

B.Sc. II (Sem - III)
Zoology Paper VI
(Biochemistry)

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Q.1. Select the correct alternative and rewrite the sentence

1. In DNA double helix, the two DNA chains are held together by _____.

- A. Covalent bonds between the complementary basepairs
- B. Hydrogen bonds between the complementary base pairs
- C. Ionic bonds between the complementary basepairs
- D. None of the above

2. The 5' and 3' numbers are related to the

- A. Length of the DNA strand
- B. Carbon number in sugar
- C. Carbon number on nitrogen base
- D. It's for phosphate group attached to sugar

3. HMP shunt is required for which kind of metabolism?

- A. carbohydrate metabolism
- B. fat metabolism
- C. lipid metabolism
- D. amino acid metabolism

4. What is the location of pentose phosphate pathway to take place?

- A. cell membrane
- B. Cytosol
- C. ribosomes
- D. mitochondria

5. Which of the following is incorrect about DNA?

- A. Two strands of the DNA are anti parallel to each other.
- B. Adenine always pairs with thymine.
- C. Guanine always pairs with the cytosine.
- D. None of the above

6. If one cell has 40% A-T content, what will be the percentage of Guanine residue?

- A. 60%
- B. 15%
- C. 30%

D. Guanine residue can't be calculated

7. In deoxyribose sugar one oxygen atom is less at position _____

- a. 1' carbon atom
- b. 2' carbon atom
- c. 3' carbon atom
- d. 4' carbon atom

8. Double helical structure of DNA was explained by _____ in 1953.

- a. J. D. Watson
- b. F. H. C. Crick
- c. Watson & Crick
- d. None of the above

9. Which of the following statement is NOT true?

- A. HMP shunt stands for hexose monophosphate shunt
- B. HMP shunt does not generate CO₂
- C. HMP does not generate ATP
- D. pentose phosphate pathway takes place in cytosol

10. Which of the following statement is NOT true about glycolysis?

- A. It occurs in cytoplasm of the cell
- B. It also helps in fructose metabolism
- C. Glycolysis generates ATP
- D. Glycolysis generates CO₂

11. Which of the following enzymes participate in first phase of glycolysis?

- A. Hexokinase
- B. Phospho-fructokinase
- C. Aldolase
- D. All of the above

12. What stimulates the pentose phosphate pathway?

- A. high concentration of insulin
- B. low level of NADPH
- C. high level of NADPH
- d. both A and B

13. What is the product generated after the transketolase catalyzes the transfer of 2 carbon units from xylulose-5-phosphate to erythrose-4-phosphate?

- A. fructose-4-phosphate B. glyceraldehyde 3 phosphate
C. fructose-6-phosphate D. both B and C

14. Which enzyme belongs to the 2nd phase of HMP shunt?

- A. glucose-6-phosphate dehydrogenase B. 6-phosphogluconate
C. 6-phosphogluconate dehydrogenase D. none of the above

15. What type of reactions occurs in the 1st phase of pentose phosphate pathway?

- A. oxidative reversible B. non-oxidative reversible
C. non-oxidative irreversible D. oxidative irreversible

16. What is the function of ribulose-5-phosphate epimerase?

- A. epimerization of glucose-6-phosphate
B. epimerization of ribulose-5-phosphate
C. epimerization of xylulose-5-phosphate
D. epimerization of fructose -4-phosphate

17. Which form of energy is used by the glucose-6-phosphate dehydrogenase enzyme?

- A. ATP B. AMP C. GTP D. NADPH

18. Hexose monophosphate shunt is also called as-----

- A. TCA B. PPP C. HMP D. Glycogenolysis

19. Which of the following enzyme acts in PPP pathway----

- A. Glycogen phosphorylase B. 6-phosphogluconate dehydrogenase
C. Hexokinase D. Pyruvate Kinase

20. Main function of pentose phosphate pathway is -----

- A. Supply pentose sugars B. Supply NADPH C. Both A and B
D. Glucose

21. In the pentose phosphate pathway, the major products are ----

- A. Ribulose and NADPH B. Ribulose and NADH
C. Ribulose and NAD⁺ D. Ribulose and ATP

