(Answer ALL questions)

56. For a non-spontaneous process the free energy (ΔG) is
1. Zero
2. Positive
3. Negative
4. All the above

57. In Lineweaver-Burk plot, the effect of non-competitive inhibition will appear as
1. it can move the entire curve to the right
2. it can change the y-intercept
3. it can change the x-intercept
4. All of these

58. Which one of the following is an appropriate description of stationary phase?
1. no further increase in the cell population after a maximum value
2. deceleration of growth and division rate after the growth rate reaches a maximum
3. acceleration of growth and division rate after the growth rate reaches a maximum
4. deceleration of growth and division rate after the growth rate reaches a minimum

59. The annealing temperature is ———— in touchdown PCR.
1. Steadily decreased
2. Steadily increase
3. Equal to T_m
4. None of the above

60. The lowest biomass yield in a culture of *Escherichia coli* will be in
1. an aerated batch culture containing a initial high concentration of glucose
2. an aerated batch reactor containing an initial low concentration of glucose
3. an aerated fed-batch reactor having a low glucose concentration
4. an aerated continuous reactor having a low glucose concentration

61. Fermentation is an ———— oxidation o substrate and thus, liberates ————
1. complete and less energy
2. complete and high energy
3. incomplete and less energy
4. incomplete and high energy

62. How an enzyme increases the rate of reaction?
1. Increasing K_m
2. Increasing initial velocity
3. Decreasing activation energy
4. All of the above

63. 2D-PAGE separates mixture of protei based on the following, except
1. Isoelectric point
2. Molecular weight
3. Both (1) and (2)
4. None the above

64. Which of the following microscopy techniq relies on the specimen interfering with wavelength of light to produce a high contr image without the need for dyes or damage to the sample?
1. Conventional bright field li microscopy
2. Phase contrast microscopy
3. Electron microscopy
4. Fluorescence microscopy

65. The proteins exhibit higher absorption 280 nm when they are rich in ———— amino acids.
1. aliphatic
2. sulfur containing
3. aromatic
4. carboxylic group

66. The lower absorption of double stranded than single stranded DNA at 260 nm is to
1. Increased base stacking
2. Deoxyribose
3. Thymine
4. All the above

67. Oxidation of Poly Unsaturated Fatty Acids (PUFAs) releases ———— than saturated fatty acids and hence, PUFAs are good for health.
1. Less energy
2. More energy
3. Same energy
4. None of the above

68. Which of the following amino acid side chain is polar at physiological pH?
1. Lysine
2. Leucine
3. Isoleucine
4. Tryptophan

69. In general, the competitive inhibitor of an enzyme is
1. a highly reactive compound
2. a metal ion
3. structurally similar to the substrate
4. a nonpolar compound

70. What will be structure of a DNA when A ≠ T and G ≠ C?
1. Single helix
2. Double helix
3. No helix
4. None of the above

71. The peptide bond is rigid and planar
1. Due to restriction caused by rotation around C^{α} -N
2. Due to restriction around C^{α} -C' bond
3. Due to delocalization of the lone pair of electrons of the nitrogen onto carbonyl oxygen
4. Because amide protons and carbonyl oxygen are involved in hydrogen binding

72. Which of the following events/pathway generates ATP for red blood cells maintenance?
1. Oxidative phosphorylation
2. Substrate level phosphorylation
3. Photosensitive phosphorylation
4. HMP pathway

73. Within the nucleus, individual chromosomes are thought to occupy discrete territories. Which of the following is most likely to promote this segregation?
1. Nuclear lamina
2. Nuclear pore complexes
3. Nuclear matrix/scaffold
4. Intermediate fibres

74. Except ————, all other molecules are substrates for gluconeogenesis pathway.
1. Lactate
2. Pyruvate
3. Alananie
4. Glycogen

75. Which one of the following is applicable to prokaryotic cells?
1. Ribosomes
2. Nucleus
3. Lysosomes
4. Chloroplasts

76. Which of the following is lost when nicking (single stranded nick) a circular plasmid DNA?
1. Double helical structure
2. Supercoil
3. Information
4. None of the above

