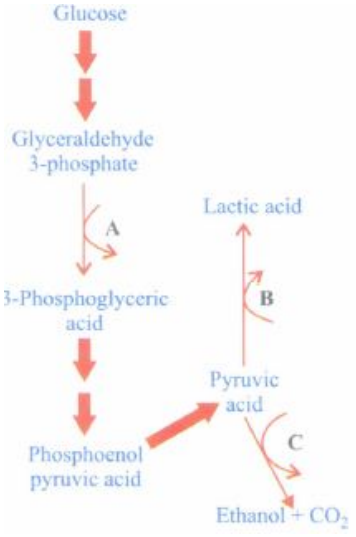
Time : 1 Mins **RESPIRATION OF PLANTS 1** **Marks : 892**

1. RQ of fats and proteins is generally
   a) 1 b) <1 c) >1 d) α
2. Which of the following steps is associated with ATP formation (substrate level phosphorylation)?
   a) Succinyl CoA ~ Succinic acid b) 1, 3 bisPGA → 3 PGA c) PEP → Pyruvate
   d) All of these
3. Number of multiprotein complexes involved in ETS and oxidative phosphorylation of mitochondria is
   a) Three b) Four c) Five d) Six
4. 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 end the useful chemical energy available in the high energy phosphate bond of one mole of ATP is 12 kcal?
   a) Thirty b) Fifty-seven c) One d) Two
5. Match the following and choose the correct option from those given below.

Column I	**Column II**
A. Molecular oxygen	i. α- ketoglutaric acid
B. Electron acceptor	ii. Hydrogen acceptor
C. Pyruvate dehydrogenase	iii. Cytochrome C
D. Decarboxylation	iv. Acetyl Co A

   a) A-ii, B-iii, C-iv, D-i b) A-iii, B-iv, C-ii, D-i c) A-ii, B-i, C-iii, D-iv d) A-iv, B-iii, C-i, D-ii
6. What does A, B and C depict in the given pathways of anaerobic respiration?



a)

A	B	C
NADH + H $^{+}\rightarrow$ NAD^{+}	$NAD^{+}\rightarrow$ NADH + H^{+}	NAD+→ NADH + H^{+}

b)

A	B	C
NADH + H $^{+}\rightarrow$ NAD^{+}	$NADH+H^{+}\rightarrow$ NADH + H^{+}	$NAD^{+}\rightarrow$ NADH + H+

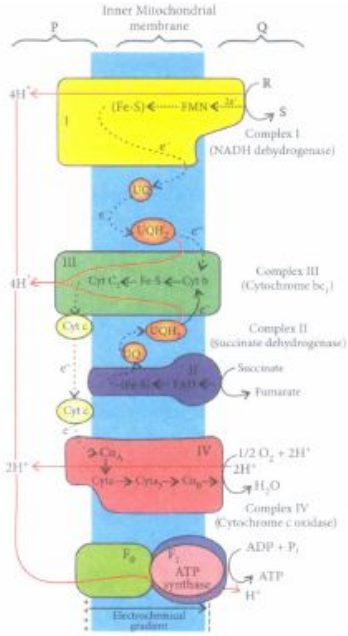
c)

A	B	C
$NAD^{+}\rightarrow$ NADH + H^{+}	NADH + $H^{+}\rightarrow$ NAD	NADH + $H^{+}\rightarrow$ NAD^{+}

d)

A	B	C
$NAD^{+}\rightarrow$ $NADH+H^{+}$	NADH + $H^{+}\rightarrow$ NAD^{+}	$NAD^{+}\rightarrow$ NADH + H^{+}

7. Which of the following conversions involve ATP synthesis during glycolysis?
   a) Glucose → Glucose - 6- phosphate
   b) Fructose-6-phosphate → Fructose-1,6-biphosphate
   c) 1,3-bisphosphoglyceric acid (BPGA) → 3-phosphoglyceric acid (PGA) d) All of these
8. Identify P, Q, R and S in the given diagram of electron transport system.



a)

P	Q	R	S
Matrix	Outer chamber	$FMNH_2$	$NADH_2$

b)

P	Q	R	S
Inter-membrane space	Matrix	NADH + H^{+}	NAD^{+}

c)

P	Q	R	S
Inter-membran space	Cristae	NAD^{+}	NADH +H^{+}

d)

P	Q	R	S
Cristae	Outer chamber	NADH + H^{+}	NAD^{+}

9. The energy-releasing process in which the substrate is oxidised without an extemal electron acceptor is called_____ .
   a) fermentation b) photorespiration c) aerobic respiration d) glycolysis
10. EMP can produce a total of____
    a) 6 ATP b) 8 ATP c) 24 ATP d) 38 ATP
11. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
    Assertion: Fermentation is the incomplete oxidation of glucose into lactic acid or ethanol.

Reason: It takes place under anaerobic conditions in prokaryotes only.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

12. Value of RQ in succulents is

a) unity b) infinite c) less than unity d) zero

13. Oxidative phosphorylation is

a) Formation of ATP energy released from electrons removed during substrate oxidation

b) Formation of ATP by transfer of phosphate group from a substrate to ADP

c) Oxidation of phosphate group in ATP d) Addition of phosphate group to ATP

14. Which of the following is a 4-carbon compound?

a) Oxaloacetic acid b) Phosphoglyceric acid c) Ribulose bisphosphate

d) Phosphoenol pyruvate

15. In the electron transport system present in the inner mitochondrial membrane complexes I and IV are respectively

a) NADH dehydrogenase and $FADH_2$ b) $FADH_2$ and NADH dehydrogenase

c) NADH dehydrogenase and cytochrome c oxidase complex

d) NADH dehydrogenase and ATP synthase

16. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: The metabolic pathway through which the electron passes from one carrier to another is called the electron transport system (ETS).

Reason: ETS is present in the inner mitochondrial membrane.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

17. Match column I with column II and select the correct option from the codes given below.

Column I	**Column II**
A. Fats made of three fatty acid chains attached to glycerol	(i) Glycogen
B. Glycolysis metabolite made from glycerol	(ii) Glyceraldehyde
C. Storage form of glucose	(iii) Triglycerides
D. Common respiratory substrate of glycolysis	(iv) Glucose

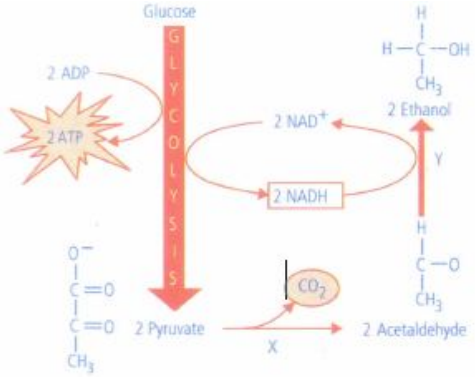
a) A-(iv), B-(ii), C-(i), D-(iii) b) A-(iii), B-(ii), C-(i), D-(iv) c) A-(iv), B-(iii), C-(i), D-(ii)

d) A-(i), B-(ii), C-(iii), D-(iv)

18. Which of the following is link between carbohydrate ansd fat metabolism?

a) CO_2 b) Acetyl Co-A c) Pyruvic acid d) Citric acid

19. Select the incorrect statement with respect to the given representation



a) X is the enzyme pyruvate dehydrogenase and Y is the enzyme ethanol decarboxylase.

b)

This process is involved in brewing industry for producing beverages like beer, rum, whisky, etc.

c)

Accumulation of the end product (i.e., ethanol) during this process, in a culture of yeast, stops the multiplication of yeast cells and may even lead to death of cells.

d) None of these

20. Pyuvate dehydrogenase complex is used ion converting-

a) Pyurvate to glucose b) Glouse to pyruvate c) Pyruvic acid to lactic acid

d) Pyruvate to acetyl Co-A

21. Identify A and B in the given reaction.

$$Pyruvic\ acid + CoA + NAD^+ \xrightarrow[Pyruvate\ dehydrogenase]{Mg^{1+}} A + B + NADH + H^+$$

a)

A	B
PEP	CO_2

b)

A	B
Acetyl CoA	CO_2

c)

A	B
CO_2	H_2O

d)

A	B
Acetyl CoA	H_2O

22. Phytochrome is a____

a) flavoprotein b) glycoprotein c) lipoprotein d) chromoprotein

23. End product of citric acid/Krebs' cycle is_____

a) citric acid b) lactic acid c) pyruvic acid d) CO_2+H_2O

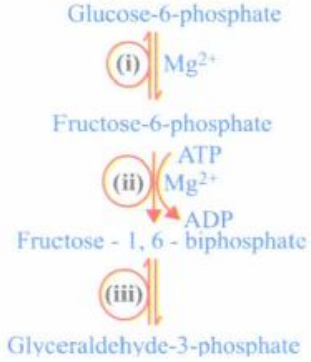
24. RQ in anaerobic respiration is

a) 0.7 b) 0.9 c) unity d) infinity.

