CHAPTER 14

Respiration in Plants

14.2 Glycolysis

1. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalysed by
   (a) phosphofructokinase
   (b) aldolase
   (c) hexokinase
   (d) enolase. *(NEET 2019)*

2. What is the role of NAD^+ in cellular respiration?
   (a) It functions as an enzyme.
   (b) It functions as an electron carrier.
   (c) It is a nucleotide source for ATP synthesis.
   (d) It is the final electron acceptor for anaerobic respiration. *(NEET 2018)*

3. In glycolysis, during oxidation electrons are removed by
   (a) ATP
   (b) glyceraldehyde-3-phosphate
   (c) NAD^+
   (d) molecular oxygen. *(2004)*

4. At the end of glycolysis, six carbon compound ultimately changes into
   (a) ethyl alcohol (b) acetyl Co-A
   (c) pyruvic acid (d) ATP. *(1996)*

5. The first phase in the breakdown of glucose, in animal cell, is
   (a) fermentation (b) Krebs' cycle
   (c) glycolysis (d) ETS. *(1994)*

6. End product of glycolysis is
   (a) acetyl CoA
   (b) pyruvic acid
   (c) glucose 1-phosphate
   (d) fructose 1-phosphate. *(1990)*

14.3 Fermentation

7. In which one of the following processes CO_2 is not released?
   (a) Aerobic respiration in plants
   (b) Aerobic respiration in animals
   (c) Alcoholic fermentation
   (d) Lactate fermentation *(2014)*

8. The energy-releasing metabolic process in which substrate is oxidised without an external electron acceptor is called
   (a) glycolysis
   (b) fermentation
   (c) aerobic respiration
   (d) photorespiration. *(2010, 2008)*

9. In alcohol fermentation
   (a) triose phosphate is the electron donor while acetaldehyde is the electron acceptor
   (b) triose phosphate is the electron donor while pyruvic acid is the electron acceptor
   (c) there is no electron donor
   (d) oxygen is the electron acceptor. *(2003)*

10. The end product of fermentation are
    (a) O_2 and C_2H_5OH
    (b) CO_2 and acetaldehyde
    (c) CO_2 and O_2
    (d) CO_2 and C_2H_5OH. *(1997)*

11. Which of the following products are obtained by anaerobic respiration from yeast?
    (a) Beer and wine (b) Alcohols
    (c) CO_2 (d) All of these *(1996)*

12. When yeast ferments glucose, the products obtained are
    (a) ethanol and CO_2
    (b) methanol and CO_2
    (c) ethanol and water
    (d) water and CO_2. *(1994)*

14.4 Aerobic Respiration

13. The number of substrate level phosphorylations in one turn of citric acid cycle is
    (a) zero (b) one
    (c) two (d) three. *(NEET 2020)*

14. Where is respiratory electron transport system (ETS) located in plants ?
(a) Mitochondrial matrix
(b) Outer mitochondrial membrane
(c) Inner mitochondrial membrane
(d) Intermembrane space *(Odisha NEET 2019)*

15. Which of these statements is incorrect?
(a) Enzymes of TCA cycle are present in mitochondrial matrix.
(b) Glycolysis occurs in cytosol.
(c) Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms.
(d) Oxidative phosphorylation takes place in outer mitochondrial membrane. *(NEET 2018)*

16. Which statement is wrong for Krebs' cycle?
(a) There is one point in the cycle where FAD^+ is reduced to $FADH_2$.
(b) During conversion of succinyl CoA to succinic acid, a molecule of GTP is synthesised.
(c) The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid.
(d) There are three points in the cycle where NAD^+ is reduced to $NADH + H^+$. *(NEET 2017)*

17. Oxidative phosphorylation is
(a) formation of ATP by transfer of phosphate group from a substrate to ADP
(b) oxidation of phosphate group in ATP
(c) addition of phosphate group to ATP
(d) formation of ATP by energy released from electrons removed during substrate oxidation.
(NEET-II 2016)

18. Cytochromes are found in
(a) cristae of mitochondria
(b) lysosomes
(c) matrix of mitochondria
(d) outer wall of mitochondria. *(2015 Cancelled)*

19. In mitochondria, protons accumulate in the
(a) outer membrane
(b) inner membrane
(c) intermembrane space
(d) matrix. *(Mains 2011)*

20. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is
(a) isocitrate dehydrogenase
(b) malate dehydrogenase
(c) succinate dehydrogenase
(d) lactate dehydrogenase. *(2007)*

