1. Acetoacetate decarboxylase catalyzes the decarboxylation of acetoacetate via formation of Schiff base between the ketone of acetoacetate and its Lys 115. Which of the following is most likely correct?

a) The perturbed pKa of Lys 115 is a result of interaction with Glu 76
b) The pKa of Lys 115 is increased by its microenvironment
c) The measured pKa of Lys 115 is 11.96
d) The perturbed pKa of Lys 115 is a result of interaction with Lys 116##
e) Lys 115 is a base catalyse

2. In the chymotrypsin mechanism, which of the following is most likely incorrect?

a) The pKa of Ser 195 is lowered by the combined effect of Asp 102 and His 57
b) His 57 is an acid-base catalysts
c) Ser 195 acts as a nucleophile
d) The pKa of His 57 is increased by Asp 102
e) Ser 195 acts as an acid catalyst by donating its hydrogen to His 57##

3. Which of the following is most likely correct?

a) Zymogen can catalyze hydrolysis only in the presence of cofactor
b) Activation of trypsinogen by trypsin is an example of autoactivation##
c) A comparison of the X-ray structures of chymotrypsin and trypsin reveals that their substrate specificity pockets are virtually identical
d) The oxyanion hole is not found in chymotrypsin is different from that of trypsin
e) None of the rest

4. A plasmid with 4000 bp of closed circular duplex DNA was isolated from E. coli. It has a 300-bp segment of alternating C and G residues. Upon transfer to a high salt solution, this segment undergoes a transition from the B conformation to the Z conformation. Which of the followings is CORRECT after this plasmid is further treated with a type IB topoisomerase that is active at the high salt solution and then transferred back to a low salt solution?

a) Its final writhing number is 55##
b) Its original linking number is 400
c) Its linking number is not changed
d) The change in its twist is -55
e) All answers are correct

5. Which of the following describes the kinetics of an enzyme-catalyzed reaction affected by an irreversible inhibitor?

a) Figure 4
b) Figure 5
c) Figure 7
d) Figure 8
e) None of the rest##

6. Which of the following expresses the velocity for an enzyme-catalyzed reaction that obeys Michaelis-Menten kinetics?

a) v = k2[ES]
b) v = k1[E][S]##
c) v = k2[ES] - k-1[ES]
d) v = k1[E][S] + k2[ES]
e) v = k1[E][S] - k-1[ES]

7. Which of the following is incorrect about human genome?

a) The estimated number of protein-coding genes in the human genome is 22000
b) Protein-coding genes make up 1.5% of the genome
c) The average length of protein-coding genes is 27000 bp′s
d) 80% of the genome are transcribed into coding RNA's##
e) The majority of the bp's in a typical gene belong to introns.

8. Which of the following is incorrect about transcription factors?

a) There are 6 highly conserved Eukaryotic General Transcription Factors
b) TFIID has a TBP subunit
c) Bromodomain has a cavity for methyl-lys##
d) TBP induces a kink in DNA
e) The ″II″ in TFIIB indicates the TF is specific to polymerase II

9. Which of the following is true about DNA and RNA polymerase

a) Only DNA polymerase carries out proofreading
b) Polymerase catalyzes nucleophilic attack of 3' OH of growing polypeptide chain to 5' phosphate of the incoming nucleotide
c) Only DNA polymerase has the finger, palm, thumb like structure
d) Prokaryotic DNA polymerase III has a clamp liked subunit that enhances its processivity##
e) Eukaryotic cells only have 1 type of RNA polymerase

10. Genomic DNA that encodes proteins undergoes the process of _____ to produce _____.

a) transcription; mRNA##
b) transcription; tRNA
c) translation; rRNA
d) translation; proteins
e) transcription; proteins

11. Which of the following best describes the nucleic acid complex formed during RNA polymerization?

a) two DNA-RNA hybrids since both DNA strands are transcribed simultaneously
b) one DNA-RNA hybrid and one single stranded DNA##
c) one DNA-RNA hybrid with the other DNA strand bound to an RNA molecule on RNA polymerase

d) there is no interaction between the growing RNA and the DNA
e) none of the rest

12. Which of the eukaryotic transcription factors is responsible for binding the TATA box?
a) TFIIB
b) TFIID##
c) TFIIE
d) TFIIF
e) TFIIH