25. Curing of tea leavesis brught by the activity of -

a) viruses b) fungl c) bacteria d) mycorhiza

26. Study the given steps of glycolysis and identify the enzymes (i), (ii) and (iii) responsible for carrying out these steps.



a)

(i)	(ii)	(iii)
Phosphohexose isomerase	Phospho fructokinase	Aldolase

b)

(i)	(ii)	(iii)
Hexokinase	Phospho fructokinase	Aldolase

c)

(i)	(ii)	(iii)
Phosphohexose isomerase	Hexokinase	Phospho fructokinase

d)

(i)	(ii)	(iii)
Aldolase	Phospho fructokinase	Phosphohexose isomerase

27. The respiration in germinating seeds produces energy which can be detected in the form of
a) water b) heat c) oxygen d) CO_2

28. Chemiosrnotic theory of ATP synthesis in the chloroplasts and mitochondria is based on_____
a) membrane potential b) accumulation of Na ions c) accumulation of K ions
d) proton gradient

29. Which of the following statements is correct with respect to the effect of temperature on rate of respiration?
a) Rate of respiration increases with an increase in temperature from O^oC to 30^oC.
b)
Rate of respiration doubles for every 100^oC rise in temperature, thus temperature co-efficient (Q_{10}) for respiration is 2.
c)
At very high temperatures such as 500^oC or more, rate of respiration decreases due to enzymatic degradation.
d) All of these

30. Total yiled in one Kerb cycle:
a) $3FADH_2$, $2NADH_2$, 1ATP b) $2FADH_2$, $2NADH_2$, 2ATP c) $2NADH_2$, $1FADH_2$, 2ATP
d) $3NADH_2$, $1FADH_2$,1ATP

31. Respirometer is an instrument used to measure
a) rate of respiration b) respiratory quotient c) both of these d) none of these.

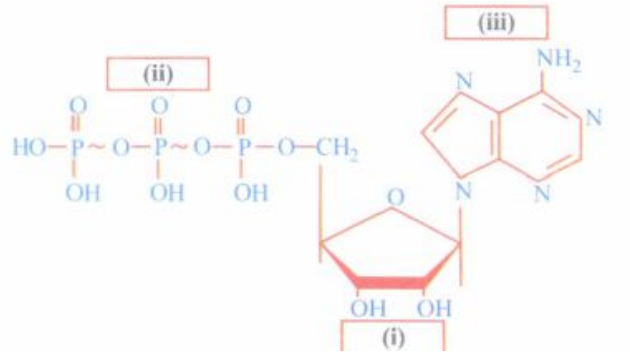
32. The chemiosmotic coupling hypothesis of oxidative phosphorylation proposes that adenosine triphosphate (ATP) is formed because_____
a) high energy bonds are formed in mitochondrial proteins
b) ADP is purnped out of the matrix into the intermembrane space
c) a proton gradient forms across the inner membrane
d)
there is a change in the perureability of the inner mitochondrial membrane toward adenosine diphosphate (ADP)'.

33. 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 Co-A

34. The germinating seeds fatty acids are degraded exclusively in the
a) Peroxisomes b) Mitochondria c) Proplastids d) Glyoxysomes

35. In glycolysis, during oxidation electrons are removed by____
a) ATP b) glyceraldehyde-3-phosphate c) NAD+ d) molecular oxygen

36. Identify the three components [(i), (ii) and (iii)] of ATP molecule shown in the given figure.



a)

(i)	(ii)	(iii)
Ribose	Triphosphate group	Adenine

b)

(i)	(ii)	(iii)
Adenine	Triphosphate group	Ribose

c)

(i)	(ii)	(iii)
Glucose	Triphosphate group	Adenine

d)

(i)	(ii)	(iii)
Ribose	Triphosphate group	Guanine

37. 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

38. Identify the correct terms for the given statements and select the correct answer
(i) Sudden increase in the rate of respiration during ripening of fruits.
(ii) Reduction in the consumption of respiratory substrate when mode of respiration is changed from anaerobic to aerobic.
(iii) Respiratory oxidation of carbohydrates and fats.
a)

Pasteur effect	**Floating respiration**	**Climacteric respiration**
(i)	(ii)	(iii)

b)

Pasteur effect	**Floating respiration**	**Climacteric respiration**
(ii)	(iii)	(i)

c)

Pasteur effect	**Floating respiration**	**Climacteric respiration**
(iii)	(ii)	(i)

d)

Pasteur effect	**Floating respiration**	**Climacteric respiration**
(ii)	(i)	(iii)

39. Enzyme of cyctchrome oxidase can be inhibited by:
a) Iodo acetate b) Azides & cycanides c) Olignomycins d) Dintrophenol

40. Fermentation is represented by the equation
a) $C_6H_{12}O_6 \rightarrow 6O_2 + 6H_2O + 686$ kcal b) $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 59$ kcal
c) $6CO_2 + 12H_2O \xrightarrow[Chlorophy]{Light} C_6H_{12}O_6 + 6H_2O + 6O_2$ d) $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

41. How many ATP will be produced during the production of 1 molecule of Accetyl Co-A from 1 molecule of pyruvic acid?
a) 3 ATP b) 5 ATP c) 8 ATP d) 38 ATP

42. A test tube containing molasses solution and yeast is kept in a warm place overnight. The gas collected from this mixture
    a) extinguishes the flame b) bursts into flame when ignited c) turns lime water milky
    d) both (a) and (c).

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

44. Which of the following options does not hold good regarding anaerobic respiration or fermentation?
    a) Occurs inside the mitochondria b) Partial breakdown of glucose occurs
    c) Net gain of only 2 ATP molecules d) None of these

45. Select the wrong statement.
    a)
    Oxidative decarboxylation of pyruvic acid requires the presence of enzyme pyruvate dehydrogenase.
    b) All living cells whether aerobic or anaerobic, perform glycolysis.
    c) Cyanide does not stop chemiosmosis.
    d) Respiratory chain uses O_2 as final hydrogen acceptor.

46. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
    Assertion: Glycolysis is also called EMP pathway
    Reason: It is the only process of respiration in aerobic organisms
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false d) If both assertion and reason are false.