22. The first reaction of the pentose phosphate pathway is -----

- A. Oxidation of glucose 6-phosphate to 6-phosphoglucono- δ -lactone
- B. Oxidation of 6-phosphogluconate to ketopentose ribulose 5-phosphate
- C. Reduction of 6-phosphoglucono- δ -lactone to glucose 6-phosphate
- D. Reduction of ketopentose ribulose 5-phosphate to 6-phosphogluconate

23. Which of the following statements is correct about oxidative pentose phosphate pathway?

- A. It generates NADH
- B. It oxidizes NADPH to NADP⁺
- C. The pathway supplies ribose 5-phosphate and NADPH in the quantities the cell requires
- D. Glucose 6-phosphatase catalyzes the rate limiting reaction of the pathway

24. Which one out of the following enzymes acts in oxidative phase of pentose phosphate pathway?

- A. Aldolase
- B. Glycogen phosphorylase
- C. Pyruvate kinase
- D. 6-phosphogluconate dehydrogenase

25. Which one out of the following enzymes acts in Nonoxidative phase of pentose phosphate pathway?

- A. Aldolase
- B. Glycogen phosphorylase
- C. Pyruvate kinase
- D. 6-phosphogluconate dehydrogenase

26. Oxidation of 3 molecules of glucose by pentose phosphate pathway results in the production of

- A. 3 molecules of pentose, 6 molecules of NADPH and 3 molecules of CO₂
- B. 4 molecules of pentose, 6 molecules of NADPH and 3 molecules of CO₂

C. 4 molecules of pentose, 3 molecules of NADPH and 3 molecules of CO₂

D. 3 molecules of pentose, 4 molecules of NADPH and 3 molecules of CO₂

27. Which of the following is not an important precursor of glucose in animals?

A. Lactate B. Pyruvate C. Glycerol D. Glucose 6-phosphate

28. The enzyme which catalyzes the conversion of pyruvate to oxaloacetate

A. Pyruvate carboxylase B. Pyruvate dehydrogenase
C. Pyruvate kinase D. Phosphofructokinase-1

29. Oxaloacetate is reduced to malate by -----

A. Pyruvate carboxylase B. Malate dehydrogenase
C. Pyruvate kinase D. Phosphofructokinase-1

30. Gluconeogenesis involves conversion of -----

A. Glucose to pyruvate B. Pyruvate to glucose
C. Phosphoenolpyruvate to glucose D. Pyruvate to fructose

31. Pentose phosphate pathway is parallel to-----

A. Glycolysis B. Krebs cycle C. fermentation D. Respiration

32. Where are the enzymes for β -oxidation present?

A. Nucleus B. Cytosol C. Mitochondria D. Golgi apparatus

33. The long-chain fatty acids get transported through the inner mitochondrial membrane

A. as acyl-CoA derivative B. free fatty acid
C. as carnitine derivative D. require sodium-dependent carrier

34. What is the precursor for fatty acid synthesis?

A. Acetyl CoA B. Propionyl CoA
C. Succinyl CoA D. Acetoacetyl CoA

35. The conversion of acetyl CoA to malonyl CoA is the rate-limiting step in fatty acid synthesis. Which of the following enzyme catalyzes the above-mentioned reaction?

- A. Acetyl CoA carboxylase
- B. Malonyl CoA synthetase
- C. Acetyl CoA decarboxylase
- D. Malonyl CoA synthase

36. What form of energy is required for fatty acid biosynthesis?

- A. ATP
- B. NADH
- C. NADPH
- D. FADH₂

37. The role of L-carnitine in fatty acid metabolism is

- A. Facilitate the transport of fatty acid from the cytosol to mitochondria
- B. Serve as a cofactor for enzyme fatty acid synthase
- C. Activator of acetyl CoA carboxylase
- D. None of the above

38. Pentose phosphate pathways is also called as -----

- A. Phosphogluconate pathway
- B. HMP
- C. Both A and B
- D. HSK pathway

39. What is the net gain through the beta oxidation of palmitic acid?

- A. 131 ATP
- B. 130 ATP
- C. 129 ATP
- D. 132 ATP

40. The complete beta-oxidation of palmitoyl CoA yield

- A. 8 molecules of Acetyl CoA and 16 NADH
- B. 8 molecules of Acetyl CoA and 16 FADH₂
- C. 8 molecules of Acetyl CoA, 7NADH, and 7 FADH₂
- D. 8 molecules of Acetyl CoA and 16 NADPH