13. TFIIH is a transcription factor that is responsible for forming the transcription bubble. For this reason, TFIIH is best described as a _____.
a) gyrase
b) ligase
c) helicase##
d) endonuclease
e) single-strand binding protein

14. Genes that are not often transcribed generally have _____ sequences that bind to _____ proteins.
a) inhibitor; mediator
b) interrupter; regulatory
c) obstruction; restraint
d) silencer; repressor##
e) negative control; arrestor

15. The protein that is responsible for bringing together proteins bound to enhancers with proteins bound to promoters is called _____.
a) TAF1
b) chromatin remodeling enhancer
c) mediator complex##
d) sigma subunit of RNA polymerase
e) none of the rest

16. What does allolactose bind?
a) lac operon
b) lac repressor##
c) operator
d) promoter
e) all of the above

17. Which of the following best describes the functioning of the lac repressor protein?
a) in the presence of allolactose, the protein binds the operator inhibiting transcription
b) in the presence of allolactose, the protein binds the operator enhancing transcription

c) in the absence of allolactose, the protein binds the operator inhibiting transcription##
d) in the absence of allolactose, the protein binds the operator enhancing transcription
e) none of the above

18. RNA polymerase is said to have high _____, meaning that it can catalyze thousands to millions of reactions without releasing the DNA template
a) processivity##
b) continuity
c) fidelity
d) stability
e) connectivity

19. Which transcription factor is required to aid RNA polymerase in the removal of an incorrect nucleotide incorporated into the growing RNA?
a) TFIIP
b) TFIIS##
c) TFIIT
d) TFIIX
e) TFIIZ

20. In prokaryotic transcription, what must be released for the switch from initiation to elongation to occur?
a) TFIIB
b) ADP following phosphorylation of the RNA polymerase C-terminal domain
c) regulatory subunit bound to the C-terminal domain
d) sigma subunit##
e) the TATA-binding protein

21. Phosphorylation of the C-terminal domain of eukaryotic RNA polymerase inhibits interaction with what protein, thus allowing the polymerase to leave the promoter?
a) mediator complex##
b) all transcription factors
c) TFIIF and TFIIH
d) TFIIS
e) none of the rest

22. During termination, Rho acts as a _____.
a) polymerase
b) ligase
c) NTP hydrolase
d) single-strand binding protein
e) helicase##

23. What is the purpose of the poly(A) tail on eukaryotic mRNA?

a) binds to short poly(U) molecules forming duplex RNA that resists degradation
b) forms a stem loop to aid in transport to the cytosol
c) aids in transport to the lysosome for degradation once the ribosome is finished with it
d) binds to the poly(A) binding protein to prevent exonuclease activity##
e) none of the above

24. Which of the following is the major factor in determining how quickly an mRNA is degraded?
a) overall length of the mRNA
b) degree of intron removal
c) how quickly the cap is removed
d) length of poly(A) tail##
e) all of the above play a role

25. Which of the following details the correct sequence of events for RNA interference mediated by siRNA?
a) degradation of passenger RNA strand, binding of mRNA, formation of double-stranded RNA, cleavage by dicer, binding to RISC, cleavage of mRNA
b) binding to RISC, binding of mRNA, formation of double-stranded RNA, degradation of passenger RNA strand, cleavage by dicer, cleavage of mRNA
c) formation of double-stranded RNA, cleavage by dicer, binding to RISC, degradation of passenger RNA strand, binding of mRNA, cleavage of mRNA##
d) binding of mRNA, formation of double-stranded RNA, degradation of passenger RNA strand, cleavage by dicer, binding to RISC, cleavage of mRNA
e) binding of mRNA, formation of double-stranded RNA, cleavage by dicer, degradation of passenger RNA strand, binding to RISC, cleavage of mRNA

26. Diisopropylphosphofluoridate (DIPF) was used to identify the active site serine of chymotrypsin. Which of the following figures best describe the kinetics of DIPF's reaction with chymotrypsin?
a) Figure 4##
b) Figure 5
c) Figure 8
d) Figure 9
e) None of the rest

27. Which of the following figures best describe the kinetics of reaction between Bovine Pancreatic Trypsin Inhibitor (BPTI) with Trypsin?
a) Figure 4##
b) Figure 5
c) Figure 6
d) Figure 7
e) None of the rest