77. Several of the complement components are
1. Hormones
2. Enzymes
3. Cytokines
4. Antibodies

78. The melting temperature (T_m) of a double stranded DNA increases by
1. Decreasing A:T content
2. Increasing ionic strength
3. Dehydration
4. All of the above

79. ———— determines the overall shape of a bacterial cell.
1. Cell wall
2. Nucleoid
3. Cytoskeleton
4. Cell membrane

80. The _____ nucleic acids is determined from ratio of absorbance at 260 and 280 (A_{260}/A_{280}).
1. purity
2. integrity
3. concentration
4. All the above

81. Which of the following statement is not true about plasma membranes?
1. Membrane lipids are composed of amphipathic molecules
2. Scramblases and flippases are able to catalyze the transfer of lipid molecules between the outer and inner leaflets
3. Membrane lipids are able to spontaneously move between the outer and inner leaflets
4. Different lipid compositions are found in the two leaflets of a membrane.

82. The rate of enzyme catalyzed reactions is determined by monitoring the
1. rate of disappearance of the enzyme
2. rate of disappearance of the substrate
3. rate of disappearance of the product
4. change in volume of the solution

83. Identify the semi autonomous organelle in the cell.
1. Peroxisomes
2. Mitochondria
3. Endoplasmic reticulum
4. Golgibodies

84. _____ is the enzyme used as a marker for the mitochondria.
1. Pyruvate dehydrogenase
2. Phospholipase
3. Acid phosphatase
4. Succinate dehydrogenase

85. An example of a peptide hormone produced by the thymus is
1. Thyroxine
2. Thyroglobulin
3. Thymulin
4. Thiamine

86. Sequence alignment helps to
1. Trace our evolutionary relationships
2. Infer the functions of newly synthesized genes
3. Predict the new member of gene families
4. All of the above

87. Identify the best vector for a cloning experiment.
1. Vector-1 (Antibiotic resistance gene$^+$)
2. Vector-2 (Antibiotic resistance gene$^-$)
3. Vector-3 (Antibiotic resistance gene lac Z$^+$)
4. Vector-4 (Antibiotic resistance gene$^+$/Sac B$^+$)

88. Identify the WRONG statements.
1. Expression vector is also a cloning vector but not *vice versa*.
2. Plasmids with similar replication and partitioning systems are incompatible
3. A plasmid which produces many replication proteins will have narrow host range.
4. It is advantageous to eliminate restriction systems in host in rDNA technology.

89. Identify the WRONG statements about bacteriophage λ '*cos*' site.
1. Used to circularize λ-DNA and cosmid DNA inside the host.
2. Important to package λ-DNA and cosmid DNA in viral particles.
3. Involved in the formation of concatameric λ-DNA
4. Responsible for lysogenization of both λ-DNA and cosmid DNA in host genome

90. The earliest site of hematopoiesis in embryo is
1. Bone marrow
2. Liver
3. Spleen
4. Yolk sac

91. Identify appropriate substrate for terminal transferase enzyme to create homopolymer tailing.
1. 3'-overhang DNA
2. 5'-overhang DNA
3. Blunt end DNA
4. None of the above

92. The monod model predicts that the specific growth rate
1. will increase with the concentration of the growth limiting substrate until it reaches a maximum value
2. will decrease with the concentration of the growth limiting substrate
3. will increase with the concentration of the growth limiting substrate
4. does not depend on growth limiting substrate

93. Identify the WRONG statement.
1. Instead of 5'-P and 3'-OH, the primers with 5'-OH and 3'-OH are not useful in PCR.
2. Hot-Start PCR requires denaturation of anti-Taq DNA polymerase
3. Assembly PCR utilizes overlapping oligonucleotides.
4. Inverse PCR read the DNA template in 3'-5' direction and synthesizes new strand in 5'-3' direction.