41. In DNA, there are

- A. Five bases known as adenine, guanine, thymine, tryptophan and cytosine
- B. Four bases known as adenine, guanine, thymine and cytosine
- C. Three bases known as adenine, guanine and cytosine
- D. Only two bases known as adenine and cytosine

42. In DNA, guanine pairs with

- A. Adenine
- B. Cytosine

C. Thymine

D. Uracil

43. What is the product generated after the completion of 1st phase?

A. ribulose-5-phosphate B. CO₂ C. NADPH D. all of the above

44. Through which process, the catabolism of fat occurs?

A. Beta oxidation B. Omega oxidation
C. Alpha oxidation D. All of the above

45. After each oxidation cycle, how many carbons are removed?

A. 2 B. 1 C. 3 D. 4

46. What modified base is present at the 5' extremity of a capped eukaryotic m-RNA?

A. 1-methyl-guanosine
B. 3-methyl-guanosine
C. 5-methyl-guanosine
D. 7-methyl-guanosine

47. What is the function of messenger RNA?

A. It carries amino acids
B. It is a component of the ribosomes
C. It carries information about amino acid sequence in a protein
D. It is the genetic material of some organisms

48. Which of following RNA contains unusual purines and pyrimidines?

A. rRNA
B. tRNA
C. mRNA
D. None of the above

49. The anticodon is a structure on a

- A. rRNA
- B. ribosome
- C. mRNA
- D. tRNA

50. The genetic material of retroviruses such as HIV is-----

- A. DNA
- B. RNA
- C. protein
- D. all of these

51. In a double stranded DNA molecule guanine forms ____ hydrogen bonds with cytosine.

- a. 1
- b. 2
- c. 3
- d. 4

52. In a double stranded DNA molecule adenine forms ____ hydrogen bonds with thymine.

- a. 1
- b. 2
- c. 3
- d. 4

53. In a DNA sample, there is 20% Adenine, what will be the percentage of cytosine?

- a. 20 %
- b. 30 %
- c. 40 %
- d. 60 %

54. In a DNA sample, there is 30% guanine, what will be the percentage of thymine?

- a. 20 %
- b. 30 %
- c. 40 %
- d. 60 %

55. Each turn of DNA helix has a length of _____.

- a. 24 Å
- b. 28 Å
- c. 34 Å
- d. 36 Å

56. Total width/diameter of DNA double helix is _____.

- a. 20 Å
- b. 10 Å
- c. 34 Å
- d. 3.4 Å

57. A nucleoside is formed by the combination of _____.

- a. Sugar + Nitrogenous base
- b. Sugar + phosphoric acid
- c. Phosphoric acid+ Nitrogenous base
- d. Sugar+ nitrogenous base + phosphoric acid

58. A nucleotide is formed by the combination of _____.

- a. Sugar + Nitrogenous base
- b. Sugar + phosphoric acid
- c. Phosphoric acid+ Nitrogenous base

d. Sugar+ nitrogenous base + phosphoric acid

59.The bond or linkage between two sugar molecules formed by phosphate group is called as _____.

- a. Glycosidic bond
- b. Peptide bond
- c. Phosphodiester bond
- d. Ester bond

60.The attachment of purine base to the carbon 1' of the sugar is through position _____.

- a. 1
- b. 3
- c. 6
- d. 9

61.Attachment of a pyrimidine to carbon 1' of sugar is through position _____.

- a. 1
- b. 3**
- c. 6
- d. 9

62.Ribonucleic acid (RNA) does not contain _____.

- a. Uracil
- b. Adenine
- c. Cytosine
- d. Thymine

63.Ribose sugar is a _____.

