

ENTRANCE EXAMINATION-2026**Ph.D. Biotechnology/ Ph.D. Bioinformatics****HALL TICKET NUMBER****Maximum Marks: 70****Time: 2 Hours**

Instructions: Please read the instructions carefully before answering the questions.

1. Write your Hall Ticket number in the space provided above.
2. All answers to be marked on the OMR answer sheet following the instructions provided there upon.
3. Handover the OMR sheet at the end of the examination to the invigilator.
4. The question paper contains 70 questions of multiple choices, printed in 16 pages including this page (last three pages are left blank that may be used for rough work). No additional sheet will be provided.
5. Question paper contains Part A and B. In case the candidates have scored equal marks, preference will be given towards the candidate who has obtained higher marks in Part A.
6. Each question carries one mark.
7. There is no negative marking for wrong answer.
8. Non-programmable scientific calculator is permitted.
9. Cells, Mobile Phones and any other electronic gadgets are strictly prohibited in the examination hall.

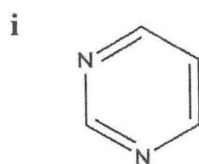
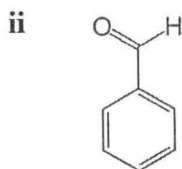
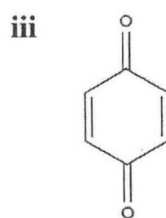
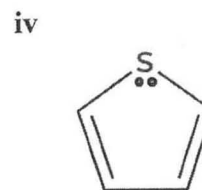
PART A

1. When a 0.25 M ferrous chloride solution required to be prepared, which of the following primary standard with self-indicator property is used?
 - A. Oxalic acid
 - B. Potassium permanganate
 - C. Cerium chloride
 - D. Potassium dichromate
2. Gold is soluble in
 - A. Mixture of Sulfuric acid and Nitric acid
 - B. Mixture of Hydrochloric acid and Nitric acid
 - C. Mixture of Sulfuric acid and Hydrochloric acid
 - D. Mixture of Perchloric acid and Hydrochloric acid
3. In which of the following nucleophilic substitution reaction, a racemic mixture is formed?
 - A. S_N1 reaction
 - B. S_N2 reaction
 - C. E1 reaction
 - D. E2 reaction
4. Which of the following molecule exhibits intramolecular hydrogen bonding?
 - A. Ortho-hydroxy benzoic acid
 - B. Para-hydroxy benzoic acid
 - C. Meta-hydroxy benzoic acid
 - D. Amino benzene
5. Which of the following hybridization results in tetrahedral structure?
 - A. sp
 - B. sp^2
 - C. sp^3
 - D. dsp^2
6. If a train travels at 80 km/hr instead of 60 km/hr, it reaches its destination 2 hours earlier. What is the total distance covered?
 - A. 360 km
 - B. 420 km
 - C. 480 km
 - D. 520 km
7. In a class of 40 students, 22 students like Mathematics, 18 students like science, and 8 students like neither of the subject. How many students like both Mathematics and Science?
 - A. 6
 - B. 8
 - C. 10

- D. 12
8. According to the second law of thermodynamics, entropy of an isolated system
- Always decreases
 - Remains constant
 - Always increases or remains constant
 - Becomes zero at equilibrium
9. The de Broglie wavelength of a particle is inversely proportional to its
- Velocity
 - Momentum
 - Mass density
 - Charge
10. A box contains 5 red and 7 blue balls. Two balls are drawn without replacement. What is the probability that both balls are of different colours?
- 35/66
 - 21/66
 - 42/66
 - 28/66
11. What is the angle between the hour hand and minute hand of a clock at 3:30?
- 60°
 - 75°
 - 90°
 - 105°
12. Which of the following molecule has center of symmetry?
- Benzene
 - Water
 - Ammonia
 - Nitrous oxide
13. When 2 moles of an ideal gas expand reversibly and isothermally to the double of its initial volume at 27°C and 1 atm pressure, the work done by the gas is $\approx$
- 311 J
 - 1502 J
 - 3458 J
 - 7963 J
14. An equal amount of heat is absorbed by five different solid metals each of 10 g, having different specific heat capacities. Which of the following statements is correct?
- At the melting point, the metal having the smallest specific heat will resist melting to the greater degree.
 - At the melting point, the metal having the highest specific heat will resist melting to the greater degree.