47. In glycolysis net gain of ATP directly is
    a) 2 ATP b) 6 ATP c) 8 ATP d) 1 ATP

48. Match column I with column II and select the correct option from the codes given below.

Column I	**Column II**
A. TCA cycle	(i) Inner mitochondrial membrane
B. F_0 - F_1 particles	(ii) Hans Krebs
C. End product of glycolysis	(iii) Oxidative decarboxylation
D. Pyruvate dehydrogenase	(iv) Pyruvic acid

    a) A-(ii), B-(i), C-(iv), D-(iii) b) A-(i), B-(ii), C-(iv), D-(iii) c) A-(ii), B-(iii), C-(iv), D-(i)
    d) A-(iii), B-(ii), C-(i), D-(iv)

49. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
    Assertion: Anaerobic respiration sometimes occurs in our skeletal muscles during strenous exercise.
    Reason: Pyruvic acid is reduced to lactic acid by lactate dehydrogenase in the absence of oxygen
    a) If both assertion and reason are true and reason is the correct explanation of assertion.
    b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

50. Krebs' cycle is also called metabolic sink as it is a common pathway for:
    a) carbohydrates, fats and proteins (amino acids) b) carbohydrates and fats only
    c) carbohydrates and organic acids only d) proteins and fats only

51. Fermentation is anaerobic production of_____
    a) protein and acetic acid b) atcohol, lactic acid or similar compounds
    c) ethers and acetones d) alcohol and lipoproteins

52. An organic substance bound to an enzyme and essential for its activity is called
    a) Apoenzyme b) Isoenzyme c) Coenzyme d) Holoenzyme

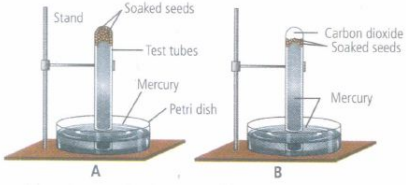
53. Refer the given equation.
    $2(C_{51}H_{98}O_6) + 145O_2 \rightarrow 102CO_2 + 98H_2O + Energy$
    The RQ in this case is:
    a) 1 b) 0.7 c) 1.45 d) 1.62

54. Which statement is wrong for Kreb's cycle?
    a) There are three point in the cycle where NAD+ is reduced to NADH + H+
    b) There is one point in the cycle where FAD+ is reduced to FADH2
    c) During conversion of succinyl CoA to succine acid, a molecule of GTP is synthesised
    d)
    The cycle starts with condensation of acetyl group (acetyl CoA) with pyruvic acid to yield citric acid

55. Read the given statements and select the correct option.
    Statement 1: Glycolysis occurs in mitochondrial matrix.
    Statement 2: Krebs' cycle occurs on cristae of mitochondria.
    a) Both statements 1 and 2 are correct. b) Statement 1 is correct but statement 2 incorrect.
    c) Statement 1 is incorrect but statement 2 is correct
    d) Both statements 1 and 2 are incorrect

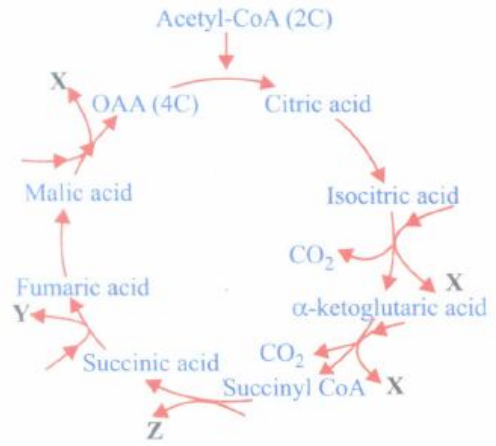
56. When one glucose molecule is completely oxidised, it changes_____
    a) 36 ADP molecules into 36 ATP molecules b) 38 ADP molecules into 38 ATP molecules
    c) 30 ADP molecules into 30 ATP molecules d) 32 ADP molecules into 32 ATP molecules

57. The given experimental set-up demonstrates



    a) photosynthesis b) aerobic respiration c) anaerobic respiration d) ascent of sap

58. Identify X, Y and Z in the given diagram representing steps of citric acid cycle and select the correct option.



a)

X	Y	Z
GTP	$NADH_2$	$FADH_2$

b)

X	Y	Z
$FADH_2$	$NADH_2$	GTP

c)

X	Y	Z
$NADH_2$	$FADH_2$	GTP

d)

X	Y	Z
CO_2	$NADH_2$	ADP

59. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Oxidation of one molecule of NADH gives rise to 3 molecules of ATP and that of one molecule of $FADH_2$ produces 2 molecules of ATP.

Reason: The number of ATP molecules synthesised depends on the nature of the electron donor.

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

60. In alcoholic fermentation____

a) oxygen is the electron acceptor.

b) triose phosphate is the electron donor while acetaldehyde is the electron acceptor.

c) triose phosphate is the electron donor while pyruvic acid is the electron acceptor.

d) there is no electron donor

61. Identify A, B and C in the given reaction of lactic acid fermentation and select the correct option.

$$Pyrucvic\ \ acid + A \xleftrightarrows[FMN, Zn^{2+}]{Lactate\ \ dehydrogenase} B + C$$

a)

A	B	C
NADH	Lactic acid + CO_2	NAD^+

b)

A	B	C
NADH	Lactic acid	NAD^+

c)

A	B	C
NAD^+	Lactic acid	NADH

d)

A	B	C
NAD^+	Lactic acid + CO_2	NADH

62. Percentage of energy in glucose released by both lactic acid and alcoholic fermentation is

a) 5-10% b) Less than 7% c) More than 13% d) 45%

63. What is true about the end products of glycolysis?

a) 2 pyruvic acid + 2ATP + $2NADH_2$ b) 2 pyruvic acid + $2NADH_2$

c) 1 pyruvic acid + 2ATP + $2NADH_2$ d) 2 pyruvic acid + 1ATP + $1NADH_2$

64. Which of the following an intermediate in Kerbs cycle?

a) Axetic acid b) Succeinyl conezyme-A c) Mallic acid d) Citric acid

65. Fermentation products of yeast are_____

a) $H_2O + CO_2$ b) methyl alcohol + CO_2 c) methyl alcohol + H_2O d) ethyl alcohol + CO_2

66. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: During aerobic respiration, pyruvic acid formed as a result of glycolysis, undergoes phosphorylation reaction to form acetyl CoA.

Reason: There is net gain of 18 ATP molecules during aerobic respiration of one molecule of glucose.

a) If both assertion and reason are true and reason is the correct explanation of assertion.

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

67. At the end of glycolysis, X is the net energy gain from one molecule of glucose via Y, but there is also energy stored in the form of Z. Identify X, Y and Z.

a)

X	Y	Z
1ATP	Oxidative phosphorylation	NADH + H^+

b)

X	Y	Z
2 ATPs	Oxidative phosphorylation	NADH + H^+

c)

X	Y	Z
1 ATP	Substrate level phosphorylation	$FADH_2$

d)

X	Y	Z
2 ATPs	Substrate level phosphorylation	NADH + H^+

68. How many ATP molecules will be generated in a plant system during complete oxidation of 40 molecules of glucose?

a) 180 b) 360 c) 1440 d) 3040

69. Alternate name of Krebs' cycle is

a) TCA cycle b) citric acid cycle c) both (a) and (b) d) none of these.

70. Select the correct statement.

a) When ATP is synthesised directly from metabolites, it is substrate level phosphorylation.

b) In Krebs' cycle, citrate undergoes 2 decarboxylations and 4 dehydrogenations.

c) Krebs' cycle is an amphibolic process d) All of these

71. Instantaneous source of energy is

a) proteins b) fats c) nucleic acids d) glucose.

72. The essential chemical components of many coenzymes are:

a) Vitamins b) Proteins c) Nucleic acids d) Carbohydrates

73. Last e^- acceptor during ETS is

a) O_2 b) cyt a c) cyt a_2 d) cyt a_3

74. Consider the first reaction of TCA cycle

What is true about compound A?

a) First product of TCA cycle b) Tricarboxylic acid and six carbon compound

c) It undergoes reorganisation in the presence of enzyme aconitase to form cis-aconitate

d) All of these

75. During complete metabolism of glucose, the number of ATP formed is:

a) 2 b) 12 c) 36 d) 44

76. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: This conversion of 1, 3-bishosphoglycerate (BPGA) to s-phosphoglyceric acid (PGA) is an energy yielding step.
Reason: This energy is trapped by the formation of ATP.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

77. The bacterium (Clostridium botulinum) that causes botulism is_____
a) an obligate anaerobe b) an facultative aerobe c) an obligate aerobe
d) a facultative anaerobe

78. The mechanism of ATP formation both in chloroplast and mitochondria is explained by_____
a) relay pump theory of Godlewski b) Munch's pressure/mass flow model
c) chemiosmotic theory of Mitchell d) Cholondy-Went's model