- a. Triose
- b. Tetrose
- c. Pentose
- d. Hexose

64. What is glycolysis?

- A. Utilization of glucose
- B. synthesis of glucose
- C. synthesis of glycogen
- D. breakdown of glycogen

65. Which of the following is the first enzyme of glycolysis?

- A. Pyruvate dehydrogenase
- B. Phosphofructokinase
- C. Hexokinase
- D. None of the above

66. Which enzyme converts pyruvate to lactate?

- A. Pyruvate kinase
- B. Pyruvate dehydrogenase**
- C. Pyruvate carboxylase
- D. Enolase

67. Which hormone stimulates glycolysis?

- A. Insulin**
- B. Glucagon
- C. Growth hormone
- D. All of the above

68. Which hormone inhibits glycolysis?

- A. Insulin
- B. Glucagon**
- C. Growth hormone

D. All of the above

69.Hexokinase is — dependent enzyme.

A. Zinc

B. Magnesium

C. sodium dependent

D. Iron

70.Which of the following is the smallest of the RNAs?

A. Messenger RNA

B. Transfer RNAs

C. Ribosomal RNAs

D. All of these

71.What is the average size of a mature t-RNA?

A. 70 to 100 bases

B. 100 to 120 bases

C. 120 to 140 bases

140 to 160 bases

72.TCA cycle is also known as?

A. Citric acid cycle

B. Kreb's cycle

C. Both

D. None

73.Which is the first compound formed in the TCA cycle?

A. Oxaloacetate

B. Citrate

C. Isocitrate

D. None of the above

74.The TCA cycle occurs in?

A. Mitochondrial matrix

- B. Cytosol
- C. Nucleus
- D. Ribosomes

75. Which compound generates acetyl-Co A?

- A. Lactate
- B. Pyruvate**
- C. Glucose
- D. Fructose

76. Which enzyme catalyzes the conversion of isocitrate to alpha-ketoglutarate?

- A. Isocitrate dehydrogenase**
- B. Isocitrate carboxylase
- C. Alpha-ketoglutarate dehydrogenase
- D. Aldolase

77. For _____ biomolecule/s the TCA cycle is the final common oxidative pathway.

- A. Carbohydrates
- B. Fats
- C. Amino acids
- D. All of the above**

78. Which of the following reaction requires FAD as hydrogen acceptor?

- A. Fumaric acid to Malic acid
- B. Succinic Co A to Succinic acid
- C. Succinic acid to fumaric acid**
- D. None of these

79. Which of the following statement is NOT true about Krebs's cycle?

- A. It occurs in mitochondria matrix of the cell
- B. It also helps in fructose metabolism

C. TCA cycle generates ATP

D. TCA cycle generates O₂

80. There is no direct participation of oxygen in the Krebs's cycle, but the cycle operates only in aerobic conditions. Why?

A. Oxaloacetate is generated only in presence of oxygen

B. FAD is generated only in presence of oxygen

C. NAD is generated only in presence of oxygen

D. Both B and C

81. The process of Glycolysis occurs in _____.

a. Ribosomes

b. Golgi complex

c. Cytoplasm

d. Mitochondria

82. The enzymes of TCA cycle are located in _____.

a. Endoplasmic Reticulum

b. Golgi complex

c. Ribosomes

d. Matrix of mitochondria

83. The formation of new glucose molecule from non-carbohydrate precursor compound is called as

a. Glycolysis

b. Glycogenesis

c. Gluconeogenesis

d. None of these

84. What is lipogenesis?

A. synthesis of lipid

B. catabolism of phospholipid

C. synthesis of fatty acids

D. catabolism of fatty acids

85. Which fatty acid contains 16 carbon skeleton?

- A. Palmitic acid
- B. glutamic acid
- C. Lauric acid
- D. Myristic acid

86. Where does lipogenesis takes place?

- A. cytoplasm
- B. mitochondria
- C. ribosomes
- D. nucleus

87. Which type of diet inhibits lipogenesis?

1. Where do the long-chain fatty acids get first activated?
2. A. Microsomes B. Mitochondria C. Cytosol D. Nucleus

88. In which compartment does the de novo fatty acid synthesis occur?

- A. Mitochondria
- B. Peroxisome
- C. Endoplasmic reticulum
- D. Cytosol

89. How many enzymatic sites does fatty acid synthase complex have?

- A. 8
- B. 6
- C. 7
- D. 5

90. Which form of energy is required for the conversion of acetyl-CoA to malonyl-CoA?

- A. NADH
- B. GTP
- C. AMP
- D. ATP

91. Which of the following is correct sequence of reactions occurring on enzyme fatty acid synthase complex?

- A. condensation-reduction-dehydration-reduction-Translocation
- B. dehydration-reduction-condensation-reduction-Translocation
- C. reduction-condensation-dehydration-reduction-Translocation
- D. reduction-condensation-reduction-dehydration-Translocation

92. Synthesis of fatty acids begins from which compound?

- a. acyl-CoA
- b. acetyl-CoA
- c. phospholipid
- d. lipoproteins

93. Carboxyl group of bicarbonate is transferred to _____ molecule of Acetyl Co A carboxylase enzyme during Malonyl Co A synthesis.