- C. The metal with the smallest specific heat will undergo the least change in its temperature.
- D. The metal with the highest specific heat will undergo the least change in its temperature.
15. Which of the following test is appropriate to compare two population variances?
- A. F-test
 - B. Chi-square test
 - C. student's t-test
 - D. Wilcoxon test
16. If $\sin x = 1$, then $x =$
- A. $(2n+1) \pi/2$
 - B. $(4n+1) \pi/2$
 - C. $(n+1) \pi$
 - D. $n\pi/2$
17. What is the number of different possible matrices of order 3×3 can be generated, if the elements have the value of either 1 or 0?
- A. 18
 - B. 27
 - C. 81
 - D. 512
18. The density of air at STP is 3 g/ltr. What is the vapour density of air? (Density of hydrogen at STP = 0.089 g/L).
- A. 0.267
 - B. 3.089
 - C. 6.178
 - D. 33.7
19. According to Hooke's law,
- A. stress is always proportional to strain
 - B. stress is proportional to strain under elastic limit
 - C. stress is proportional to strain before ultimate tensile strength
 - D. stress and strain are never directly proportional

20. Which of the following molecules are aromatic?



- A. i and ii
 B. i, ii, and iii
 C. i, ii, and iv
 D. ii, iii and iv
21. The dipole moment of HBr is 1.6×10^{-30} C m and the interatomic distance is 1 Å. What is the percentage of ionic character of HBr? (the charge of an electron is $\approx 1.6 \times 10^{-19}$ C)
- A. 7
 B. 10
 C. 15
 D. 27
22. A non-singular square matrix of order n is invertible, if its determinant is
- A. Non-zero
 B. 0
 C. 1
 D. n
23. If $A+B = \begin{bmatrix} 4 & -3 \\ 1 & 6 \end{bmatrix}$ and $A-B = \begin{bmatrix} -2 & -1 \\ 5 & 2 \end{bmatrix}$, then $AB =$
- A. $\begin{bmatrix} -7 & 5 \\ 1 & -5 \end{bmatrix}$
 B. $\begin{bmatrix} 7 & -5 \\ 1 & 5 \end{bmatrix}$
 C. $\begin{bmatrix} 7 & -1 \\ 5 & -5 \end{bmatrix}$
 D. $\begin{bmatrix} 7 & -1 \\ -5 & 5 \end{bmatrix}$
24. A team consist of 9 players to be formed by selecting 7 students from Blue house and 6 students from Red house, such that at least 5 students from Blue house and at least 3 students from Red house are part of the team. The total number of ways the team can be formed is
- A. 140
 B. 455
 C. 525
 D. 630

25. Which one of the following factors will not have any impact on the resolving power of a brightfield microscope?
- A. Color of light
 - B. Intensity of light
 - C. Angle of admittance of light in the objective lens
 - D. Medium between the objective lens and the specimen
26. In a Western blot experiment, the primary antibody is used to
- A. Block non-specific binding sites
 - B. Detect the secondary antibody
 - C. Bind specifically to the target protein
 - D. Amplify the signal from the membrane
27. In flow cytometry, cells are sorted based on which of the following physical characteristics?
- A. Their adherence to plastic surfaces
 - B. Their ability to form colonies
 - C. Their fluorescence and light scattering properties
 - D. Their sedimentation coefficient in a sucrose gradient
28. Which unit is not appropriate for measuring photosynthetically active radiation (PAR)?
- A. Lux
 - B. Candela
 - C. $\mu\text{mol photons m}^{-2} \text{ s}^{-1}$
 - D. Volt
29. Which one of the following can't be employed for detecting protein-protein interaction?
- A. Proximity-dependent Biotin identification
 - B. Yeast two-hybrid analysis
 - C. Surface Plasmon Resonance (SPR)
 - D. Chromatin immunoprecipitation (ChIP)
30. What does the X-axis represent in a mass spectrum?
- A. Relative abundance of ions
 - B. Mass-to-charge ratio
 - C. Molecular weight
 - D. Empirical weight
31. A student extracts proteins from plant tissue using a buffer containing SDS detergent and plans to perform both an enzyme activity assay and a western blot using the same extract. Which of the following is the most appropriate conclusion?
- A. The same extract can be used for both the enzyme assay and the western blot
 - B. The extract is suitable for the enzyme assay because SDS increases enzyme activity
 - C. The extract is suitable for western blot but not enzyme assay due to protein denaturation
 - D. The extract cannot be used for either technique

