

Unit 6: Bioenergetics

Multiple Choice Questions

MULTIPLE CHOICE QUESTIONS (EXERCISE)

1. What main process occurs during the dark reaction of photosynthesis?

- (a) Release of oxygen
- (b) Energy absorption by chlorophyll
- (c) Adding of hydrogen to CO_2
- (d) Formation of ATP

2. What is TRUE about glycolysis?

- (a) It produces no ATP
- (b) It takes place only in aerobic respiration
- (c) It takes place in the mitochondrion
- (d) It reduces 2 molecules of NAD^+ for every glucose molecule processed

3. Which of the following are produced by the reactions that occur in the thylakoid and consumed by the reactions that occur in the stroma?
 - (a) CO_2 and H_2O
 - (b) Glucose and O_2
 - (c) NADP^+ and ADP
 - (d) ATP and NADPH
4. When deprived of oxygen, yeast cells obtain energy by fermentation, producing CO_2 , ATP and;
 - (a) Acetyl CoA
 - (b) Ethyl Alcohol
 - (c) Lactic Acid
 - (d) Pyruvic Acid
5. Conversion of Glucose 6-phosphate into Fructose 6-phosphate is;
 - (a) Isomerization
 - (b) Polymerization
 - (c) Condensation
 - (d) Phosphorylation
6. In which of the following conversions, ATP is produced?
 - (a) Alpha ketoglutaric acid into succinyl CoA
 - (b) Succinyl CoA into succinic acid
 - (c) Succinic acid into fumaric acid
 - (d) Fumaric acid into malic acid
7. In electron transport chain, FADH_2 produces how many ATPs?
 - (a) One
 - (b) Two
 - (c) Three
 - (d) Four
8. Which of these is CO_2 acceptor during photosynthesis?
 - (a) Malic acid
 - (b) Ribulose biphosphate
 - (c) Oxaloacetic acid
 - (d) Phosphoglyceric acid
9. Which of the following takes the electrons lost by Photosystem I on absorption of light energy?
 - (a) Ferredoxin
 - (b) Cytochrome
 - (c) Cytochrome a-3
 - (d) Plastocyanin
10. Photosystem-II makes up the electrons lost due to light excitation by taking up the electrons released from,
 - (a) Ferredoxin
 - (b) $\text{NADPH} \cdot \text{H}^+$
 - (c) Plastocyanin
 - (d) Photolysis of water

SLO BASED MULTIPLE CHOICE QUESTIONS

Photosynthesis

11. Nearly all the energy used by living organisms on earth comes from:
 - (a) Photosynthesis
 - (b) Respiration
 - (c) Alcoholic Fermentation
 - (d) Lactic acid fermentation
12. Which is the energy currency of cell:
 - (a) ATP
 - (b) water
 - (c) glucose
 - (d) Fat
13. The breaking of one phosphate bond release how much energy.
 - (a) 4.3 Kcal
 - (b) 5.3 Kcal
 - (c) 6.3 Kcal
 - (d) 7.3 Kcal
14. Cells get energy from which process of food
 - (a) Digestion
 - (b) Oxidation
 - (c) Respiration
 - (d) Excretion
15. Which of the following is included in reactant side of photosynthesis?
 - (a) Water
 - (b) Oxygen
 - (c) Glucose
 - (d) Nitrogen
16. At which movement there is no net gas exchange between leaves and atmosphere:
 - (a) Saturation period
 - (b) Compensation point
 - (c) End point
 - (d) Starting point

17. Plants convert how much solar energy into chemical energy
(a) 1-2% (b) 3-4%
(c) 5-6% (d) 6-7%
18. The effectiveness of different wavelength of light is determined in terms of:
(a) Absorption spectrum
(b) Active spectrum
(c) Broad spectrum
(d) Narrow spectrum
19. The entry of CO_2 into the leaves is dependent upon
(a) Opening of stomata
(b) External humidity
(c) Water availability
(d) Intensity of light
20. Source of O_2 during process of photosynthesis is:
(a) Light (b) CO_2
(c) H_2O (d) Glucose
21. In photosynthesis water is split during the process
(a) Hydrolysis
(b) Photolysis
(c) Analysis
(d) Chemolysis
22. What serves as reducing power for the reduction of CO_2 to form sugar
(a) NADPH (b) NADP
(c) FADH_2 (d) FAD
23. Chlorophyll is what type of molecule
(a) Protein (b) Lipid
(c) Vitamin (d) Carbohydrate
24. The central atom of chlorophyll molecule is.
(a) Mg^{++} (b) Ca^{++}
(c) Fe^{+2} (d) N^+
25. A molecule of chlorophyll consists of a hydrophilic head and
(a) Hydrophobic tail
(b) Hydrophilic tail
(c) Oxidative tail
(d) Reductive tail
26. Chlorophyll absorb mainly.
(a) Violet – blue and orange – red
(b) Violet – green and indigo – red
(c) Yellow green and yellow – red
(d) Yellow red and orange – red
27. Head of chlorophyll molecule is made of:
(a) Porphyrin ring
(b) Carbon ring
(c) Nitrogen ring
(d) Hydrocarbon ring
28. Porphyrin ring of chlorophyll molecule consists of how many pyrrole rings:
(a) 1 (b) 2
(c) 3 (d) 4
29. In chlorophyll-a, the second pyrrole ring has
(a) CH_3 group (b) CHO group
(c) NH_2 group (d) COOH group
30. Carotenoids absorb light energy in which regions:
(a) Blue Green (b) Yellow Green
(c) Yellow Red (d) Red Green
31. Phycobilins are accessory pigments found in:
(a) Plants (b) Cyanobacteria
(c) Bacteria (d) Fungi
32. A graph showing different wavelengths absorbed by a pigment is called
(a) Absorption spectrum
(b) Broad spectrum
(c) Active spectrum
(d) Narrow spectrum
33. Photosystems of photosynthesis pigments are embedded in.
(a) Cristae (b) Lamella
(c) Thylakoid (d) Stroma
34. Each photosystem consists of a light gathering
(a) Antenna complex
(b) Chloroplast complex
(c) Grana complex
(d) Cytochrome complex