28. According to Figure 2 and Table 1, mutation of Glycine 216 to Threonine on Chymotrypsin will most likely _____ for Chymotrypsin and ____

a) decreases the KM; N-Acetyltyrosine ethyl ester
b) increases the KM; N-Acetylalanine ethyl ester
c) decreases the kcat/Km; N-Acetylglycine ethyl ester
d) increases the kcat/km; N-Acetylalanine ethyl ester##
e) none of the rest

29. According to Figure 2 and Table 1, which of the following enzyme-substrate pairs has the lowest catalytic efficiency?

a) Acetylcholinesterase : Acetylcholine
b) Carbonic anhydrase : CO2
c) Catalase : H2O2
d) Chymotrypsin: N-Acetylglycine ethyl ester
e) Elastase: N-Acetyltyrosine ethyl ester##

30. Acetoacetate decarboxylase catalyzes the decarboxylation of acetoacetate via formation of Schiff base between the ketone of acetoacetate and its Lys 115. Which of the following is most likely incorrect?

a) The measured pKa of Lys 115 is 5.96
b) Lys 115 is a potent nucleophile
c) The pKa of Lys 115 is perturbed by its microenvironment
d) The perturbed pKa of Lys 115 is a result of interaction with Lys 116
e) The perturbed pKa of Lys 115 is a result of its contact with a phosphate anion##

31. In the chymotrypsin mechanism, which of the following is most likely incorrect?

a) The pKa of Ser 195 is lowered by the combined effect of Asp 102 and His 57
b) The pKa of His 57 is increased by Asp 102
c) His 57 is an acid-base catalysts
d) Ser 195 acts as a nucleophile
e) Ser 195 acts as an acid catalyst by donating its hydrogen to His 57##

32. Which of the following is most likely incorrect?

a) A comparison of the X-ray structures of chymotrypsin and chymotrypsinogen reveals that the conformations of their active site Asp, His, and Ser residues are virtually identical
b) Zymogen can catalyze hydrolysis extremely slowly
c) The substrate specificity pocket in chymotrypsinogen is incompletely formed
d) The oxyanion hole in chymotrypsinogen is incompletely formed
e) Activation of chymotrypsinogen by trypsinogen is an example of autoactivation##

33. How are the kinetics of an enzyme-catalyzed reaction affected by an irreversible inhibitor?

a) Vmax decreased, KM increased
b) Vmax decreased, KM decreased

c) Vmax decreased, KM unchanged##
d) Vmax unchanged, KM increased
e) Vmax unchanged, KM decreased

34. Which of the following expresses the velocity for an enzyme-catalyzed reaction that obeys Michaelis-Menten kinetics?
a) v = k1[E][S]
b) v = k1[E][S] - k-1[ES]
c) v = k1[E][S] + k2[ES]
d) v = k2[ES]##
e) v = k2[ES] - k-1[ES]

35. Which of the following must be true if the steady state assumption is to be used?
a) [E]T = [ES]
b) (k2 - k-1) / k1 = 1
c) k1[E][S] = k2[ES]
d) k1[E][S] = k2[ES] - k-1[ES]
e) d[ES] / dt = 0##

36. When is KM considered to be the same as the dissociation constant for the ES complex i.e., KM = [E] [S] / [ES].
a) ES -> E + P is fast compared to ES -> E + S
b) the turnover number is very large
c) kcat/KM is near the diffusion-controlled limit
d) k2 << k-1##
e) KM can never be the same as the dissociation constant

37. What percentage of Vmax is obtained when the substrate is present at 1/4 of the KM?
a) 5%
b) 20%##
c) 25%
d) 80%
e) 100%

38. If an enzyme-catalyzed reaction has a velocity of 2 mM/min and a Vmax of 10 mM/min when the substrate concentration is 0.5 mM, what is the KM?
a) 0.2 mM
b) 0.5 mM
c) 1 mM
d) 2 mM##
e) 5 mM

39. If an enzyme-catalyzed reaction with a KM of 3.5 mM has a velocity of 5 mM/min at a substrate concentration of 0.5 mM, what is the Vmax?