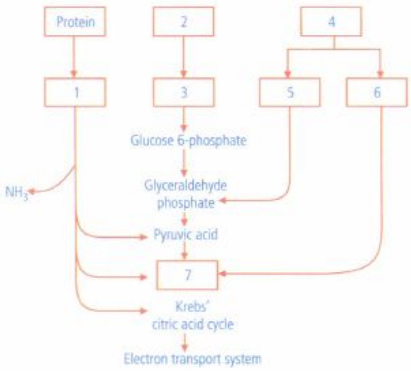
79. The net gain of ATP molecules in glycolysis during aerobic respiration is
a) 0 b) 2 c) 4 d) 8

80. Aerobic respiratory pathway is appropriately termed____
a) parabolic b) amphibolic c) anabolic d) catabolic

81. Which complex contains cytochromes a and a_3 and two copper centres?
a) NADH dehydrogenase complex b) FADH reductase c) Cytochrome bc_1 complex
d) Cytochrome c oxidase complex

82. In most eukaryotic cells, number of ATP net generated from one glucose molecule is
a) 38 b) 36 c) 34 d) 32

83. Refer to the following flow chart representing the cellular respiration and its fuels. Blanks 1, 2, 3, 4, 5, 6 and 7 are respectively



a) amino acids, carbohydrate, glucose, fats, glycerol, fatty acid, acetyl Co-A
b) fats, acetyl Co-A, amino acid, fatty acid, carbohydrate, glycerol, glucose
c) fatty acid, glucose, acetyl Co-A, glycerol, fats, carbohydrate, amino acid
d) carbohydrate, fats, glycerol, fatty acids, amino acid, glucose, acetyl Co-A.

84. Sequence of food materials consumed during repiration is:
a) Firstly → carbohydrate → fats → proteins b) Carbohydrate → proteins → fats
c) Proteins → fats → carbohydrate d) Fats → proteins → carbohydrate

85. Which of these statements is incorrect ?
a) Glycolysis operates as long as it is supplied with NAD that can pick up hydrogen atoms
b) Glycolysis occurs in cytosol

c) Enzymes of TCA cycle are present in mitochondrial matrix

d) Oxidative phosphorylation takes place in outer mitochondrial membrane

86. The chemiosmotic coupling hypothesis of oxidative phosphorylation proposes that adenosine triphosphate (ATP) is form because:

a) A proton gradient forms across the inner membrane

b)

There is a change in the permeability of the inner mitochondrial membrane toward adenosine diphosphate (ADP)

c) High energy bonds are formed in mitochondrial proteins

d) ADP is pumped out of the matrix into the intermembrane space

87. Net gain of ATP molecules during aerobic respiration is _____ .

a) 36 molecules b) 38 molecules c) 40 molecules d) 48 molecules

88. Study the incorrect statement with respect to an overview of the electron transport system (ETS).

a)

Ubiquinone receives reducing equivalents vie., FADH2 (complex II)that is generated during oxidation of succinate in the TCA cycle.

b) As the electrons move down the system, energy is released and used to form ATP

c)

2ATPs are formed for every pair of electrons that enters by way of NADH and 3ATPs are formed for every pair of electrons that enters by way of $FADH_2$

d) Oxygen, the final e acceptor becomes a part of water.

89. ATP is injected in cyanide poisoning because it is_____

a) necessary for cellular functions b) necessary for Na^+ - K^+ pump

c) Na^+ - K^+ pump operates at the cell membranes d) ATP breaks down cyanide

90. Identify enzyme A in the given reaction of Krebs' cycle.

$$OAA(4C) + Acetyl - CoA + H_20 \xrightarrow{A} Citric\ acid(6C) + CoA$$

a) Oxaloacetate synthetase b) Citrate synthase c) Aconitase d) Dehydrogenase

91. During electron transport system (ETS), electron transport proceeds from carriers that have _____ redox potential to those having _____ redox potential. This electron transport down the energy gradient leads to the formation of ATP from ADP and Pi, which is referred to as _____.

a) low, high, oxidative phosphorylation b) low, high, oxidative decarboxylation

c) high, low, oxidative phosphorylation d) high, low, oxidative decarboxylation

92. In addition to the normal process of oxidation of carbohydrates through glycolysis and Krebs' cycle, there is another process by which plants could oxidise carbohydrates to obtain energy. In this process, hexose sugars undergo oxidative degradation through 5-C sugar intermediates and hence it is known as Pentose phosphate pathway (PPP). Which of the following statements is not true with regard to PPP?

a) It is an alternative to glycolysis and also acts as a safety valve or shunt to glycolysis

b)

It is common in plants and occurs in certain specialised tissues of animal body, e.g., liver, adipose tissue, testes, ovary, adrenal cortex, lactating mammary gland, eye lens and cornea.

c) It occurs only in cytoplasm but not in any cell organelle.

d) It is also called as hexose monophosphate shunt (HMP pathway).

93. Pyruvate dehydrogenase is used in converting

a) glucose to pyruvate b) pyruvic acid to lactic acid c) pyruvate to acetyl CoA

d) pyruvate to glucose

94. Krebs' cycle starts with the formation of a six carbon compound by reaction between

a) fumaric acid and pyruvic acid b) OAA and acetyl CoA c) malic acid and acetyl CoA

d) succinic acid and pyruvic acid

95. Though vertebrates are aerobes, but their __(i)___ show anaerobic respiration during _____(ii)_____. During this, ___(iii)_____of skeletal muscle fibres is broken down to release lactic acid and energy. Lactic acid, if accumulates causes muscle fatigue. Fill up the blanks in the above paragraph and select the correct option

a)

(i)	(ii)	(iii)
skeletal muscles	heavy exercise	glucose+

b)

(i)	(ii)	(iii)
skeletal muscles	mild exercise	glycogen

c)

(i)	(ii)	(iii)
skeletal muscles	heavy exercise	glycogen

d)

(i)	(ii)	(iii)
cardiac muscles	heavy exercise	glycogen

96. Incomplete oxidation of glucose into pyruvic acid with several intermediate steps is known as__

a) TCA-pathway b) glycolysis c) HMS-pathway d) Krebs'cycle

97. Mercury (Hg) is generally used in anaerobic respiration experiments because it does not react with _____

a) O_2 b) CO_2 c) H_2O d) air

98. Study the following statements regarding chemiosmotic hypothesis in mitochondria and select the correct ones.

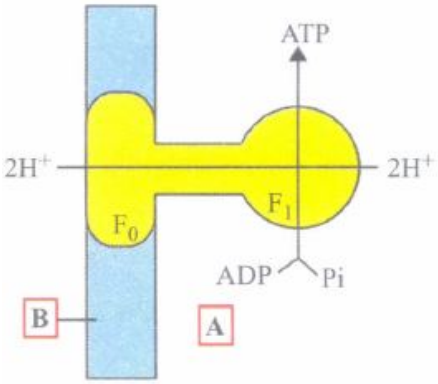
(i) F_1 headpiece contains the site for the synthesis of ATP from ADP + Pi.

(ii) F_0 part forms the channel through which protons cross the inner membrane.

(iii) For each ATP produced, 2W pass through F_0 from the intermembrane space to the matrix down the electrochemical proton gradient.

a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (i), (ii) and (iii)

99. Identify A and B in the given diagram showing ATP synthesis in mitochondria.



A = Mitochondrial matrix A = Mitochondrial matrix

a) B = Outer mitochondrial membrane b) B = Inner mitochondrial membrane

A = Cell cytoplasm A = Cell cytoplasm

c) B = Inner mitochondrial membrane d) B = Outer mitochondrial membrane

100. Which of the following is essential for conversion of pyruvic acid into acetyl Co-A?

a) LAA b) NAD+ c) TPP d) All of these

101. Which of the following steps of respiration is amphibolic?
a) Glycolysis b) Oxidative decarboxylation of pyruvate c) TCA cycle
d) Oxidative phosphorylation

102. Which component of ETS is mobile,e^- cerrier?
a) UQ(CO-Q) b) Cyto a c) Cyto-b d) Cyto-f

103. Which of the following statements regarding metabolic pathways is incorrect?
a) Many of the steps of glycolysis can run in reverse
b) Starch, sucrose or glycogen must be hydrolysed before it can enter the glycolysis
c) After fats are digested, glycerol enters glycolysis by forming DHAP.
d) After fat digestion, fatty acids can no longer participate in cellular respiration.

