Sample paper for BINC :
OBJECTIVE TYPE : PAPER I

Bioinformatics: (40%)

1. Which of these amino acids is "structurally" classified as being polar?

   A. Phe
   B. Pro
   C. Ala
   D. Leu

2. What makes FASTA faster than NEEDLEMAN WUNSCH algorithm?

   A. The processor speed of the computer
   B. Hash table lookup
   C. Dynamic programming
   D. The scoring matrix used

3. How many edges meet at every branch node in a phylogenetic tree?

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

4. What is the difference between RefSeq and GenBank?

   A. RefSeq includes publicly available DNA sequences
   B. GenBank includes non redundant curated data
   C. GenBank sequences are derived from RefSeq
   D. RefSeq sequences are derived from GenBank

5. The sugar pucker observed generally in A-DNA structures is

   A. C3'-Exo
   B. C3'-Endo
   C. O4'-Exo
   D. C4'-Endo

6. 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

   A. homology modeling
   B. comparative modeling
   C. fold recognition
   D. *ab initio* modeling

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7. Which of the following can be determined using molecular mechanics?

   A. Molecular orbital energies
   B. Minimum energy conformation
   C. Electrostatic potentials
   D. Transition-state geometries

8. The Ramachandran plot is a

   A. Phi-Psi scatter diagram.
   B. Phi-Psi correlation diagram.
   C. Phi-Psi steric contour diagram.
   D. Phi-Psi energy diagram.

Biology : (20%)

9. The dominant allele R causes seeds of maize to be coloured where as the recessive allele r causes the seeds to be colourless. From the cross Rr x Rr, what fraction of the coloured seeds will be heterozygous?

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

10. Many genes involved in pathogenicity are located in defined continuous regions ("islands") of the genome and have different GC content from other portions of the genome, suggesting that they have arisen through

   A. horizontal gene transfer
   B. gene duplication and subsequent mutation
   C. protection from methylation
   D. increase in the rate of mutation of successive GC pairs
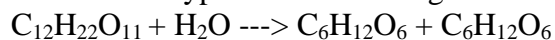
11. Polycistronic mRNA refers to

   A. mRNA which is transcribed by multiple RNA polymerases
   B. mRNAs that are simultaneously translated
   C. mRNA that is translated by many ribosomes simultaneously
   D. mRNA with multiple open reading frames

12. Which of the following hybrids will be most stable?

   A. AGTGTC
      TCACAG
   B. ATAGGC
      TATCCG
   C. GTTGGC
      CAACCG
   D. ATTGGC
      TTTCCG

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Physical & Chemical Science (20%)

13. Mention the type of the following reaction
    $C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$

    A. Synthesis
    B. Hydrolysis
    C. Dehydration
    D. Hydrogenation

14. Most accurate mass with highest sensitivity in case of a protein is determined by

    A. high resolution Mass spectrometer
    B. electrospray ionization tandem Mass spectrometer
    C. MALADI– TOF
    D. 2D Gel electrophoresis

15. The coefficient of x^{10} in the expansion of $(2 + 3x)^{-1}$ in ascending powers of x is

    A. $3^{10}/2^{10}$
    B. $-3^{10}/2^{10}$
    C. $3^{10}/2^{11}$
    D. $-3^{10}/2^{11}$

16. Distance between the point (2, –3, 4) and any point on the surface
    $x^2 + y^2 + z^2 - 4x + 6y - 8z + 4 = 0$ is

    A. 4
    B. 5
    C. 6
    D. 7

17. Value of coefficient of kurtosis for a Normal distribution is

    A. positive
    B. negative
    C. equal to one
    D. equal to three

18. A linear arrangement of three DNA nucleotides called a triplet contains four
    possible bases (A, C, G and T). How many different triplets are possible without
    'AT' as first two letters?

    A. 32
    B. 48
    C. 60
    D. 64

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IT: (20%)

19. Which of the following is not a random access device?

    A. Magnetic tape
    B. Hard disk
    C. CD-ROM
    D. RAM

20. In an airline reservation system, the entities are date, flight number, place of departure, destination, type of plane and seats available. The primary key is

    A. flight number
    B. flight number + place of departure
    C. flight number + date
    D. flight number + destination

21. Which of the following is NOT a characteristic of all Object Oriented Programming Languages?

    A. Inheritance
    B. Garbage collection
    C. Abstraction
    D. Data hiding

22. Which protocol is used by browsers to communicate between two machines?

    A. ftp
    B. ssl
    C. tcp
    D. http

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