a) 0.625 mM/min
b) 15 mM/min
c) 17.5 mM/min
d) 35 mM/min
e) 40 mM/min##

40. The catalytic constant, or kcat, is also known as the _____.
a) turnover number##
b) saturation number
c) catalytic efficiency number
d) diffusion number
e) Menten number

41. Which of the following indicates that an enzyme has evolved to its most efficient form?
a) kcat is a large number
b) KM is a small number
c) KM is a large number
d) kcat/KM is a small number
e) kcat/KM is near the diffusion-controlled limit##

42. An extremely efficient enzyme has a _____ KM and a _____ kcat.
a) small; small
b) small; large##
c) large; large
d) large; small
e) kcat and KM do nothing to predict the efficiency of an enzyme

43. If a Lineweaver-Burk plot gave a line with an equation of y = 0.490 x + 0.059, what is the velocity at a substrate concentration of 5 mM? The original units for substrate were in mM and velocity in mM/s.
a) 0.288 mM/s
b) 0.399 mM/s
c) 2.51 mM/s
d) 6.37 mM/s##
e) the velocity cannot be determined from this data

44. At pH 9, how many charged groups are present in the pentapeptide ADHRCK?
a) 3
b) 4
c) 5
d) 6##
e) 7

45. A plot of velocity versus substrate concentration for a simple enzyme-catalyzed reaction produces a _____. This indicates that at some point, the enzyme is _____.
a) straight line; inhibited by product
b) hyperbolic curve; saturated with substrate##
c) sigmoidal curve; inhibited by substrate
d) hyperbolic curve; activated by substrate
e) sigmoidal curve; saturated with substrate

46. In a bisubstrate reaction, reactant A binds, followed by reactant B which then get converted to products C and D. An experiment showed that B cannot bind without A having bound first. What mechanism is indicated by this data?
a) ordered mechanism##
b) random mechanism
c) ping pong mechanism
d) cooperative mechanism
e) none of the above

47. In a bisubstrate reaction, reactant A binds and is then converted to product C. Next, reactant B binds and is then converted to product D. An experiment showed that B cannot bind without C being released first. What mechanism is indicated by this data?
a) ordered mechanism
b) random mechanism
c) ping pong mechanism##
d) cooperative mechanism
e) none of the above

48. How are the kinetics of an enzyme-catalyzed reaction affected by a purely noncompetitive inhibitor?
a) Vmax decreased, KM increased
b) Vmax decreased, KM decreased
c) Vmax decreased, KM unchanged##
d) Vmax unchanged, KM increased
e) Vmax unchanged, KM decreased

49. What type of inhibition explains why even at very high substrate concentrations, enzyme activity will decrease as time increases?
a) allosteric inhibition
b) product inhibition##
c) transition state analogs
d) irreversible inhibition
e) uncompetitive inhibition

50. Which of the following represents a rapid and reversible mechanism to alter the activity of an enzyme?

a) synthesis of more enzyme to increase activity
b) degradation of enzyme to decrease activity
c) covalent attachment of a phosphate group to increase or decrease activity##
d) movement of an enzyme from one cellular compartment to another
e) none of the above

51. When is KM considered to be the same as the dissociation constant for the ES complex i.e., KM = [E] [S] / [ES].
a) ES -> E + P is fast compared to ES -> E + S
b) the turnover number is very large
c) kcat/KM is near the diffusion-controlled limit
d) k2 >> k-1
e) none of the rest##

52. An extremely efficient enzyme has a _____ kcat and a _____ KM.
a) small; small
b) small; large
c) large; large
d) large; small##
e) kcat and KM do nothing to predict the efficiency of an enzyme

53. Which of the following best describe a substrate-enzyme system that has an KM value of 10 to the power of -6
a) The dissociation constant of the substrate-enzyme complex is very small##
b) Kcat is very large
c) This substrate-enzyme system is very efficient
d) This substrate-enzyme system approaches diffusion limit
e) none of the rest

54. For a reaction A + B -> C, if [B] is much larger than [A] so that [B] essentially remains constant over the course of the reaction, the kinetics will be _____.
A) zero-order
B) hyperbolic
C) first-order
D) sigmoidal
E) pseudo first-order##

55. Which of the following must be true for an enzymatic reaction obeying the Michaelis-Menten equation to reach 4/5 of its maximum velocity?
a) [S] must be 3/4 KM
b) [S] must be 1.5 KM
c) [S] must be 2KM
d) [S] must be 3KM
e) [S] must be 4KM##