104. Respiratory quotient (RQ) for fatty acid is____
a) > 1 b) < 1 c) 1 d) 0

105. Amount of energy released during hydrolysis of a high energy bond of ATP is
a) 73 kcal $rnol^{-1}$ b) 0.73 kcal mol^{-1} c) 3.4 kcal $rnol^{-1}$ d) 7.3 kcal mol^{-1}

106. Number of oxygen atoms required for aerobic oxidation of one pyruvate-
a) 5 b) 8 c) 10 d) 12

107. The following ie required both by the process of respirtion and photosynthesis
a) Carbohydrates b) Sunlight c) Chlorophyll d) Cytochromes

108. In Krebs' cycle, OAA accepts acetyl CoA to form
a) citric acid b) oxalosuccinate c) fumarate d) succinyl CoA

109. The balance sheet for ATP production in glycolysis has been given below. Select the option which correctly fills up the blanks for P,0, Rand S. ['X' stands for 'nil'].

	Steps	**ATP Utilisation**	**ATP Production**
1.	Glucose → Glucose-6-phosphate	**P**	X
2.	Fructose-6-phosphate → Fructose-1, 6-bisphosphate	1	**Q**
3.	1, 3-bisphosphoglyceric acid → 3-Phosphoglyceric acid	X	**R**
4.	2-Phosphoenol pyruvic acid → Pyruvic acid	**S**	2

a)

P	**Q**	**R**	**S**
1	X	X	2

b)

P	**Q**	**R**	**S**
1	X	2	X

c)

P	**Q**	**R**	**S**
2	1	X	1

d)

P	**Q**	**R**	**S**
X	1	2	X

110. Which of these are respiratory poisons or inhibitors of ETC?
a) Cyanides b) Antimycin A c) Carbon monoxide d) All of these

111. $NADP^+$ is reduced to NADPH in _____ .
a) HMP b) Calvin cycle c) glycolysis d) EMP

112. Dough kept overnight in warm weather becomes soft and spongy due to
a) absorption of CO_2 from atmosphere b) imbibition c) fermentation d) fermentation

113. Number of total ATP generated through TCA cycle per pyruvic acid molecule is
a) 10 b) 12 c) 14 d) 24

114. Substrate level phosphorylation (GTP synthesis) occurs during conversion of
a) OAA to citric acid b) Citric acid to isocitrate c) α-ketoglutaric acid to succinyl Co-A
d) Succinyl Co-A to succinic acid

115. Select the incorrectly matched pair

a) End products of alcoholic fermentation - Ethanol + CO_2

b) End products of lactic acid fermentation - Lactic acid + CO_2 c) Glycolysis - Cytoplasm

d) Key product of glycolysis - Pyruvic acid

116. The number of ATP molecules produced by electron transport system from kreb's cycle intermediates in a single turn is

a) 11 b) 14 c) 12 d) 16

117. Complete the following biochemical equation of respiration and select the correct answer

$C_6H_{12}O_6 + 6O_2 \longrightarrow \square + \square + \square$

a) $6CO_2$ + 12Hp + Energy b) $12CO_2 + 4H_2O$ + Energy c) $12CO_2 + 6H_2O$ + Energy

d) $6CO_2 + 6H_2O$ + Energy

118. Name the enzyme responsible for oxidative decarboxylation during aerobic respiration.

a) Pyruvate dehydrogenase b) Succinate dehydrogenase c) Pyruvate kinase

d) Citrate synthase

119. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

Assertion: Complex II and complex III of ETS are NADH dehydrogenase and cytochrome oxidase complex respectively.

Reason: Cytochrome c acts as a mobile carrier for transfer of electrons between complex II and III

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

120. Kerbs cycle begins with the reaction :

a) Citric acid + Acetyl CO-A b) Oxalacetic acid + Pyruvic acid

c) Oxalacetic acid + Citric acid d) Oxaloacetate + Acetyl acid

121. During which stage in the complete oxidation of glucose are the greatest nuxber of ATP molecules formed from ADP_____

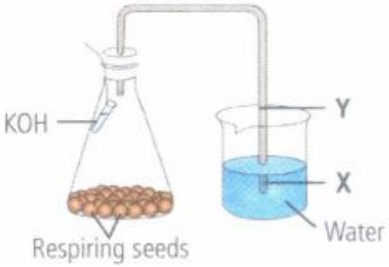
a) glycolysis b) krebs cycle c) conversion of pynrvic acid to acetyl CoA

d) electron transport chain

122. Oxidation of one NADH and one $FADH_2$ respectively gives rise to _____ and _____ ATP molecules.

a) 3 and 2 b) 2 and 1 c) 2 and 3 d) 1 and 1

123. Rise in the water level from X to Y in the given experimental set-up demonstrates



a) aerobic respirat b) anaerobic respiration c) photosynthesis d) transpiration pull

124. Which one of the following is the first step of gloyclysis?

a) Breakdown of glucose b) Phosphorlyation of glucose

c) Conversion of glucose into fructose d) Dehydrogenation of glucose

125. In which one of the following processes, carbon dioxide is not released?

a) Aerobic respiration in animals b) Alcoholic fermentation c) Lactate fermentation
d) Aerobic respiration in plants

126. Which step is called gateway step/link reaction in aerobic respiration?
a) Glycolysis b) Formation of acetyl coenzymeA c) Citric acid formation
d) ETS terminal oxidation

127. Select the option that correctly fills the blanks in the following statements.
A. Glucose has _____(i)_____ carbon atoms, pyruvic acid has _____(ii)_____ carbon atoms and the acetyl group has _____(iii)_____ carbon atoms.
B. Electrons enter the electron transport system as parts of hydrogen atoms attached to _____(i)_____ and ____(ii)_____.

a)

A	**B**
(i)-6, (ii)-4, (iii)-3	(i)-NADH, (ii)-$FADH_2$

b)

A	**B**
(i)-6, (ii)-3, (iii)-2	(i)-NADH, (ii)-$FADH_2$

c)

A	**B**
(i)-6, (ii)-3, (iii)-2	(i)-ATP, (ii)-GTP

d)

A	**B**
(i)-6, (ii)-4, (iii)-3	(i)-ATP, (ii)-GTP

128. Which of the following describes significance of fermentation?
(i) Production of alcohol in brewing industry
(ii) Making of dough in baking industry
(iii) Curing of tea and tobacco
(iv) Production of vinegar by acetic acid bacteria
a) (i), (ii) and (iii) b) (i), (ii) and (iv) c) (ii), (iii) and (iv) d) (i), (ii), (iii) and (iv)

129. In germinating seeds fatty acids are degrade exclusively in the_____
a) proplastids b) glyoxysomes c) peroxisomes d) mitochondria

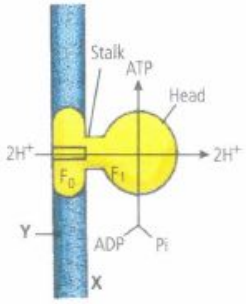
130. When two molecules of acetyl CoA enter the TCA cycle, net gain at the end of the cycle is
a) $2NADH_2 + 2FADH_2 + 1GTP$ b) $3NADH_2 + 2FADH_2 + 2GTP$
c) $6NADH_2 + 2FADH_2 + 2GTP$ d) $3NADH_2 + 1FADH_2 + 4GTP$

131. Match the following and choose the correct option from those given below.

	Column A		Column B
A.	Molecular oxygen	i	α-ketoqlutaric acid
B.	Electron aceptor	ii.	H drogen acceptor
C.	Pyvate dehydrogenase	iii.	Cytochrome C
D.	Decarboxylation	iv	Acetyl Co A

a) A-ii, B-iii, C-iv, D-i b) A-iii, B-iv, C-ii, D-i c) A-ii, B-i, C-iii, D-iv d) A-iv, B-iii, C-i, D-ii

132. Study the given figure and select the incorrect option regarding this.



a)
The figure represents chemiosmotic ATP synthesis by oxysomes where X is the mitochondrial matrix and Y is the inner mitochondrial membrane
b)
Enzyme required for ATP synthesis is ATP synthase, considered to be the complex-V of ETS.
c)
The figure represents oxidative phosphorylation which is the synthesis of energy rich ATP molecules with the help of energy liberated during oxidation of reduced co-enzymes (NADH, FADH2) produced in respiration.
d)
ATP synthase becomes active only when there is a proton gradient having higher concentration of protons (W) on the inner side (F1 side) as compared to the outer side (Fa side).