- a. Biotin carrier protein
- b. Biotin Carboxylase
- c. Transcarboxylase
- d. Biotin

94. β oxidation takes place in _____.

- A. cytosol
- B. mitochondria
- C. ribosomes
- D. nucleus

95. Activation of fatty acid for β oxidation requires _____.

- A. NADH
- B. GTP
- C. AMP
- D. ATP

96. Transport of fatty acyl Co A to mitochondrial matrix for β oxidation is brought about by ___?

- A. Carnitine acyl transferase
- B. Fatty acid synthase
- C. Fatty acyl Co A synthetase
- D. None of the above

97. β oxidation is completed in _____ steps.

- A. 1
- B. 3
- C. 4
- D. 7

98. Acetyl CoA is converted into malonyl CoA with the help of enzyme _____.

- A. Acetyl CoA synthase
- B. Acetyl CoA Carboxylase
- C. Acetyl CoA reductase
- D. Thioesterase

99. How many carbons are removed from fatty acid molecule in each β oxidation cycle?

- A. 1 B. 2 C. 3 D. 4

100. Which of the following product is released from fatty acid during β oxidation cycle?

- A. Acyl CoA B. Acetyl CoA C. CO₂ D. H₂O

101. What type of reactions occurs in 2nd phase?

- A. oxidative reversible B. non-oxidative reversible
C. non-oxidative irreversible D. oxidative irreversible

102. transaldolase enzyme catalyzes the transfer of how many carbon units from sedoheptulose-7-phosphate?

- A. 2 units C. 3 units C. 4 units D. 5 units

103. Glycolysis is also known as?

- A. Kreb's cycle
B. Respiratory cycle
C. Embden Meyerhof pathway
D. HMP-shunt

104. Which process shares the same pathway as glycolysis but in opposite direction?

- A. Glycogenesis B. Gluconeogenesis C. Glycogenolysis D. HMP-shunt

105. In which organ, lipogenesis occur mostly?

- A. liver B. Lungs C. mammary glands D. both A and C

106. Which of the following statement is NOT true?

- A. lipogenesis is same as lipolysis
B. fatty acids are synthesized from acetyl-CoA.
C. Insulin activates the acetyl-CoA carboxylase enzyme.
D. Glucagon inhibits the acetyl-CoA carboxylase enzyme

107. ----- number of phases involves in Pentose phosphate pathway.

A.2 B.4 C.6 D.1

108.----- molecule is generated in oxidative phase of pentose phosphate pathway.