56. What percentage of Vmax is obtained when the substrate is present at 1/3 of the KM?
a) 5%
b) 20%
c) 25%##
d) 80%
e) 100%

57. If an enzyme-catalyzed reaction has a velocity of 4 mM/min and a Vmax of 10 mM/min when the substrate concentration is 0.5 mM, what is the KM?
a) 0.2 mM
b) 0.75 mM##
c) 1 mM
d) 2 mM
e) 5 mM

58. If a Lineweaver-Burk plot gave a line with an equation of y = 0.490 x + 0.059, what is the velocity at a substrate concentration of 7 mM? The original units for substrate were in mM and velocity in mM/s.
a) 0.288 mM/s
b) 0.399 mM/s
c) 2.51 mM/s
d) 6.37 mM/s
e) 7.75 mM/s##

59. If a Lineweaver-Burk plot was made for an enzyme-catalyzed reaction, both with and without a competitive inhibitor present, what difference would be seen?
a) the y-intercept would be lower for the inhibited reaction
b) the y-intercept would be higher for the inhibited reaction
c) the slope would be less for the inhibited reaction
d) the slope would be the same as the inhibited reaction
e) none of the rest##

60. According to Figure 1 and Table 2, mutation of Glycine 216 to Threonine on Chymotrypsin will most likely _____ for Chymotrypsin and ____
a) decreases the KM; N-Acetyltyrosine ethyl ester
b) increases the KM; N-Acetylalanine ethyl ester
c) decreases the kcat/Km; N-Acetylglycine ethyl ester
d) increases the kcat/km; N-Acetyltyrosine ethyl ester
e) none of the rest##

61. According to Figure 1 and Table 2, which of the following enzyme-substrate pairs has the lowest catalytic efficiency?
a) Acetylcholinesterase : Acetylcholine

b) Carbonic anhydrase : CO_2
c) Catalase : H_2O_2
d) Chymotrypsin: N-Acetylglycine ethyl ester
e) Elastase: N-Acetyltyrosine ethyl ester##

62. What does the KI for a competitive inhibitor mean?
a) higher KI values mean tighter binding to ES complex
b) lower KI values mean tighter binding to ES complex
c) higher KI values mean tighter binding to the enzyme
d) lower KI values mean tighter binding to the enzyme##
e) KI values tell nothing about inhibitor binding

63. Which of the following represents a rapid and reversible mechanism to alter the activity of an enzyme?
a) synthesis of more enzyme to increase activity
b) degradation of enzyme to decrease activity
c) covalent attachment of a sulphate group to increase or decrease activity
d) movement of an enzyme from one cellular compartment to another
e) none of the rest##

64. How are the kinetics of an enzyme-catalyzed reaction affected by an irreversible inhibitor?
a) Vmax decreased, KM increased
b) Vmax decreased, KM decreased
c) Vmax decreased, KM unchanged##
d) Vmax unchanged, KM increased
e) Vmax unchanged, KM decreased

65. Which of the following is true regarding transition state analogs?
A) they are competitive inhibitors
B) they bind to an active site with much higher affinity than most inhibitors
C) they are much more stable than the transition state
D) their affinity for an enzyme is often much greater that the substrate
E) all of the rest##

66. A plasmid with 5000 bp of closed circular duplex DNA was isolated from E. coli. It has a 600-bp segment of alternating C and G residues. Upon transfer to a high salt solution, this segment undergoes a transition from the B conformation to the Z conformation. Which of the followings is CORRECT AFTER this plasmid is further treated with a type IB topoisomerase that is active at the high salt solution and then transferred back to a low salt solution?
a) Its final writhing number is -110##
b) Its original linking number is 500
c) The overall change in its linking number is zero
d) The overall change in its twist is -110

e) All answers are correct

67. If a 600-bp segment of the DNA in a relaxed circular-covalently-closed plasmid is induced to change from B-DNA to Z-DNA and then treated by an enzyme that has type IB topoisomerase activity, what happens to the value of the linking number?
a) decreases##
b) remains the same
c) increases
d) need to know the size of the plasmid
e) none of the answers