21. In which one of the following do the two names refer to one and the same thing?
(a) Krebs' cycle and Calvin cycle
(b) Tricarboxylic acid cycle and citric acid cycle
(c) Citric acid cycle and Calvin cycle
(d) Tricarboxylic acid cycle and urea cycle *(2003)*

22. Cytochrome is
(a) metallo flavo protein
(b) Fe containing porphyrin pigment
(c) glycoprotein
(d) lipid. *(2001)*

23. Which one of the following statements about cytochrome P_{450} is wrong?
(a) It is a coloured cell.
(b) It is an enzyme involved in oxidation reactions.
(c) It has an important role in metabolism.
(d) It contains iron. *(1998)*

24. Which of the following is the key intermediate compound linking glycolysis to the Krebs' cycle?
(a) Malic acid (b) Acetyl CoA
(c) NADH (d) ATP *(1997)*

25. In Krebs' cycle, the FAD precipitates as electron acceptor during the conversion of
(a) fumaric acid to malic acid
(b) succinic acid to fumaric acid
(c) succinyl CoA to succinic acid
(d) α-ketoglutarate to succinyl CoA. *(1997)*

26. The correct sequence of electron acceptor in ATP synthesis is
(a) Cyt. *b*, *c*, a_3, *a* (b) Cyt. *c*, *b*, *a*, a_3
(c) Cyt. *a*, *a*, *b*, *c* (d) Cyt. *b*, *c*, *a*, a_3. *(1997)*

27. The 1992 Nobel Prize for medicine was awarded to Edmond H. Fischer and Edwin J. Krebs for their work concerning
(a) reversible protein phosphorylation as a biological regulation mechanism
(b) isolation of the gene for a human disease
(c) human genome project
(d) drug designing involving inhibition of DNA synthesis of the pathogen. *(1994)*

28. End product of citric acid cycle/Krebs' cycle is
(a) citric acid (b) lactic acid
(c) pyruvic acid (d) $CO_2 + H_2O$. *(1993)*

29. Oxidative phosphorylation is production of
(a) ATP in photosynthesis
(b) NADPH in photosynthesis
(c) ATP in respiration
(d) NADH in respiration. *(1992)*

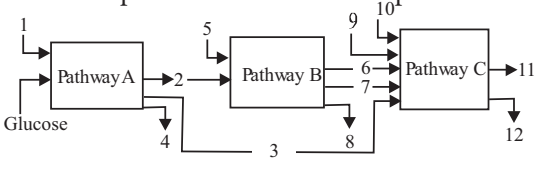
30. End products of aerobic respiration are
(a) sugar and oxygen
(b) water and energy
(c) carbon dioxide, water and energy
(d) carbon dioxide and energy. *(1992)*

31. Terminal cytochrome of respiratory chain which donates electrons to oxygen is
(a) Cyt *b* (b) Cyt *c*
(c) Cyt a_1 (d) Cyt a_3. *(1992)*

32. Connecting link between glycolysis and Krebs' cycle before pyruvate entering Krebs' cycle is changed to
(a) oxaloacetate (b) PEP
(c) pyruvate (d) acetyl CoA. *(1990)*

14.5 The Respiration Balance Sheet

33. The three boxes in this diagram represent the three major biosynthetic pathways in aerobic respiration. Arrows represent net reactants or products.



Arrows numbered 4, 8 and 12 can all be
(a) H_2O
(b) FAD^+ or $FADH_2$
(c) NADH
(d) ATP. *(NEET 2013)*

34. The overall goal of glycolysis, Krebs' cycle and the electron transport system is the formation of
(a) ATP in one large oxidation reaction
(b) sugars
(c) nucleic acids
(d) ATP in small stepwise units. *(2007)*

35. How many ATP molecules could maximally be generated from one molecule of glucose, if the complete oxidation of one mole of glucose to CO_2 and H_2O yields 686 kcal and the useful chemical energy available in the high energy phosphate bond of one mole of ATP is 12 kcal?
(a) 1 (b) 2 (c) 30 (d) 57 *(2006)*

36. During which stage in the complete oxidation of glucose are the greatest number of ATP molecules formed from ADP?
(a) Glycolysis
(b) Krebs' cycle
(c) Conversion of pyruvic acid to acetyl CoA
(d) Electron transport chain *(2005)*

37. How many ATP molecules are produced by aerobic oxidation of one molecule of glucose?
(a) 2 (b) 4 (c) 38 (d) 34 *(2002)*

38. Net gain of ATP molecules, during aerobic respiration, is
(a) 40 molecules (b) 48 molecules
(c) 36 molecules (d) 38 molecules. *(1999)*