133. Which one of the following statements in incorrect?
a) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme
b)
The competitive inhibitor does not affect the rate of breakdown of the enzyme for the substrate.
c)
The presence of the competitive inhibitor decreases the KM of the enzyme of the substrate
d)
A competitive inhibitor reacts reversibly with the enzyme to form an enzyme -inhibitor complex.

134. Select the correct combination of the respiratory substrates and their respective RQs.

a)

Organic acids	Fats	Succulents
1.3	0.7	Zero

b)

Organic acids	Fats	Succulents
Infinity	0.7	Zero

c)

Organic acids	Fats	Succulents
Zero	1.3	0.7

d)

Organic acids	Fats	Succulents
Zero	0.7	1.3

135. Krebs' cycle occurs in _____ .
a) mitochondria b) cytoplasm c) chloroplast d) ribosomes

136. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Plants have no specialised respiratory organs.
Reason: There is very little transport of gases from one plant part to another
a) If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.

137. Read the given statements and select the correct option.
Statement 1: During photophosphorylation (of photosynthesis), light energy is utilised for the production of proton gradient during ATP synthesis.
Statement 2: In respiration, energy of oxidationreduction is utilised for the phosphorylation and thus the process is called oxidative phosphorylation.

a) Both statements 1 and 2 are correct

b) Statement 1 is correct but statement 2 is incorrect

c) Statement 1 is incorrect but statement 2 is correct.

d) Both statements 1 and 2 are incorrect

138. In mitochondria, protons accumulate in
a) Outer membrane b) Intermembrane space c) Inner membrane d) Matrix

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

140. In Krebs'cycle FAD participates as electron acceptor during the conversion of_____
a) succinyl Co-A to succinic acid b) a-ketoglutarate to succinyl Co-A
c) succinic acid to fumaric acid d) fumaric acidto malic acid

141. All of the following processes can release CO_2 except
a) alcoholic fermentation b) oxidative decarboxylation and Krebs' cycle

c) oxidative phosphorylation d) conversion of a-ketoglutaric acid to succinic acid.

142. Categorise the given equations under respective phases and select the correct option.
(i) $C_6H_{12}O_6 + 2NAD^+ + 2ADP + 2Pi \rightarrow 2C_3H_4O_3 + 2ATP + 2NADH + 2H^+$
(ii)
$Pyrucvic \quad acid + 4NAD^+ + FAD^+ + 2H_2O + ADP + Pi \rightarrow 3CO_2 + 4NADH + 4H^+ + ATP + FADH_2$
(iii)

a)

I	II	III
Glycolysis	Fermentation	Krebs' cycle

b)

I	II	III
Krebs' cycle	Fermentation	Glycolysis

c)

I	II	III
Krebs' cycle	Glycolysis	Fermentation

d)

I	II	III
Glycolysis	Krebs' cycle	Fermentation

143. Which of the following are isomers?
a) 3PGA and 2PGA b) PGAL and DHAP c) Glucose and Fructose d) All of these

144. Phosphorylation of glucose during glycolysis is catalysed by
a) phosphoglucomutase b) phosphoglucoisomerase c) hexokinase d) phosphorylase

145. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: Respiration is the breaking of the C - C bonds of complex compounds through oxidation within the cells and release of large amount of energy.
Reason: The compounds that are oxidised during respiration are called respiratory substrates
a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false.

146. In the electron transport chain during terminal oxidation, the cytochrome, which donates electrons to O_2 is
a) Cytochrome -b b) Cycto-C c) Cycto-a_3 d) Cycto-f

147. End product of glycolysis is____
a) acetyl Co-A b) pyruvic acid c) glucose 1-phosphate d) fructose 1-phosphate

148. If volume of CO_2 liberated during respiration is more than the volume of O_2 used, then the respiratory substrate will be:
a) carbohydrate b) fat c) protein d) organic acid.

149. 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

150. The pathway of respiration common in all living organisms is ____X_____ it occurs in the ____Y_____ and the products formed are two molecules of ___Z___.Identify X, Y and Z in the above paragraph and select the correct answer.

a)

X	**Y**	**Z**
EMP pathway	mitochondrion	pyruvic acid

b)

X	**Y**	**Z**
EMP pathway	cytoplasm	pyruvic acid

c)

X	**Y**	**Z**
Krebs' cycle	cytoplasm	acetyl CoA

d)

X	**Y**	**Z**
Krebs' cycle	mitochondrion	acetyl CoA

151. As per chemiosmotic coupling hypothesis, in mitochondria, protons accumulate in the
a) outer membrane b) inner membrane c) intermembrane space d) matrix

152. Which of the following steps during glycolysis is associated with utilisation of ATP?
a) Glucose → Glucose - 6- phosphate
b) Fructose-6-phosphate → Fructose-1,6-biphosphate c) PEP → Pyruvic acid
d) Both (a) and (b)

153. 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

154. Which metabolite is common in respiration mediated breakdown of fats, carbohydrates and proteins?
a) Acetyl CoA b) Glucose 6-phosphate c) Fructose 1, 6-biphosphate d) Pyruvic acid

155. Respiratory quotient may be represented as
a) O_2 taken in /CO_2 evolved b) CO_2 evolved /O_2 taken in c) O_2 taken in
d) CO_2 taken in.

156. 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

157. Respiratory substrate yielding maximum number of ATP molecule is_____
a) ketogenic amino acids b) glucose c) amylose d) glycogen

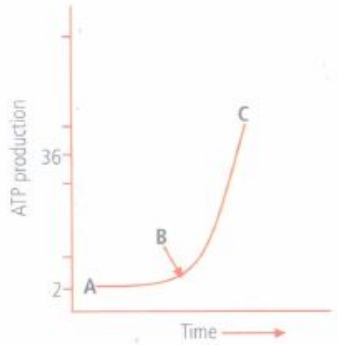
158. Which of the following biomolecules is common to respiration mediated breakdown?
a) Acetyl CoA b) Glucose 6-phosphate c) Fructose 1,6-biphosphate d) Pyruvic acid

159. ATP generated by 1 NADH and 1 $FADH_2$ are respectively.
a) 3,2 b) 2,3 c) 3,5 d) 5,3

160. Mobile electrons carriers of ETS in mitochondrial membrane are
a) PQ, PC b) CoQ, Cyt.c c) PQ, Cyt.c d) PC, CoQ

161. Study carefully the following statements and select the incorrect ones.
(i) When fats are used in respiration, the RQ is more than unity because fats contain more O_2 and require relatively less amount of O_2 for oxidation.
(ii) The most important energy carrier is ATP. This energy rich compound is mobile and can pass from one cell to another.
(iii) Before pyruvic acid enters Krebs' cycle, one of the two carbon atoms of pyruvic acid is reduced to carbon dioxide in the reaction called reductive carboxylation.
(iv) A special electron carrier system located in the mitochondrial membrane is called shuttle system. It transfers electrons from the hydrogens of cytoplasmic NADH to the mitochondrial electron carriers across the mitochondrial membrane.
(v) Zymase is a complex mixture of many enzymes which requires several coenzymes for its action. The enzyme complex-zymase catalyses series of reactions taking place during fermentation leading to the production of ethyl alcohol
a) (i) and (ii) b) (iii) and (iv) c) (i), (ii) and (iii) d) (iii), (iv) and (v)

162. Animal cells are suspended in a culture medium that contains excess glucose. The graph below shows glucose utilisation under different growth conditions. (A), (B), and (C) in the graph indicate.



