

## Entrance Examinations Model Questions

### Model Paper - 2 : Bioinformatics

51. What makes FASTA faster than NEEDLEMAN WUNSCH algorithm?
- The processor speed of the computer
  - Hash table lookup
  - Dynamic programming
  - The scoring matrix used
52. How many edges meet at every branch node in a phylogenetic tree?
- 1
  - 2
  - 3
  - 4
53. What is the difference between RefSeq and GenBank?
- RefSeq includes publicly available DNA sequences
  - GenBank includes non redundant curated data
  - GenBank sequences are derived from RefSeq
  - RefSeq sequences are derived from GenBank
54. The sugar pucker observed generally in A-DNA structures is
- C3'-Exo
  - C3'-Endo
  - O4'-Exo
  - C4'-Endo
55. The approach that can be used to predict the 3D structure of a protein which has no detectable sequence similarity with the available templates is
- homology modeling
  - comparative modeling
  - fold recognition
  - ab initio modeling
56. Which of the following can be determined using molecular mechanics?
- Molecular orbital energies.
  - Minimum energy conformation
  - Electrostatic potentials
  - Transition-state geometries
57. The Ramachandran plot is a
- Phi-Psi scatter diagram.
  - Phi-Psi correlation diagram.
  - Phi-Psi steric contour diagram.
  - Phi-Psi energy diagram.

58. Which disease is not caused by a virus
- a) Influenza
  - b) Polio
  - c) HIV
  - d) TB
59. The liquid part of blood after the fibrinogen is removed is
- a) Plasma
  - b) lymph
  - c) Serum
  - d) platelets
60. In living system the molecules used to transfer energy is
- a) glucose
  - b) insulin
  - c) DNA
  - d) ATP
61. The intel Pentium IV is the name of
- a) mother board
  - b) computer
  - c) microprocessor
  - d) computer company
62. In the formation of a macromolecule, what type of bond would join two amino acids subunits
- a) ionic bond
  - b) hydrogen bond
  - c) peptide bond
  - d) phosphodiester bond
63. Dr. Venkatraman Ramakrishnan received the Noble Prize for his work on
- a) HIV
  - b) AIDS
  - c) Ribosomes
  - d) Malaria
64. Protein folding is contributed by
- a) intramolecular interaction
  - b) water mediated interaction
  - c) disulphide bridges
  - d) all the above

65. The two amino acids that contain Sulphur atom are  
a) Gly and Cys  
b) Met and Leu  
c) Ser and Met  
d) Cys and Met
66. The quaternary structure of hemoglobin is  
a) dimer  
b) pentamer  
c) trimer  
d) tetramer
67. Protein Data Bank contains  
a) More than 80,000 entries  
b) Less than 60,000 entries  
c) Less than 20,000 entries  
d) More than a Lakh
68. In docking for the hydrogen bond interactions the hydrogen are from  
a) ligand alone  
b) macromolecule alone  
c) ligand and macromolecules  
d) none of the above
69. The first researcher to sequence a genome, in 1977, was  
a) Todd Golub.  
b) Frederick Sanger.  
c) Craig Venter.  
d) Stephen Fodor.
70. The translated genes of genomes that encode proteins are referred to as  
a) the open reading frame.  
b) introns.  
c) codons.  
d) pseudogenes.
71. The correct order of events for sequencing DNA is  
a) amplify DNA fragment of unknown sequence; gel electrophoresis; heat; add four different chain-terminating chemical tags; mix with primer; computer analysis.  
b) amplify DNA fragment of unknown sequence; heat; gel electrophoresis; mix with primer; computer analysis; add four different chain-terminating chemical tags.

- c) amplify DNA fragment of unknown sequence; mix with primer; add four different chain-terminating chemical tags; heat; gel electrophoresis; computer analysis.  
d) amplify DNA fragment of unknown sequence; add four different chain-terminating chemical tags; gel electrophoresis; heat; mix with primer; computer analysis.
72. Of the organisms that follow, what has the largest genome size?  
a) the ulcer-causing bacterium, *Helicobacter pylori*  
b) the malarial parasite *Plasmodium*  
c) the fruit fly, *Drosophila melanogaster*  
d) commercial rice, *Oryza sativa*
73. What step of DNA sequencing is skipped during shotgun sequencing?  
a) computer analysis  
b) cloning of DNA fragment  
c) primer reactions  
d) mapping step
74. How is it possible that there are four times as many kinds of mRNA as there are genes in the human genome?  
a) genes are distributed evenly over the genome and not all are used  
b) human genes are fragmented and use alternative splicing  
c) the human genome contains special introns that code for proteins  
d) the human genome contains bacterial genes that are not accounted for
75. Genes for typical single-character Mendelian traits are called  
a) segmental duplications.  
b) multigene families.  
c) tandem clusters.  
d) single-copy genes.
76. The genes encoding rRNA are examples of  
a) single-copy genes.  
b) segmental duplications.  
c) tandem clusters of genes.  
d) multigene families.
77. What type of noncoding DNA tends to be localized around the centromere?  
a) constitutive heterochromatin  
b) structural DNA  
c) repeated sequences  
d) Both a and b are correct.

