English

1. What represents a 'tuple' in a relational database?

(A) Object
(B) Row
(C) Column
(D) Table

Correct Option(s): B

English

2. The secondary structure of proteins is assigned using the DSSP approach based on

(A) Coulomb hydrogen bond energy calculation.
(B) Empirical hydrogen bond energy calculation
(C) Peptide bond torsion angle calculation.
(D) Side chain torsion angle calculation

Correct Option(s): B

English

3.

Which genome browser is known for annotating vertebrate genomes and offers access to manually curated genomes?

(A) UCSC Genome Browser
(B) Ensemble
(C) KEGG
(D) VEGA Genome Browser

Correct Option(s): D

English

4. In molecular docking, which metric is used to compare the predicted docking pose with the known experimental pose?

(A) Hydrogen bond energy
(B) Solvation energy
(C) Lennard-Jones potential
(D) Root mean square deviation (RMSD)

Correct Option(s): D

English

5.

What is the typical purpose of using periodic boundary conditions in molecular dynamics simulations?

(A) To simulate infinite systems by repeating the simulated box
(B) To introduce flexibility into the system
(C) To limit the number of atoms in the system
(D) To apply temperature restraints

Correct Option(s): A

English

6. The temperature and pressure of the system during molecular dynamics simulation are usually controlled by:

(A) Periodic boundary conditions
(B) RMSD analysis
(C) Thermostats and barostats
(D) Grid-based methods

Correct Option(s): C

English

7. Choose the correct statement about peptides in the Ramachandran plot.

(A) Peptides that are unstructured will have all the backbone dihedral angles in the disallowed regions.
(B) It is not possible to conclude whether a peptide adopts entirely helix or entirely beta sheet conformation
(C) The occurrence of beta turn conformations in a peptide can be deduced
(D) The sequence of a peptide can be deduced.

Correct Option(s): C

English

8. What does the command "chmod a+x file.sh" do in Linux?

(A) Changes the ownership of file.sh
(B) Sets the permission of file.sh to execute for all users and admin
(C) Executes the file
(D) Creates a new file called file.sh

Correct Option(s): B

English

9. Which of the following is not a commonly used NGS platform?

(A) PacBio
(B) Oxford Nanopore
(C) Sanger
(D) Illumina

Correct Option(s): C

English

10. What is the primary function of the sequencing-by-synthesis method in NGS?

(A) Synthesizing complementary DNA strands
(B) Determining the order of nucleotides in a DNA molecule
(C) Detecting fluorescent signals from labelled nucleotides
(D) Identifying mutations in DNA sequences

Correct Option(s): B

English

11. What is the role of bioinformatics in NGS data analysis?

(A) Assembling sequencing reads and analysing data
(B) sequencing DNA fragments
(C) Clonal amplification of DNA fragments
(D) Generating DNA libraries

Correct Option(s): A

English

12. How do you display the disk usage of files and directories in the current directory?

(A) du
(B) df
(C) ps
(D) top

Correct Option(s): A

English

13. To search for a specific pattern in a file, which command is used?

(A) find
(B) locate
(C) grep
(D) search

Correct Option(s): C

English

14. Which component is responsible for rendering images and videos on a computer screen?

(A) Sound Card
(B) Network Card
(C) Graphics Processing Unit (GPU)
(D) Hard Disk Drive (HDD)

Correct Option(s): C

English

15. Which of the following represents the correct boot sequence in most modern computer systems?

(A) BIOS → Bootloader → Kernel → Operating System
(B) Bootloader → BIOS → Kernel → Operating System
(C) Operating System → Kernel → Bootloader → BIOS
(D) Kernel → BIOS → Bootloader → Operating System

Correct Option(s): A

English

16. In microarray analysis, what does the term "differentially expressed genes (DEGs)" refer to?

(A) Genes that are mutated in different species
(B) Genes with significant changes in expression between experimental conditions
(C) Genes that are expressed only in certain cell types
(D) Genes with different nucleotide sequences

Correct Option(s): B

English

17.

Which of the following statements best describes an induced fit?