A.ATP B.NADPH C.NADH D.GTP

109. Function of carbohydrate in diet is.....

(a) Supply energy (b) Supply lipid (c) Supply protein (d) None of above

110. Enzymes are basicallyin nature

(a)Protein (b) Lipid (c) Carbohydrates (d) None of abov

111. Adjacent nucleotide are joined by

(a) Covalent bomd (b) Ionic bond (c) Phosphodiester bond (d) Hydrogen bond

112. TCA cycle occurs in

(a)mtrix of mitochondria (b) Nucleus (c) Nucleolous (d) All of above

113. Kreb's Cycle's another name is -----

(a) EMP pathway (b) TCA cycle (c) Glycolysis (d) All

114. Deamination means.....

(a) Removal of amino group (b) Transfer of amino group

(c) Both a and b (d) None of the above

115. The formation of new glucose molecule from non carbohydrate precursor is called

(a) Glycolysis (b) Glycogenolysis (c) Gluconeogenesis (d)none of these

116. Enzymes are polymers of.....

(a) Amino acid (b) Fatty acids (c) Hexoxse sugar (d) organic substance

117. The is rate limiting step in the oxidation of fatty acid in the mitochondria

(a)Acyl CoA (b) NADPH (c) Acetyl CoA carboxylase (d) carnitine shuttle

118. End product of Glycolysis is.....

(a) Pyruvic acid (b) Citric acid (c) Fumaric Acid (d)All of above

119. Koshland theory of enzyme action known as
- (a) Induced fit theory (b) Coenzyme theory (c) Reduced fit theory (d) All of above
120. Transamination means
- (a) Transfer of amino group (b) Removal of amino group (c) both a and b (d) all of above
121. Glycolysis is also known as
- (a) TCA (b) EMP (c) Gluconeogenesis (d) None of above
122. Micells are converted into chylomicron in theorganelles of the cell
- (a) ER (b) lysosome (c) Golgi complex (d) Nucleus
123. Fatty acid synthase (FAS) is the enzyme complex composed ofnumber of enzyme
- (a) 3 (b) 4 (c) 5 (d) 7
124. is a milk sugar
- (a) Galactose (b) Lactose (c) Maltose (d) Mannose
125. The is rate limiting step in the oxidation of fatty acid in the mitochondria
- (a) Acyl CoA (b) NADPH (c) Acetyl CoA carboxylase (d) carnitine shuttle
126. amino acid is called as scavenger of ammonia
- (a) threonin (b) serine (c) alpha ketoglutamic acid (d) Glycine
127. Enzymes are classified ingroup
- (a) 3 (b) 6 (c) 4 (d) 2
128. Enzymes are polymers of.....
- (a) Amino acid (b) Fatty acids (c) Hexose sugar (d) organic substance

Q.2 Give the answers of the following questions

1. Define Gluconeogenesis, Write how body synthesise glucose from lactose and different amino acids

2. Describe in detail types of RNAs.
3. Describe in detail fatty acid synthesis.
4. Describe in detail beta oxidation of fatty acid.
5. Describe in detail Watson & Crick model of DNA.
6. Define Glycolysis, Write in detail about pathway of Glycolysis
7. What are nucleotides? How are they formed?
8. What is RNA? Describe its biological role
9. Give an account of structure and functions of DNA
10. What are carbohydrates? Explain in brief classification of Carbohydrates
11. Explain Glycolysis with its significance
12. Explain in brief Gluconeogenesis
13. Describe in detail Hexose Monophosphate Shunt
14. Explain mechanism of digestion & absorption of fatty acids from alimentary canal to blood
15. Explain activation & transportation of free fatty acids into mitochondria
16. Explain transportation of Acetyl CoA from cell cytosol to mitochondrial matrix
17. Explain beta oxidation in eukaryotic cell
18. Describe fatty acid synthesis in eukaryotic cell
19. Describe how excess amino acids, sugars are converted into fatty acid in eukaryotic cell
20. Explain the role of fatty acid synthesis in eukaryotic cell
21. Explain the detail structure of fatty acid synthase with suitable diagram
22. What is body's way to convert ammonia to urea
23. Explain in detail protein metabolism in animals
24. Explain Urea cycle of ureotelic animals
25. Why carbonyl phosphate synthase I (CPS I) and N- acetyl glutamate (NAG) called as rate limiting factors of ornithine cycle
26. Describe chemical nature of Enzymes
27. Describe how enzymes are classified and its naming methods
28. Describe mechanism of Enzymes actions
29. Explain factors influencing enzyme activity
30. Explain Michaelis Menten constant

Q.3 Write short note on following

- 1. Cori cycle**
- 2. Urea cycle**
- 3. Induced fit hypothesis**
- 4. EMP pathway**
- 5. ETC**
- 6. Coenzymes**
- 7. Koshland hypothesis**
- 8. Isoenzymes**
- 9. PPP pathway**
- 10. Transamination**
- 11. t-RNA**
12. Significance of TCA cycle
13. Carbohydrates
14. Nucleosides
15. Nucleotides
16. Nitrogen bases
17. mRNA
18. r RNA
19. Comparison between different types of RNA
20. fatty acid synthase complex
21. Formation of malonyl CoA
22. Mechanism of deamination of urea cycle
23. Explain ornithine cycle
24. Digestion process of proteins in alimentary canal of human
25. Absorption of amino acids from intestinal lumen into blood
26. Cofactors
27. Enzyme inhibition