78. What percentage of the human genome is comprised of structural DNA?  
a) 1%  
b) 10%  
c) 24%  
d) 20%
79. What type of transposon jump is most likely to cause a harmful mutation?  
a) long terminal repeats  
b) retroposons  
c) LINES  
d) ALU transpositions
80. What percentage of the human genome is made up of repeated sequences?  
a) 0%  
b) 1%  
c) 3%  
d) 20%
81. The type of transposons that have lost their signals for replication are  
a) long interspersed elements (LINES).  
b) dead transposons.  
c) parasitic elements.  
d) ALU.
82. When comparing the genomes of a variety of organisms, what is most surprising?  
a) how similar living organisms are to each other at the genetic level  
b) how unrelated most genera really are  
c) the striking number of differences between species  
d) traditional taxonomy has accurately reflected the number of differences between organisms
83. The most effective way to analyze variation at the whole genome level is to use  
a) frequency of tandem clusters.  
b) number of transposons.  
c) single nucleotide polymorphisms (SNPs).  
d) segmental duplications.
84. Certain bacterial genes are present in the human genome but are not present in the genomes of roundworms or fruit flies. How could bacterial genes have become incorporated in the human genome?  
a) retroposons  
b) alternative mRNA splicing  
c) lateral transfer  
d) T-box

85. What is true about the distribution of genes among the human chromosomes?
- a) Genes are distributed proportionately among the chromosomes; ... larger the chromosome, the more genes it contains.
  - b) Genes are not distributed evenly among chromosomes.
  - c) Genes are clustered about the centromeres of most chromosomes, but scattered randomly along the rest of a given chromosome.
  - d) The autosomes have few genes compared to the sex chromosomes.
86. The field of study involving the sequencing of the genomes of organisms is
- a) Proteomics.
  - b) Molecular genetics.
  - c) Bioinformatics.
  - d) Genomics.
87. Microarray gene chips will eventually be used to
- a) screen for mutations leading to cancer.
  - b) identify carriers of genetic diseases.
  - c) identify probable behavioral traits.
  - d) A, B, and C are Correct.
88. The identification of the function of a gene in a genome can be accomplished using
- a) functional genomics.
  - b) gene microarrays.
  - c) gel electrophoresis.
  - d) bioinformatics.
89. Labeling a stretch of DNA according to its function is called
- a) recombinant DNA technology.
  - b) functional analysis.
  - c) annotation.
  - d) screening.
90. The new area of science that seeks to catalog and analyze every protein in the human body in order to help understand the human genome is called
- a) bioinformatics.
  - b) proteomics.
  - c) molecular genetics.
  - d) genomics.
91. The most abundant element in the universe is
- a) Hydrogen
  - b) Helium
  - c) Oxygen
  - d) Silicon

92. Which of the following does not protect body surfaces:
- a) Mucus.
  - b) Gastric acid.
  - c) Salivary amylase
  - d) Gut microflora.
93. Which of the following is incorrect 'Natural antibodies' are often:
- a) Autoreactive.
  - b) Polyspecific.
  - c) Reactive with bacterial carbohydrates.
  - d) High affinity IgG.
94. The basic Ig unit is composed of:
- a) 2 identical heavy and 2 identical light chains.
  - b) 2 identical heavy and 2 different light chains.
  - c) 2 different heavy and 2 identical light chains.
  - d) 2 different heavy and 2 different light chains.
95. The following Gram negative bacteria are known to cause
- a) corneal ulcer:
  - b) *Pseudomonas aeruginosa*
  - c) *Moraxella lacunata*
  - d) *Bacillus brevis*
  - e) *Klebsiella pneumoniae*
96. Pick the wrong statement about "Glucogenesis":
- a) maintains blood glucose during overnight fast
  - b) occurs in muscles
  - c) is stimulated by elevated levels of acetyl CoA
  - d) is inhibited by fructose 2,6-biphosphate
97. Pick the incorrect statement regarding "Amyloid":
- a) occurs in chronic inflammatory disorders
  - b) occurs in medullary carcinoma of the thyroid
  - c) is a basophilic substance which can be stained with
  - d) Congo red
  - e) weakens the walls of blood vessels
98. Which is not a direct DNA analysis method:
- a) Western blotting
  - b) Southern blotting
  - c) polymerase chain reaction (PCR)
  - d) denaturing gradient gel electrophoresis (DGGE)