35. Photosystem I has which chlorophyll-a molecule in its reaction centre
 (a) p600 (b) p650
 (c) p700 (d) p750
36. Reaction centre of PS-II has chlorophyll-a, which absorbs best light of
 (a) 500 nm (b) 580 nm
 (c) 600 nm (d) 680 nm
37. The light dependent reaction takes place on:
 (a) Thylakoid membrane (b) Cristae
 (c) F1-particles (d) Stroma
38. Light independent reactions take place in the
 (a) Stroma of chloroplast
 (b) Matrix of mitochondria
 (c) Lumen of Golgi apparatus
 (d) Granum of thylakoids
39. Which is not part of light dependent reactions of photosynthesis
 (a) Absorption of light energy
 (b) Excitation of electrons
 (c) Photophosphorylation
 (d) Oxidative phosphorylation
40. What is not true for non-cyclic photophosphorylation?
 (a) PS-I and PS-II participate
 (b) Two electron chains are involved
 (c) Only ATPs are produced
 (d) Both ATP and NADPH are produced
41. The main source of atmospheric oxygen is:
 (a) Respiration (b) Photosynthesis
 (c) Water (d) Photorespiration
42. ATPs are produced through the process of
 (a) Chemiosmosis (b) Reverse osmosis
 (c) Photolysis (d) Analysis
43. The zigzag pathway taken by electrons through PS-II and PS-I and electron transport chain is called:
 (a) P-Scheme (b) Z-scheme
 (c) C-scheme (d) F-scheme
44. Cyclic photophosphorylation occurs when Calvin cycle slows down and:
 (a) NADPH accumulation
 (b) ATP accumulation
 (c) NADPH deficiency
 (d) Nitrogen deficiency
45. There is no production of NADPH and oxygen during
 (a) Non-cyclic photophosphorylation
 (b) Cyclic photophosphorylation
 (c) Oxidative phosphorylation
 (d) Oxidation and reduction
46. During chemiosmosis which structures coupled the redox reaction with synthesis of ATP?
 (a) Thylakoid membrane
 (b) Cell membrane
 (c) F1-particles
 (d) Cristae
47. Light independent reactions occur in:
 (a) Thylakoid
 (b) Granum
 (c) Matrix
 (d) Stroma
48. What is true for dark reactions?
 (a) Can occur only in dark
 (b) Can occur in presence as well as in absence of light
 (c) Can occur only in the presence of light
 (d) Can occur in chloroplast as well as in mitochondria
49. Carbon fixation refers to the initial incorporation of CO₂ into:
 (a) Organic material
 (b) Inorganic compound
 (c) Mesophyll cell
 (d) Lumen of thylakoid
50. The most abundant protein on earth is
 (a) Rubisco (b) Actin
 (c) Myosin (d) Tropomyosin
51. Calvin cycle is also known as:
 (a) C-2 pathway (b) C-3 pathway
 (c) C-5 pathway (d) C-6 pathway

52. During reduction phase of Calvin cycle how many NADPH are used:

- (a) 1 (b) 3
(c) 6 (d) 9

Cellular Respiration

53. Almost all cells in all organisms use it as energy source:

- (a) Glucose (b) Starch
(c) Protein (d) Vitamin

54. During glycolysis, glucose molecule is split into two molecules of:

- (a) Acetyl CoA
(b) Pyruvate
(c) Phosphoenol pyruvate
(d) Ethanol pyruvate

55. The energy of 2ATPs is equivalent to

- (a) 10.6 Kcal
(b) 14.6 Kcal
(c) 24.6 Kcal
(d) 34.6 Kcal

56. As a result of anaerobic respiration one glucose molecule yields only two ATPs which equals to about how much of energy present in it.