68. An antibiotic that interferes with bacterial topoisomerase activity is _____, which specifically inhibits _____.
A) ciprofloxacin; DNA gyrase##
B) doxorubicin; type IA topoisomerase
C) novobiocin; ATPase
D) camptothecin; type II topoisomerase
E) none of the rest

69. Besides the obvious role of keeping DNA in a single strand state, what do single-strand binding proteins do?
A) prevent supercoiling
B) protect single stand DNA from nucleases##
C) aid in the formation of hairpin structures
D) aid DNA polymerase with DNA binding
E) all of the rest

70. In most organisms, replication proceeds in a _____ manner from the _____.
A) bidirectional; replication origin##
B) bidirectional; theta site
C) bidirectional; lagging strand
D) unidirectional; chromosome ends
E) none of the rest

71. Which of the following is found in high concentration in all telomeres?
A) A
B) C
C) G##
D) T
E) pyrimidines

72. Which tumor suppressor gene is found to be mutated in at least half of all human tumors?
A) BRCA1
B) BRCA2

C) retinoblastoma
D) p53##
E) none of the rest

73. Which of the following mutations would cause a bulge in the DNA backbone?
A) point mutation
B) transversion mutation##
C) transition mutation
D) frame shift mutation
E) all of the rest

74. What is the process used for genes shuffling in meiosis that is also used to repair double-strand breaks?
A) homologous end-joining
B) nonhomologous end-joining
C) recombination##
D) non-mutagenic strand coupling
E) telomerase-assisted ligation

75. What type of modification is used to make CpG islands?
A) acetylation of guanine
B) methylation of guanine
C) phosphorylation of guanine
D) acetylation of cytosine
E) methylation of cytosine##

76. The four most abundant elements found in biological systems are:
a) Potassium, cobalt, nitrogen, bromine
b) Hydrogen, carbon, nitrogen, oxygen##
c) Hydrogen, carbon, sodium, sulfur
d) Calcium, chlorine, carbon, hydrogen
e) Calcium, hydrogen, carbon, nitrogen

77. The first law of thermodynamics states that:
a) Mass is conserved
b) Energy is lost
c) Energy is conserved##
d) Enthalpy increases
e) Entropy decreases

78. CEPwtEE stands for:
a) Coupled Enzymatic Paradigm with the Expense of Effort
b) Coupled Enzymatic Processes with the Effort of Exertion
c) Core Enzymatic processes with the Expenditure of Exertion

d) Coupled Enzymatic Processes with the Expense of Energy##
e) Couples Enter Programs with the Energy of Ebola

79. What percentage of the human body is composed of water?
a) 5%
b) 15%
c) 60%##
d) 85%
e) 97%

80. Which element has the highest electronegativity?
a) Carbon
b) Fluorine##
c) Hydroen
d) Nitrogen
e) Oxygen

81. DNA is polymers of nucletodies consisting of _____, _____ and _____.
a) Purine or pyrimidine base, ribose, sulfate
b) Purine or pyrimidine base, deoxyribose, phosphate##
c) Purine or pyrimidine base, ribose, phosphate
d) Purine or pyramidine base, deoxyribose, nitrate
e) None of the above

82. The process of going from genes to proteins includes _____, _____ and then _____.
a) Replication, transcription, translation##
b) Transcription, translation, replication
c) Replication, translocation, transcription
d) Replication, translation, transcription
e) Translation, replication, transcription

83. What are the three fundamental types of RNA?
a) Messenger, transfer and transcriptional
b) Messenger, transfer and ribosomal##
c) Transfer, ribosomal and transcription
d) Transfer, messenger and bichromal
e) Messenger, bichromal and transcriptional

84. What bases are purines?
a) Adenine, cytosine
b) Cytosine, thymine
c) Pyrimidine, cytosine
d) Adenine, guanine##
e) Thymine, pyrimidine

85. In DNA, A and T form ___ H-bonds and G and C form ___ H-bonds.
a) 1, 2
b) 2, 2
c) 2, 3##
d) 3, 3
e) 3, 2

86. Proteins containing more than one polypeptide chain have _____ structure.
a) quaternary##
b) tertiary
c) secondary
d) primary
e) none of the above

87. The sequence of amino acids in a polypeptide can be determined by:
a) high performance liquid chromatography
b) size exclusion chromatography
c) thin layer chromatography
d) mass spectrometry##
e) magnetic resonance imaging