99. Dendritic cells (DC) of the innate immunity are
- Toll like receptors
  - Antigen presenting cells
  - Cytokines
  - None of the above
100. In the process of DNA replication, genetic information of the cell is carried by
- tRNA
  - sRNA
  - mRNA
  - all of the above
101. Which of the following bacterium is used in transfection to create genetically modified plants or transgenic plants
- Escherichia coli*
  - Agrobacterium tumefaciens*
  - Pseudomonas aeruginosa*
  - Enterococci* spp.
102. Which of the following cells contain nuclear membrane
- Prokaryotic cells
  - Eukaryotic cells
  - None of the above
  - Both a and b
103. The following nucleic acids are double stranded
- DNA
  - RNA
  - mRNA
  - None of the above
104. In conventional polymerase chain reaction (PCR), the *Taq polymerase* enzyme is obtained from a thermophilic bacteria called
- Borkhoderia pseudomaliae*
  - Thermus aquaticus*
  - Acinetobacter baumannii*
  - None of the above
105. The restriction enzymes that digest the DNA sequences from the terminal ends (3' or 5' end) are called as
- Exonucleases
  - Endonucleases
  - Polymerases
  - RNase

106. Which of the following divalent cation is most important for the efficiency of thermostable polymerase in PCR reaction
- a)  $\text{Ca}^{++}$
  - b)  $\text{Na}^{++}$
  - c)  $\text{Mg}^{++}$
  - d)  $\text{Zn}^{++}$
107. In a PCR reaction, the temperature at which the primer bind to the template DNA is called as
- a) Denaturation temperature
  - b) Boiling temperature
  - c) Annealing temperature
  - d) Extension time
108. The electrophoretic separation of DNA is based on the principle of differences in
- a) Molecular charge of DNA
  - b) Valency
  - c) Shape of DNA
  - d) None of the above
109. Which of the following immune cells produce antibodies
- a) Macrophage
  - b) T-cells
  - c) B-cells
  - d) Natural Killer (NK) cells
110. Which of the following is the first immunoglobulins to appear following an infection
- a) IgG
  - b) IgM
  - c) IgD
  - d) IgE
111. Which of the following leads to memory cells
- a) T-cells
  - b) Macrophages
  - c) B-cells
  - d) Neutrophils
112. The following method is used to determine the evolutionary relationship of organisms
- a) Monogamy tree
  - b) Phylogenetic tree
  - c) Organogram
  - d) Paternity tree

113. In blast database, Blastn is used to search for
- a) Protein sequences
  - b) Aminoacid sequences
  - c) Nucleotide sequences
  - d) All of above
114. Which of the following immunity is non-specific
- a) Innate immunity
  - b) Acquired immunity
  - c) Both
  - d) None of them
115. Immune cells like T-cells recognize foreign antigens through
- a) Recognition of auto-antigens
  - b) Differentiation of self and non-self antigens
  - c) Recognition of antibodies
  - d) None of the above
116. Magic table in SQL is:
- a) Primary and Foreign key
  - b) Insert and Delete Commands
  - c) Stored procedures
  - d) DDL
117. How many different trees are possible with 10 nodes?
- a) 10
  - b) 100
  - c) 1014
  - d) 1024
118. Run Time Memory Allocation is:
- a) Static memory allocation
  - b) Physical memory allocation
  - c) Dynamically allocating memory
  - d) Virtual memory allocation
119. Shell scripting is mostly used to:
- a) Program operating system of Windows, UNIX, etc.
  - b) Program command line of an operating system
  - c) All of above
  - d) None of above

120. The slow executing speed of shell can be resolved by:
- a) Echo command
  - b) Environmental variables
  - c) Exit command
  - d) Using pipeline and filter commands
121. Sh command makes your program to:
- a) Initiate the interpreter
  - b) Run within the shell
  - c) Run as a separate shell
  - d) Display value of a variable
122. UniProt is:
- a) A highly redundant protein sequence database with a high level of annotation
  - b) A highly redundant protein sequence database with a low level of annotation
  - c) A protein sequence database with low redundancy and a high level of annotation
  - d) A protein sequence database with low redundancy and a low level of annotation
123. Viruses containing RNA rather than DNA are called
- a) riboviruses
  - b) immunoviruses
  - c) bacteriophages
  - d) retroviruses
124. In preliminary screening of clones, it is common to use
- a) restriction enzymes
  - b) dyes
  - c) antibiotics
  - d) radiation
125. To identify an individual by DNA analysis of their blood, investigators look for
- a) primers
  - b) DNA fingerprints
  - c) probes
  - d) nucleosomes