- (a) 2% (b) 4%
(c) 6% (d) 8%

57. In yeast during alcoholic fermentation pyruvic acid is further broken down into alcohol and

- (a) CO₂ (b) O₂
(c) N₂ (d) NH₃

58. Which process occurs in muscle cells of humans during extreme physical activities and insufficient oxygen

- (a) Alcoholic fermentation
(b) Aerobic respiration
(c) Lactic acid fermentation
(d) Photophorylation

59. During aerobic respiration glucose is completely oxidized into:

- (a) CO₂+H₂O
(b) Pyruvate + H₂O
(c) Alcohol + CO₂
(d) Lactic acid +CO₂

60. Enzymes of glycolysis are

- (a) Present on crista of mitochondria
(b) Thylakoid of chloroplast
(c) Dissolved in stroma
(d) Dissolved in cytoplasm

61. Which process is common both in photosynthesis and respiration:

- (a) Glycolysis
(b) Pyruvic acid oxidation
(c) Krebs cycle
(d) Electron transport chain and chemiosmosis

62. Which is not essential of glycolysis?

- (a) Oxygen (b) Enzymes
(c) Glucose (d) Aerobic condition

63. Which of the following are interconverted during glycolysis

- (a) Glucose-6-PO₄ and Fructose-6-PO₄
(b) Dihydroxy acetone PO₄ and glyceraldehyde 3-PO₄
(c) 3 Phosphoglyceric acid and 2 phosphoglyceraldehyde
(d) Pyruvate and Phosphoenol pyruvate

64. In which of glycolysis Glucose is converted into Glucose-6-PO₄:

- (a) 1st step (b) 2nd step
(c) 3rd step (d) 4th step

65. Pyruvic acid can also be turned back into glucose by reversing glycolysis, the process called as:

- (a) Reverse glycolysis
(b) Reverse osmosis
(c) Gluconeogenesis
(d) Lactic acidosis

66. Before entry into Krebs's cycle Pyruvic acid is activated to:

- (a) Acetyl CoA (b) Pyruvate
(c) Oxaloacetate (d) Succinyl CoA

67. Another name for Krebs's cycle is:

- (a) Citric acid cycle
(b) Carbon acid cycle
(c) Lactic acid cycle
(d) Phosphoric acid cycle

68. All steps of citric acid cycle occur in

- (a) Cytosol (b) Mitochondria
(c) Chloroplast (d) Peroxisomes

69. First stable compound of Krebs cycle is

- (a) Citric acid
(b) Ketoglutaric acid
(c) α Succinic acid
(d) Fumaric acid

70. How many NADH molecules are formed during Krebs cycle

- (a) 1 (b) 2
(c) 3 (d) 4

71. During electron transport chain the electrons from reduced coenzymes are finally transferred to:

- (a) Cytochrome-a (b) Cytochrome-c
(c) Oxygen (d) Cytochrome-a₃

72. How many molecules of ATP are generated during Krebs cycle

- (a) None (b) One
(c) Two (d) Three

73. Oxidation of one molecule of NADH produces how many ATPs.

- (a) One (b) Two
(c) Three (d) Four

74. In substrate level phosphorylation, ATP is produced by:

- (a) Enzyme (b) Chemiosmosis
(c) Reduction (d) Oxidation

Photorespiration

75. Photorespiration occurs in green cells in:

- (a) Absence of light
(b) Presence of light
(c) Presence of water
(d) Presence of light CO₂

76. Photorespiration involves mitochondria chloroplast and:

- (a) Lysosomes (b) Peroxisomes
(c) Glyoxisomes (d) Ribosomes

77. Plants of warmer climates deal with the problem of photorespiration by:

- (a) C-2 photosynthesis
(b) C-3 photosynthesis
(c) C-4 photosynthesis
(d) C-5 photosynthesis

78. CAM metabolism is present in:

- (a) Cacti (b) Mango
(c) Rose (d) Mustard

★79. Which pathway occurs in CAM plants:

- (a) C-3 pathway
(b) C-4 pathway
(c) C-3 and C-4 pathway
(d) C-2 pathway

ANSWER KEY

1.	c	2.	d	3.	d	4.	b	5.	a	6.	b	7.	b
8.	b	9.	a	10.	d	11.	a	12.	a	13.	d	14.	c
15.	a	16.	b	17.	a	18.	b	19.	a	20.	c	21.	b
22.	a	23.	b	24.	a	25.	a	26.	a	27.	a	28.	d
29.	a	30.	a	31.	b	32.	a	33.	c	34.	a	35.	c
36.	d	37.	a	38.	a	39.	d	40.	c	41.	b	42.	a
43.	b	44.	a	45.	b	46.	a	47.	d	48.	b	49.	a
50.	a	51.	b	52.	c	53.	a	54.	b	55.	b	56.	a
57.	a	58.	c	59.	a	60.	d	61.	d	62.	a	63.	b
64.	a	65.	c	66.	a	67.	a	68.	b	69.	a	70.	c
71.	c	72.	b	73.	c	74.	a	75.	b	76.	b	77.	c
78.	a	79.	c										