(A) The process by which a binding site alters shape such that it is ready to accept a drug
(B) The process by which a drug adopts the correct binding conformation before entering a binding site
(C) The process by which binding of a drug to a binding site alters the shape of the binding site
(D) the process by which a binding site alters the shape of the drug into the binding conformation before binding

Correct Option(s): C

English

18. Which of the following statements best describes a lead compound?

(A) A compound that contains the element lead
(B) A compound from the research laboratory that is chosen to go forward for preclinical and clinical trials
(C) A molecule that shows some activity or property of interest and serves as the starting point for the development of a drug.
(D) The first compound of a structural class of compounds to reach the market.

Correct Option(s): C

English

19. Which of the following methods CANNOT be used for ab initio determination of the three dimensional structure of proteins?

(A) X-ray crystallography
(B) NMR
(C) Cryo electron Microscopy
(D) Conventional Mass spectrometry

Correct Option(s): D

English

20. CRISPR-Cas9 technology is typically used for

(A) Genomic sequencing
(B) Gene editing
(C) DNA replication
(D) Gene Mapping

Correct Option(s): B

English

21. Which of the following is the most important parameter used to assess the quality of alignment in a BLAST result?

(A) Score
(B) E-value
(C) Query coverage
(D) Percentage identity

Correct Option(s): B

English

22. The radius of gyration for a polymer chain is most relevant in describing:

(A) The rotational inertia of a molecule.
(B) The mass distribution of a polymer around its center of mass.
(C) The thermal energy of the polymer.
(D) The speed at which a molecule diffuse

Correct Option(s): B

English

23. Which organization collaborated with DeepMind to make AlphaFoldDB publicly available?

(A) European Bioinformatics Institute (EBI)
(B) National Institutes of Health (NIH)
(C) DNA Data Bank of Japan (DDBJ)
(D) National Center for Biotechnology Information (NCBI)

Correct Option(s): A

English

24. A folding protein must proceed from a high-energy, high-entropy state to low-energy, low-entropy state. This energy-entropy relationship is called as

(A) Folding funnel
(B) Phase Space
(C) Hilbert minima
(D) Gibb's surface

Correct Option(s): A

English

25. Which of the following statistical tests would be most appropriate to determine if there is a significant difference between two independent groups?

(A) Paired t-test
(B) Chi-square test
(C) ANOVA
(D) Independent samples t-test

Correct Option(s): D

English

26. In the context of a research report, "confounding variables" are best described as:

(A) Variables that are directly manipulated by the researcher
(B) Variables that influence the dependent variable but are not accounted for in the study
(C) Variables that have no impact on the outcome of the research
(D) Variables that are controlled by the experimental design to ensure validity

Correct Option(s): B

English

27. Free Energy Landscapes (FELs) derived from principal component analysis (PCA) often use a two-dimensional projection. What is the primary goal of this projection?

(A) To visualize the complete high-dimensional data set in a more comprehensible form
(B) To determine the temperature dependence of the free energy landscape
(C) To calculate the average free energy across all dimensions
(D) To reduce computational cost by approximating the entire FEL

Correct Option(s): A

English

28. Which one of the following activities is NOT involved in protein folding in the endoplasmic reticulum?

(A) Peptidyl prolyl isomerase.
(B) Protein disulphide isomerase.
(C) Protein glycosylation
(D) Protein ubiquitination

Correct Option(s): D

English

29.

Following are statements on β-turns: 1. All the 20 coded amino acids have equal propensity to form β-turns. 2. Pro cannot occur in β-turns. 3. Pro-Gly sequence strongly favours β-turns: 4. In Asn-Gly β-turns, Asn have positive φ, ψ values.

Choose the combination with all correct statements.

(A) 2, 4
(B) 1, 3
(C) 1, 4
(D) 3, 4

Correct Option(s): D

English

30. Which one of the following pair of amino acids are glucogenic and ketogenic in nature?

(A) Alanine and Lysine
(B) Lysine and Leucine
(C) Isoleucine and Phenylalanine
(D) Aspartate and Lysine

Correct Option(s): C

English

31. Ability of a membrane protein to span the lipid bilayer strictly depends upon the presence of

(A) Zinc finger domain
(B) α-helices
(C) Parallel β-sheet
(D) Anti-Parallel β-sheet

Correct Option(s): B

English

32. In PERL language '*' symbol stands for

(A) Multiplier
(B) Addition list
(C) Squaring
(D) No action

Correct Option(s): D

English

33.

