chloroplast	➢ Occurs in matrix of chloroplast
➢ Light is required	➢ Light is not required
➢ O_2, ATP and $NADPH_2$ are the end products	➢ In Calvin cyclic, ATP and $NADPH_2$ uesd to prepare carbohydrates

Q46: **Compare cyclic and non-cyclic phosphorylation.**

Ans: Comparison between Cyclic and Non-cyclic:

Non-Cyclic	Cyclic
➢ Electrons are not reused	➢ Electrons are reused Light
➢ It involves both PS I and II	➢ It involves only PS I
➢ It is long circuit	➢ It is short circuit
➢ It is normal process	➢ It generates only ATP

Q47: **What causes the variation of osmotic potential in the guard cells?**

Ans: Photosynthesis causes the variations of osmotic potential in the guard cells, by use and disuse of water. If photosynthesis is going on, water is being used causing an increase in osmotic potential and movement of water into guard cells.

On the other hand when there is no photosynthesis, there will be no use of water so it accumulates in guard cells, thus decreasing osmotic potential and water may move out of the guard cells.

Q48: **How does light affect opening of stomata?**

Ans: Guard cells are the only photosynthesizing cells of lower epidermis. So in the presence of light, photosynthesis starts and water is used. More water moves into guard cells form surroundings cells, they become turgid, and the inner thick walls bend outwards at the center, thus they produce an opening or pore.

It would happen when osmotic potential of guard cells becomes less then that of surrounding epidermal cells. It means light is the driving force for opening of stomata.

Q49: **How much a water medium is denser than air medium for exchange of respiratory gases?**

Ans: Water medium is 8000 times denser than air medium for exchange of respiratory gases.

Q50: **What are the products which are produced during photorespiration?**

Ans: Glycolate, glycine, serine.

Q51: **How does air always remain in the lungs of human beings?**

Ans: About 1.5 liter air always remain in the lungs of human beings.

Q52: **How much carbon dioxide is present in venous and arterial blood?**

Ans: Arterial blood contains about 50 ml of carbon dioxide per 100 ml of blood while venous blood contains about 54 ml.

Q53: **Write down the differences between photorespiration and Calvin cycle.**

Ans:

Photorespiration	Calvin Cycle
➢ Oxygen is fixed	➢ Carbon dioxide is fixed
➢ Carbon dioxide is produced	➢ Carbon dioxide is fixed
➢ Oxygenase is involved	➢ Oxygen is produced
➢ It retards growth	➢ It promotes growth

Q54: **Compare which medium, water or air is better for oxygen?**

Ans:

Feature	Water	Air
Oxygen contents	10 ml O_2 / liter	200 ml O_2 / liter
Rate of diffusion	Less	More (8000 times water)
Viscosity	More (50 times)	Less
Density	More (8000 times)	Less
Ventilation	Difficult	Easy

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Imp.Long Questions

Q1: Prove that water is the source of oxygen during photosynthesis.

Q2: Describe water as important reactant of photosynthesis. (v.imp)

Q3: Explain the chloroplast as the "sites of photosynthesis" in plants.

Q4: Photosynthetic pigments (Chlorophyll & Carotenoids) Write down differences between chlorophyll "a" and chlorophyll "b".

Q5: Describe the role of CO_2 in photosynthesis.

Q6: Write mechanism of light dependent ractions/ Non-cyclic phosphorylation.

Q7: Draw and label Z-scheme/non-cyclic phosphorylation. (v.imp)

Q8: Describe in detail cylic photophosphorylation.

Q9: Describe chemiosmosis in detail.

Q10: Sketch and describe Calvin cycle. (v.imp)

Q11: Write a note on Calvin Cycle.

Q12: Skectch and describe glycolysis. (v.imp)

Q13: Write a detailed note on citric acid or Kreb cycle.

Q14: Give the outline of Krebs cycle. (Description is not required). (v.imp)

Q15: Write a note on respiratory chain.

Q16: Describe respiratory electron transport chain.