A - Anaerobic respiration A - Aerobic respiration
B - Introduction of O_2 to culture medium B - Introduction of CO_2 to culture medium
a) C - Aerobic respiration b) C - Anaerobic respiration
A - Aerobic respiration A - Aerobic respiration
B - Supply of organic triphosphate B - Introduction of CO to culture medium
c) C - Aerobic respiration d) C - Anaerobic respiration

163. Three of the following statements about enzymes are correct and one is wrong. Which one is wrong?
a)
Enzymes are denatured at high temperatures but in certain exceptional organisms, they are effective even at temperatures 80^0-90^0C
b) Enzymes are highly specific c) Most enzymes are proteins but some are lipids
d) Enzymes require optimum pH for maximal activity

164. Select the wrong statement with respect to glycolysis.
a) It occurs outside mitochondria. b) It is an anaerobic phase.
c) Glucose undergoes partial oxidation to form 2 molecules of pyruvic acid.
d) Glucose is phosphorylated to glucose-6-phosphate by isomerase enzyme.

165. Match column I with column II and select the correct option from the given codes.

	Column I		Column II

A.	Glycolysis	(i)	Inner mitochondrial membrane
B.	TCA cycle	(ii)	Mitochondrial matrix
C.	ETS	(iii)	Cytoplasm

a) A-(iii), B-(i), C-(ii) b) A-(iii), B-(ii), C-(i) c) A-(i), B-(ii), C-(iii) d) A-(ii), B-(i), C-(iii)

166. Number of NADH molecules produced in EMP pathway from one glucose molecule is
a) One b) Two c) Three d) Four

167. For its activity, carboxypeptidase requires formed during an enzymatic reaction is:
a) Nitaccin b) Copper c) zinc d) Iron

168. The ultimate electron acceptor of respiration in an aerobic organism is:
a) cytochrome b) oxygen c) hydrogen d) glucose.

169. Consider the following statements with respect to respiration.
(i) Glycolysis occurs in the cytoplasm of the cell.
(ii) Aerobic respiration takes place within the mitochondria.
(iil) Electron transport system is present in the outer mitochondrial membrane.
(iv) $C_{51}H_{98}O_6$ is the chemical formula of tripalmitin, a fatty acid
(v) Respiratory Quotient = $\frac{Volume\ of\ O_2\ evolved}{Volume\ of\ CO_2\ consumed}$
Of the above statements
a) (i), (ii) and (iv) are correct b) (ii), (iii) and (iv) are correct c) (iii), (iv) and (v) are correct
d) (ii), (iv) and (v) are correct.

170. Site of Krebs' cycle in mitochondria is
a) inner membrane b) outer membrane c) matrix d) oxysomes

171. Mitochondria are called power houses of the cell. Which of the following observations support this statement?
a) Mitochondria synthesise ATP. b) Mitochondria have a double membrane
c) The enzymes of the Krebs' cycle and the cytochromes are found in mitochondria.
d) Mitochondria are found in almost all plant and animal cells.

172. The first 5C dicarboxylic acid in Krebs' cycle which is used in nitrogen metabolism is
a) OAA b) citric acid c) α-ketoglutaric acid d) acetyl coenzyme A.

173. The number of substrate level phosphorylations in one turn of citric acid cycle is____
a) 2 b) 3 c) 0 d) 1

174. Select the correct statements.
(i) Between temperature range 0 - 25°C, rate of respiration doubles for every 10° Crise in temperature
(ii) Cytochrornes are iron-porphyrin compounds.
(iii) Respiratory rate of wounded or injured plant parts generally decreases
a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) d) (i), (ii) and (iii)

175. Which of the following cellular metabolic processes can occur both in the presence or absence of O_2?
a) Glycolysis b) Fermentation c) TCA cycle
d) Electron transport coupled with chemiosmosis

176. Apparatus to measure rate of respiration and RQ is_____
a) auxanometer b) potometer c) respirometer d) manometer

177. During the process of aerobic respiration, ____(i)____ gets oxidised and its electrons get transferred to the electron transport chain while in photosynthesis ___(ii)___ gets oxidised to transfer molecules to the electron transport chain.
a) (i)-glucose; (ii)-xanthophyll b) (i)-carbon dioxide, (ii) - xanthophyll
c) (i)-carbon dioxide, (ii)-chlorophyll-a d) (i)-glucose, (ii)-chlorophyll-a

178. Anaerobic respiration takes place in
a) mitochondrion b) nucleus c) cytoplasm d) vacuole

179. How many ATP molecules released when 1 molecules of glucose in our liver cells?
a) 36 b) 38 c) 2 d) 8

180. Respiratory pathway is
a) catabolic b) amphibolic c) anabolic d) endergonic

181. Seeds respire in
a) presence of O_2 b) presence of CO_2 c) absence of O_2 d) both (a) and (c)

182. First step of CO_2 liberation during aerobic respiration is
a) PEP ⟶ Pyruvate b) Pyruvate ⟶ Acetyl CoA c) Isocitrate ⟶ Oxalosuccinate
d) Succinyl CoA ⟶ Succinate

183. Which out of the following statements is incorrect?
a)
The breakdown product of glucose which enters into mitochondrion during aerobic respiration is pyruvic acid generated in the cytosol.
b)
When the electrons pass from one carrier to another via complex I to IV in the electron transport chain, they are coupled to ATP synthase (complex V) for the production of ATP from ADP and Pi.
c)
The ratio of volume of O_2 consumed in respiration to the volume of CO_2 evolved is called as the respiratory quotient (RQ).
d)
Compensation point is the point reached in a plant when the rate of photosynthesis is equal to the rate of respiration

184. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: In electron transport system, the electrons are passed on to oxygen resulting in the formation of H_2O.
Reason: Oxygen is the ultimate acceptor of electrons.
a) If both assertion and reason are true and reason is the correct explanation of assertion.
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

185. Life without air would be_____
a) reductional b) free from oxidative damage c) impossible d) anaerobic

186. During anaerobic digestion of organic waste, such as in producing biogas, which one of the following is left undegraded?
a) Cellulose b) Lipids c) Lignin d) Hemi-cellulose

187. Which of the following exhibits the highest rate of respiration?

a) Growing shoot apex b) Germinating seed c) Root tip d) Leaf bud

188. Oxidative phosphorylation involves simultaneous oxidation and phosphorylation to finally form _____ .
a) pyruvate b) NADP c) DPN d) ATP

189. At a temperature above 35^oC____
a) rate of photosynthesis will decline earlier than that of respiration
b) rate of respiration will decline earlier than that of photosynthesis
c) there is no fixed pattern d) both decline simultaneously

190. The end product of glycolysis is
a) pyruvic acid b) glucose c) ethyl alcohol d) CO_2

191. 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) ketoglutarate dehydrogenase
c) succinate dehydrogenase d) lactate dehydrogenase

192. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: ATP acts as the energy currency of the cell.
Reason: ATP can be broken down to release energy wherever and whenever energy needs to be utilised.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false.

193. Oxidative phosphorylation is production of_____
a) ATP in photosynthesis b) NADPH in photosynthesis c) ATP in respiration
d) NADH in respiration

194. 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

195. FAD participates in Krebs' cycle as electron acceptor during conversion of
a) succinyl CoA to succinic acid b) α -ketoglutarate to succinyl CoA
c) succinic acid to fumaric acid d) fumaric acid to malic acid.

196. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of_____
a) 1 molecule of 6-C compound
b) 1 molecule of 4-C compound and I molecule of 2-C compound
c) 2 molecules of 3-C compound d) 1 molecule of 3-C compound

197. During oxidation of one mole of glucose, 36 ATP can be obtained by which of the following distribution?
a) Glycolsis-2, Citric acid cycl-6, ETS-28 b) Glycolysis-2, Citric acid cycle-2, ETS-32
c) Glycolysis-4, Citic acid cycle-2, ETS-30 d) Glycolysis-2, Citic acid cycle-4, ETS-30

198. Translation state structure of the substrate formed during an enzymatic reaction is:
a) Permanent and stable b) translate but stable c) Permenant but unstable
d) translate and unstable

199. Substrate level phosphorylation occurs during which step of Krebs' cycle?

a) Succinyl CoA → Succinic acid b) Isocitric acid → Oxalosuccinic acid
c) Oxalosuccinic acid → α-ketoglutaric acid d) Malic acid → OAA

200. Which of the molecule listed below is a product of fermentation of glucose by yeast?
a) $(C_6H_{10}O_5)_n$ b) C_2H_5OH c) $C_6H_{12}O_6$ d) CH_3OH

201. Select the correct sequence of formation of given intermediates of Krebs' cycle.
a) Succinate → Malate → Fumarate → OAA
b) Fumarate → Succinate → Malate → OAA
c) Succinate → Fumarate → Malate → OAA
d) Malate → Fumarate → Succinate → OAA

202. The intermediate product between a-ketoglutaric acid and succinic acid in TCA cycle is
a) acetyl CoA b) succinyl CoA c) fumarate d) oxalosuccinic acid

203. Consider the first reaction of TCA cycle.

$$Acetyl\ CoA + OAA + H_2O \xrightarrow[Synthesis]{Citrate} Ⓐ + CoA$$

What is true about compound A?
a) First product of TCA cycle b) Tricarboxylic acid and six carbon compound
c) It undergoes reorganisation in the presence of enzyme aconitase to form cis-aconitate
d) All of these

204. Most of the energy of the carbohydrates is released by oxidation when
a) Pyruvic acid is converted into CO_2 and H_2O
b) Pyruvic acid is converted into CO_2 and H_2O c) Sugar is converted into pyruvic acid
d) glucose is converted into alcohol and CO_2

205. In animal cells, the first stage of glucose breakdown is_____
a) Krebs'cycle b) glycolysis c) oxidative phosphorylation d) ETC

206. Respiratory substrates are the organic substances which are _____ during respiration to liberate energy.
a) oxidised b) reduced c) synthesised d) both (a) and (b)

207. Electron transport chain (ETC) is a set of __ electron carriers present in a specific sequence along __ mitochondrial membrane.
a) seven, inner b) six, inner c) seven, outer d) six, outer

208. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as:
Assertion: The first step in TCA cycle is the condensation of pyruvate with oxaloacetic acid and water.
Reason: This reaction is catalysed by enzyme pyruvate synthase
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false. d) If both assertion and reason are false

209. RQ is___
a) C/N b) N/C c) CO_2/O_2 d) O_2/CO_2

210. Match column I with column II and select the correct option from the codes given below.

Column I	**Column II**
A. RQ	(i) Chemiosmotic ATP synthesis
B. Mitchel	(ii) Muscle fatigue

Column I	Column II
C. Cytochromes	(iii) Inner mitochondrial membrane
D. Lactic acid	(iv) Alcoholic fermentation
E. Yeast	(v) Respirometer

a) A-(v), B-(i), C-(iii), D-(ii), E-(iv) b) A-(v), B-(i), C-(iii), D-(iv), E-(ii)

c) A-(i), B-(v), C-(ii), D-(iii), E-(iv) d) A-(v), B-(ii), C-(iv), D-(iii), E-(i)

211. RQ of proteins, carbohydrates, fats and organic acids are in order

a) <1,1,<1,>1 b) >1,<1,1,1 c) 1,1,0,-1 d) 0,<1,1,>1.

212. Identify the enzymes 1 and 2 in the given reaction and select the correct option.

a)

1	2
Alcohol dehydrogenase	Pyruvate decarboxylasE

b)

1	2
Alcohol decarboxylase	Pyruvate dehydrogenase

c)

1	2
Pyruvate decarboxylase	Alcohol dehydrogenaseC

d)

1	2
Pyruvate dehydrogenase	Alcohol dehydrogenase

213. Fate of pyruvic acid during aerobic respiration is:

214. Which of the following statements regarding mitochondrial membrane is NOT correct?

a) The inner membrane is highly convoluted forming a series of infoldings

b) The outer membrane resembles a sleve

c) The outer membrane is permeable to all kinds

d) The enzymes of the electron transfer chain are embedded in the outer membrane

215. The end product of oxidative phosphorylation is:

a) NADH b) Oxygen c) ADP d) ATP + H_2O.

216. Site of EMP pathway in eukaryotes is

a) Inner mitochondrial membrane b) Cytoplasm c) Mitochondrial matrix

d) Both (2) & (3)

217. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as :

Assertion: Respiratory pathway is an amphibolic pathway.

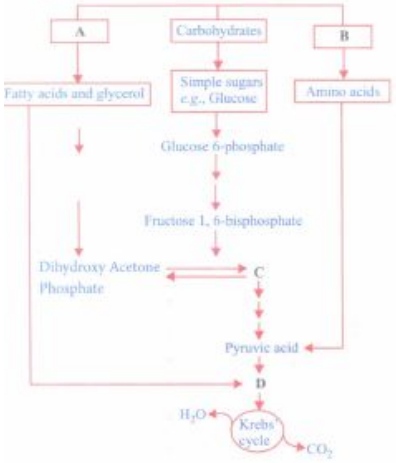
Reason: In respiration, there is breakdown of many substances (catabolism) and synthesis of many substances (anabolism) by respiratory intermediates

a) If both assertion and reason are true and reason is the correct explanation of assertion

b) If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false. d) If both assertion and reason are false

218. Refer to the given figure and select the correct option for A, B, C and D.



a)

A	B	C	D
Fats	Proteins	3-PGAL	Acetyl CoA

b)

A	B	C	D
Fats	Proteins	3-PGAL	CO_2

c)

A	B	C	D
Proteins	Fats	Acetyl CoA	PEP

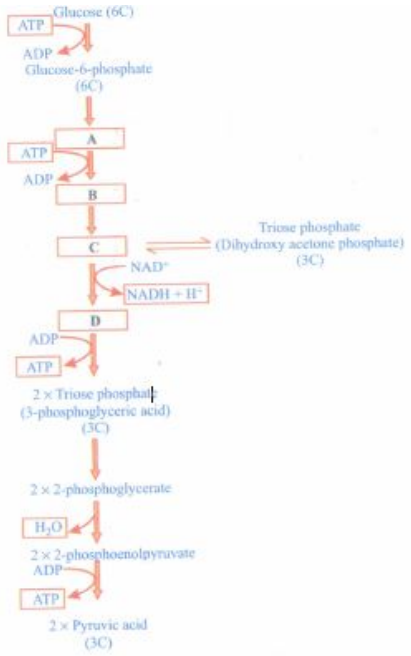
d)

A	B	C	D
Proteins	Fats	PEP	Acetyl CoA

219. 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

220. The flow chart given below shows the steps in glycolysis. Select the option that correctly fills in the missing steps A, B, C and D



a)

A	B	C	D
Fructose-6- phosphate	Fructose -1, 6-biphosphate	3-PGAL	1,3-biphospho glyceric acid

b)

A	B	C	D
Fructose-1,6-biphosphate	3-PGAL	1, 3-biphospho glyceric acid	3 PGA

c)

A	B	C	D
3-PGA	1,3- biphospho	3-PGAL	Fructose- 1, 6-biphosphate

d)

A	B	C	D
Fructose-l.6-biphosphate	Fructose -6-phosphate	3-PGAL	1.3-biphosphoglyceric acid

221. Maximum amount of energy/ATP is liberated on oxidation of _____
a) fats b) Proteins c) starch d) vitamins

222. Ethyl alcohol fermentation occurs in
a) Lactobacillus b) muscles of humans c) Rhizopus d) all of these

223. In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice as :
Assertion: When carbohydrates are used as substrate and are completely oxidised, the RQ is equal to 1.
Reason: When proteins are used in respiration, the RQ is greater than 1.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false