What will be the output of the following Perl code?

```
my $x = 10;

my $y = 20;

my $z = $x + $y;

$x = $y - $x;

$y = $z - $y;

$z = $z - $x;

print "$x $y $z\n";
```

(A) 10 10 20
(B) 10 -10 20
(C) -10 10 20
(D) 20 10 10

Correct Option(s): A

English

34. Which of the following statements about Java interfaces is correct?

(A) An interface in Java can have constructors.
(B) Interfaces in Java can contain method implementations.
(C) A class can implement multiple interfaces.
(D) An interface can extend multiple classes.

Correct Option(s): C

English

35. In Perl, what is the primary use of the tie function?

(A) To bind a variable to a data type
(B) To associate a scalar with a file handle
(C) To link a variable to a package
(D) To create a connection between objects

Correct Option(s): A

English

36. PHYLIP is used to find the evolutionary relationships between different organisms. The full form of PHYLIP is

(A) a synonym for phylogeny analysis
(B) phylogeny editing program
(C) phylogeny interference package
(D) a type of bioinformatics programming language.

Correct Option(s): C

English

37. Which of the following is NOT a data mining tool

(A) KNIME
(B) Python
(C) Orange
(D) MAST

Correct Option(s): D

English

38. In CLUSTALW, 'W' standing for

(A) weakening
(B) winding
(C) weighting
(D) wiping

Correct Option(s): C

English

39. To calculate the BLOSUM Matrix a lambda factor is used for

(A) Normalization
(B) Scaling
(C) Information Reduction
(D) Principalization

Correct Option(s): A

English

40. Probability sampling is also called

(A) Stratified Sampling
(B) Segmented Sampling
(C) Simple Random Sampling
(D) Purposive Sampling

Correct Option(s): C

English

41. Genes that are diverged through speciation from the common ancestor are called

(A) Orthologs
(B) Paralogs
(C) Xenologs
(D) Cryptologs

Correct Option(s): A

English

42. What is the twilight zone of sequence similarity?

(A) Where protein share more than 50 percent identify.
(B) Where protein share more than 50 percent similarity
(C) Where protein share more than 30 percent identity
(D) Where protein share less than 30 percent similarity

Correct Option(s): D

English

43. AMBER stands for

(A) Assisted model building for energy refinement
(B) Advanced model building for energy refinement
(C) Annotation model building for energy refinement
(D) Actual model building for energy refinement

Correct Option(s): A

English

44. The program which provide periodic boundary condition in GROMACS

(A) grompp
(B) pdb2gmx
(C) gmx
(D) editconf

Correct Option(s): D

English

45. What are the sequence submission tools? 1. BankIt, Sequin for Genbank 2. Sakura for DDBJ 3. Pfam for TrEMBL 4. Webin for EMBL 5. TaKara for PubMed

(A) 1, 2, 5
(B) 2, 4, 5
(C) 3, 4, 5
(D) 1, 2, 4

Correct Option(s): D

English

46. A researcher isolated a cell from group of virus and wants to study of protein expression, regulation, modification, and its function to analyse at molecular level. What are the best methods researcher should apply?

(A) Expression proteomics, Cell map proteomics
(B) BLAST, FASTA
(C) DNA microarray, gene annotation
(D) PyMol, RasMol, UCSF Chimera

Correct Option(s): A

English

47. Which of the following is used to evaluate the significance of phylogenetic tree topologies?

(A) Bootstrapping
(B) Random walk
(C) ROC analysis
(D) Branch length

Correct Option(s): A

English

48. In Proteins, hydrogen bonds form as follows: Donor (D)-H---Acceptor (A). Hydrogen bond is more favourable if the angle between D-H and A is

(A) <90
(B) 180
(C) >180
(D) 120

Correct Option(s): B

English

49. Two groups (Control, Treated) are to be compared to test the effect of a treatment. Since individual variability is high in both groups, the appropriate statistical test to use is

(A) Analysis of Variance
(B) Kendall's test
(C) Students t-test
(D) Mann-Whitney U-test

Correct Option(s): D

English

50. Which one of the following would contribute to intrinsic fluorescence to a protein?

(A) Aromatic amino acids
(B) Disulphide bonds
(C) Charged amino acids
(D) Branched chain amino acids

Correct Option(s): A