39. When one molecule of ATP is disintegrated, what amount of energy is liberated?
(a) 8 kcal (b) 38 kcal
(c) 7 kcal (d) 4.5 kcal *(1996)*

40. The ultimate respiratory substrate, yielding maximum number of ATP molecules, is
(a) glycogen (b) ketogenic amino acid
(c) glucose (d) amylose. *(1994)*

41. Out of 38 ATP molecules produced per glucose, 32 ATP molecules are formed from $NADH/FADH_2$ in
(a) respiratory chain
(b) Krebs' cycle
(c) oxidative decarboxylation
(d) EMP. *(1993)*

42. When one glucose molecule is completely oxidised, it changes
(a) 36 ADP molecules into 36 ATP molecules
(b) 38 ADP molecules into 38 ATP molecules
(c) 30 ADP molecules into 30 ATP molecules
(d) 32 ADP molecules into 32 ATP molecules. *(1992)*

43. Out of 36 ATP molecules produced per glucose molecule during respiration
(a) 2 are produced outside glycolysis and 34 during respiratory chain
(b) 2 are produced outside mitochondria and 34 inside mitochondria
(c) 2 during glycolysis and 34 during Krebs' cycle
(d) all are formed inside mitochondria. *(1992)*

44. EMP can produce a total of
(a) 6 ATP (b) 8 ATP
(c) 24 ATP (d) 38 ATP. *(1990)*

14.6 Amphibolic Pathway

45. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins?
(a) Glucose-6-phosphate
(b) Fructose 1, 6-bisphosphate
(c) Pyruvic acid
(d) Acetyl CoA *(NEET-II 2016)*

46. Which of the metabolites is common to respiration-mediated breakdown of fats, carbohydrates and proteins?
(a) Pyruvic acid
(b) Acetyl CoA
(c) Glucose - 6 - phosphate
(d) Fructose 1, 6 - bisphosphate *(NEET 2013)*

47. Aerobic respiratory pathway is appropriately termed
(a) parabolic (b) amphibolic
(c) anabolic (d) catabolic. *(2009)*

48. Plants, but not animals, can convert fatty acids to sugars by a series of reactions called
(a) photosynthesis (b) Kreb's cycle
(c) glycolysis (d) glyoxylate cycle. *(1994)*

49. Link between glycolysis, Krebs' cycle and β-oxidation of fatty acid or carbohydrate and fat metabolism is
(a) oxaloacetic acid (b) succinic acid
(c) citric acid (d) acetyl CoA. *(1992)*

50. $NADP^+$ is reduced to NADPH in
(a) HMP (b) Calvin Cycle
(c) glycolysis (d) EMP. *(1988)*

14.7 Respiratory Quotient

51. Respiratory Quotient (RQ) value of tripalmitin is
(a) 0.09 (b) 0.9
(c) 0.7 (d) 0.07. *(NEET 2019)*

52. Apparatus to measure rate of respiration and R.Q. is
(a) auxanometer (b) potometer
(c) respirometer (d) manometer. *(1992)*

53. R.Q. is ratio of
(a) CO_2 produced to substrate consumed
(b) CO_2 produced to O_2 consumed
(c) oxygen consumed to water produced
(d) oxygen consumed to CO_2 produced. *(1990)*

54. R.Q. is
(a) C/N (b) N/C
(c) CO_2/O_2 (d) O_2/CO_2. *(1988)*

ANSWER KEY

1.	(c)	**2.**	(b,c)	**3.**	(c)	**4.**	(c)	**5.**	(c)	**6.**	(b)	**7.**	(d)	**8.**	(b)	**9.**	(a)	**10.**	(d)
11.	(d)	**12.**	(a)	**13.**	(b)	**14.**	(c)	**15.**	(d)	**16.**	(c)	**17.**	(d)	**18.**	(a)	**19.**	(c)	**20.**	(c)
21.	(b)	**22.**	(b)	**23.**	(a)	**24.**	(b)	**25.**	(b)	**26.**	(d)	**27.**	(a)	**28.**	(d)	**29.**	(c)	**30.**	(c)
31.	(d)	**32.**	(d)	**33.**	(d)	**34.**	(d)	**35.**	(d)	**36.**	(d)	**37.**	(c)	**38.**	(c)	**39.**	(c)	**40.**	(c)
41.	(a)	**42.**	(b)	**43.**	(b)	**44.**	(b)	**45.**	(d)	**46.**	(b)	**47.**	(b)	**48.**	(d)	**49.**	(d)	**50.**	(a)
51.	(c)	**52.**	(c)	**53.**	(b)	**54.**	(c)												