94. Which one of the following is not applicable to Taqman probe based real-time PCR?
1. Multiplexing
2. Taqman method do not detect non-specific amplification
3. Amplification efficiency is calculated at exponential phase
4. Melting curve analysis is more efficient with Taqman method

95. Identify the WRONG statement associated with pyrosequencing?
1. Pyrosequencing do not require primer.
2. Pyrosequencing is based on coupled enzymatic reactions.
3. Pyrosequencing involves single stranded DNA as template.
4. Nucleotide addition in pyrosequencing emits light.

96. Which of the following is not relevant in preparing template for dideoxy sequencing?
1. M13 vector
2. LATE-PCR
3. Assembly PCR
4. Asymmetric PCR

97. Identify the mast cell product that is not preformed and therefore demands *de novo* synthesis.
1. Histamine
2. Prostaglandin D2
3. Heparin
4. Eosinophil chemotactic factor

98. Identify the wrong statement about cytoskeleton.
1. It occupies the general nucleoplasm as well as occurring in the cytosol
2. It is typically composed of three types of fibrous protein systems
3. It consists in part of networks of fibrous proteins
4. Its protein components have been highly conserved throughout evolution

99. Chronic granulomatous disease is due to defects in neutrophil
1. NADPH oxidase
2. Cytochrome p450
3. Glucokinase
4. Lactate dehydrogenase

100. A compound that has desirable properties to become drug is called
1. lead
2. find
3. fit drug
4. fit compound

101. The binding of human immunodeficiency virus is achieved through
1. IL-2 receptor
2. CD-4
3. TNF receptor
4. Reverse transcriptase

102. In a thymectomized animal which is irradiated and reconstituted with bone marrow cells
1. None of the lymphocyte populations are restored
2. All lymphocyte populations are restored.
3. The B-lymphocyte population is not restored
4. The T-lymphocyte population is not restored

103. If the phospholipids had only one hydrocarbon chain instead of two, which of the following predicted property of lipid bilayers would result?
1. The bilayers formed would be much less fluid
2. The diameter of the head group would be much larger than the acyl chain and would tend to form miscelles rather than billayers
3. The bilayer formed would be much more fluid
4. The bilayers would be more permeable to small water soluble molecules

104. Clonal selection occurs when antigen is encountered by
1. B-Cells
2. Neutrophills
3. Macrophages
4. Mast cells

105. Natural killer T-cells
1. Have rearranged TCR alpha beta genes
2. Express a gamma delta TCR
3. Have rearranged immunoglobulin genes
4. Can only recognize antigens presented by CD1

106. Identify the WRONG statements about Spi⁻ selection.
1. It is essential to replace the *red* and *gam* region λ -DNA with insert.
2. It is necessary to perform purification to remove the stuffer fragment to proceed for ligation.
3. Utilizes P2 phage lysogenized *E. coli* for selection.
4. Only recombinant DNA with 37-52 kb size is selected.

107. BLOSSUM matrices are used for
1. Multiple sequence alignment
2. Global alignment
3. Pair wise alignment
4. Local alignment

108. PRINTS are software used for
1. Detection of genes from genome sequence
2. Detection of tRNA genes
3. Prediction of function of a new gene
4. Identification of functional domains/motifs in proteins

109. Which one of the following is a nucleotide sequence data base?
1. EMBL
2. SWISS PROT
3. PROSITE
4. TREMBL

110. The first published completed gene sequence was of
1. M13 phage
2. T4 phage
3. πx 174
4. λ phage

111. Alignment method suitable for aligning closely related sequence is
1. Multiple sequence alignment
2. Global alignment
3. Pair wise alignment
4. Local alignment

112. Membrane fluidity decreases by
1. Decreasing unsaturated fatty acids
2. Increasing fatty acid chain length
3. Decreasing temperature
4. All of the above

113. The alignment method suitable for findi out conserved patterns in DNA or prote sequence is
1. Multiple sequence alignment
2. Global alignment
3. Pair wise alignment
4. Local alignment

114. Stepwise method for solving problems computer science is called
1. Flow chart
2. Algorithm
3. Sequential design
4. Procedure

115. Poor skin tests to a range of micro antigens such as tuberculin and mu indicate a deficiency of
1. Natural killer cells
2. T-Cells
3. B-Cells
4. Opsonization