88. In size exclusion chromatography, ___ molecules elute first.
a) small
b) large##
c) charged
d) non-charged
e) polar

89. The 20 amino acid constituents of proteins are differentiated by the chemical properties of their side chains, which can be roughly classified as:
a) hydrophobic, polar or charged##
b) hydrophilic, polar or charged
c) hydrophobic, non-polar or charged
d) hydrophilic, non-polar or charged
e) none of the above

90. A globular protein has a _____ core and is stabilized primarily by the _____ effect.
a) hydrophilic, hydrophilic
b) hydrophobic, hydrophilic
c) hydrophobic, hydrophobic##
d) hydrophobic, ion pairing
e) ionic, ion pairing

91. ____ forms microfilaments in cells.
a) Actin##
b) Tubulin dimers
c) Keratin filaments
d) Collagen
e) Myoglobin

92. _____ constitute microtubules.
a) Actin
b) Tubulin dimers##
c) Keratin filaments
d) Collagen
e) Myoglobin

93. _____ constitute the bulk of animal hair.
a) Actin
b) Tubulin dimers
c) Keratin filaments##
d) Collagen
e) Myoglobin

94. ____ is a major protein in connective tissue.
a) Actin
b) Tubulin dimers
c) Keratin filaments
d) Collagen##
e) Myoglobin

95. Aside from their transport, structural and motor functions some other functions of proteins include:
a) catalysis
b) immunity
c) regulation of gene expression
d) all of the above##
e) none of the above

96. Which of the following is NOT a way to increase the rate of a chemical reaction?
a) Increasing the temperature (adding energy in the form of heat)
b) Increasing the concentrations of the reacting substances
c) Adding a catalyst
d) Decreasing the temperature (removing energy in the form of heat)##
e) None of the above

97. Ligases catalyze _____.

a) oxidation-reduction reactions
b) transfer of functional groups
c) hydrolysis reactions
d) group elimination to form double bonds
e) bond formation coupled with ATP hydrolysis##

98. The catalytic activity of enzymes depends on all of the following EXCEPT:
a) transition state stabilization
b) proximity and orientation effects
c) entropy##
d) induced fit
e) electrostatic catalysis

99. Inactive zymogens are activated by:
a) proteolysis##
b) catalysis
c) hydrogen bonding
d) inhibition
e) none of the above

100. A cavity on the enzyme surface at the active site that accommodates the residue on the N-terminal side of the scissile peptide bond is called the:
a) binding site
b) N-terminal domain
c) specificity pocket##
d) N-terminal pocket
e) none of the above

101. The point where the parental strands separate and the new strands are synthesized is known as the _____.
a) new fork
b) replication fork##
c) replication strands
d) parental fork
e) replication axes

102. Lagging strands consist of a series of polynucleotide segments called _____.
a) Okazaki fragments##
b) Okazaki strands
c) Klenow fragments
d) Yang fragments
e) discontinuous pieces

103. Cells with badly damaged DNA tend to be so impaired that they undergo programmed cell death, also known as _____.
a) necroptosis
b) cellular death
c) apoptosis##
d) mutational decay
e) none of the above

104. Changing a purine (or pyrimidine) to another purine (or pyrimidine) is known as a _____.
a) point mutation
b) transition mutation##
c) transversion
d) abasic mutation
e) homologous mutation

105. What are the levels of chromatin structure?
a) The DNA helix is wrapped around a histone octamer to form a nucleosome; nucleosomes aggregate to form the 30-nm fiber; this packs into loops in the fully condensed chromosome##
b) The DNA helix is wrapped around a nucleosome octamer to form a histone; histones aggregate to form the 30-nm fiber; this packs into loops in the fully condensed chromosome
c) The DNA helix is wrapped around a priming hectamer to form a histone; histones aggregate to form the 30-nm fiber; this packs into loops in the fully condensed nucleosomes
d) The RNA helix is wrapped around a histone octamer to form a nucleosome; histones aggregate to form the 30-nm fiber; this packs into loops in the fully condensed chromosome
e) The DNA helix is wrapped around a histone pentamer to form a nucleosome; nucleosomes aggregate to form the 30-nm fiber; this packs into loops in the fully condensed chromosome