126. Bacterial DNA is not cleaved by their own restriction enzymes because bacteria add \_\_\_\_\_ to their own DNA.
- a) nucleotides
  - b) peptides
  - c) methyl groups
  - d) glyphosphate
127. The temperature of the system decreases in an \_\_\_\_\_.
- a) adiabatic compression
  - b) isothermal expansion
  - c) isothermal compression
  - d) adiabatic expansion
128. When the azimuthal quantum number has the value of 2, the number of orbitals possible are
- a) 7
  - b) 5
  - c) 3
  - d) 0
129. The maximum number of electrons that can have principal quantum number,  $n = 3$ , and spin quantum number,  $m_s = -1/2$
- a) 5
  - b) 7
  - c) 9
  - d) 11
130. Which of the following acids does not exhibit optical isomerism?
- a) Lactic acid
  - b) Tartaric acid
  - c) Maleic acid
  - d)  $\alpha$ -amino acids
131. Polymer formation from monomers starts by
- a) condensation reaction between monomers
  - b) coordination reaction between monomers
  - c) conversion of monomers to monomer ion by protons
  - d) hydrolysis of monomers
132. Amylose is a constituent of
- a) starch
  - b) Cellulose
  - c) Glycogen
  - d) None of the above

133. Synovial fluid contains:
- a) Heparin
  - b) Hyaluronic acid
  - c) Chondroitin sulphate
  - d) Keratin sulphate
134. Presence of AIDS virus cannot be detected by-
- a) ELISA
  - b) Western blotting
  - c) Northern Blot
  - d) Assay of full-length ds DNA
135. The function of macrophages is to-
- a) Enzyme Secretion
  - b) Engulf Cell organelles
  - c) Engulf Foreign Material
  - d) Kills Invading Bacteria
136. A fatty acid is unsaturated if it
- a) Contains hydrogen
  - b) Contains double bonds
  - c) Contains an acidic group
  - d) Bonds to glycogen
137. Most human pathogens prefer temperatures near that of the human body. They are called
- a) Psychrophiles
  - b) thermophiles
  - c) mesophiles
  - d) halophiles
138. Which of the following antibiotics is responsible for Gray Baby Syndrome?
- a) Chloramphenicol
  - b) Doxycycline
  - c) Erythromycin
  - d) Streptomycin
139. An audit trail
- a) is used to make backup copies
  - b) is the recorded history of operations performed on a file
  - c) can be used to restore lost information
  - d) none of the above

140. The ascending order of a data hierarchy is:  
a) bit-byte-record-field-file-database  
b) byte-bit-field-record-file-database  
c) bit-byte-field-record-file-database  
d) bit-byte-file-record-field-database
141. Which of the following is most oriented to scientific programming?  
a) FORTRAN  
b) COBOL  
c) BASIC  
d) PL/I
142. What is the only function all C++ programs must contain?  
a) start()  
b) system()  
c) main()  
d) program()
143. A black body is a body which  
a) emits all the radiation incident on it.  
b) absorbs all the radiation incident on it.  
c) will not absorb and emits radiation.  
d) none of these
144. The existence of momentum for a photon implies that it must have an effective mass ( $m$ ) also. This mass can be written as  
a)  $m = c^2/h\nu$   
b)  $m = c^2/hV$   
c)  $m = h\nu/c^2$   
d)  $m = c^2/hv$
145. In elastic scattering, the incident particle strikes the target nucleus and leaves,  
a) with loss in energy and may be in directional change.  
b) without loss in energy and no directional change  
c) with loss in energy and no directional change.  
d) without loss in energy and may be in directional change
146. Ionic crystal NaCl is the good example for  
a) body centered cubic structure.  
b) base centered cubic structure.  
c) face centered cubic structure.  
d) None of the above.

147. In Raman spectroscopy, the scattered spectrum contains
- a) incident light wavelength only.
  - b) stokes lines and anti-stokes lines.
  - c) incident light wavelength, stokes lines and anti-stokes lines.
  - d) anti-stokes lines.
148. Crystals can be scattered by x-rays that was suggested by
- a) Rontgen.
  - b) Laue.
  - c) Einstein
  - d) Newton
149. In the electromagnetic spectrum, x-rays are between
- a) UV and IR.
  - b) Visible and UV.
  - c)  $\gamma$  rays and UV .
  - d)  $\gamma$  rays and IR.
150. Proteins are quantified and measured by
- a) UV rays.
  - b) x-rays.
  - c) visible rays.
  - d) all the above.