32. Which of the following technique(s) are useful in bacterial genetic profiling?
- Immuno-electrophoresis
 - Multi-locus variable number of tandem repeats analysis (MLVA)
 - Pulsed field gel-electrophoresis
 - B and C
33. Which of the following centrality measure indicates how frequently a particular node comes in the shortest paths between two other nodes?
- Betweenness centrality
 - Closeness centrality
 - Degree centrality
 - Clustering coefficient
34. Which of the following are commonly used molecular structure visualization forms?
- Frames
 - Balls and sticks
 - Ribbons
 - Square
- i and ii
 - ii and iv
 - i and iii
 - ii and iii
35. A student is working on isolating nucleic acids from plant tissue. After extraction, the sample's purity and concentration are assessed using a NanoDrop spectrophotometer. The instrument reports the following values. Identify the correct matching.

Column I

- $A_{260}/A_{280} = 1.65$, $A_{260}/A_{230} = 2.0$
- $A_{260}/A_{280} = 1.82$, $A_{260}/A_{230} = 2.1$
- $A_{260}/A_{280} = 2.05$, $A_{260}/A_{230} = 2.2$
- $A_{260}/A_{280} = 1.85$, $A_{260}/A_{230} = 1.0$

Column II

- Purity of DNA
- Protein concentration
- Purity of RNA
- Phenol/salt contamination

Options:

- 1-B, 2-A, 3-C, 4-D
- 1-A, 2-B, 3-C, 4-D
- 1-B, 2-C, 3-A, 4-D
- 1-D, 2-A, 3-C, 4-B

PART B

36. What is the primary underlying technology used in AlphaFold?
- A. Deep neural networks
 - B. Random forest classification
 - C. Deterministic molecular dynamics
 - D. Sequence alignment algorithms (BLAST)
37. Which of the following describes a phylogenetic tree construction strategy based on character states?
- A. Distance
 - B. UPGMA
 - C. Neighbor joining
 - D. Maximum parsimony
38. Which of the following is a part of Gene Ontology description.
- A. Molecular Function
 - B. Cell Interaction
 - C. ORF prediction
 - D. Protein-protein interaction
39. The Chou–Fasman method is known to predict
- A. Translated sequence of a protein
 - B. ORF from a given DNA sequence
 - C. Secondary structure of a protein
 - D. Tertiary structure of a protein
40. Which of the following sequence contains the pattern [AT]-x(4)-G-H-[LG]?
- A. AAGWGHSM
 - B. AVLKRGHG
 - C. ATVLKGLG
 - D. SGVGKSLG
41. Which of the following database is primarily used to retrieve comprehensive protein sequence and functional information?
- A. GenBank
 - B. GEO
 - C. DDBJ
 - D. UniProt
42. What is the best platform for sequencing data with long reads?
- A. Illumina
 - B. Ion-torrent
 - C. Oxford nanopore sequencing
 - D. SOLiD

43. Why is clonal amplification done in NGS?
- A. To label the DNA with fluorescent dyes
 - B. To remove the repetitive sequences from the genome
 - C. To remove errors by generating a single DNA copy
 - D. To generate identical clusters and boost signal amplification
44. Which of the following algorithm is primarily used for dimensionality reduction?
- A. Random Forest
 - B. Principal Component Analysis (PCA)
 - C. K-Nearest Neighbors
 - D. Naive Bayes
45. A machine learning model performs extremely well on a training data but poorly on an unseen test data. This phenomenon is called
- A. Regularization
 - B. Underfitting
 - C. Overfitting
 - D. Normalization
46. Which of the following is an example of unsupervised learning?
- A. Disease classification using labeled patient data
 - B. Image clustering without predefined labels
 - C. Predicting stock prices using historical outputs
 - D. Spam email detection using labeled examples
47. Which normalization method is commonly used in RNA-seq analysis to account for the sequencing depth and gene length?
- A. TPM
 - B. BLAST
 - C. FASTA
 - D. Smith-Waterman
48. In molecular dynamic simulation, the Lennard-Jones potential is used to
- A. measure the attraction and repulsion between non-bonded atoms
 - B. stabilize the peptide bonds during simulation
 - C. effectively maintain the simulation temperature
 - D. to keep the protein at the center of the simulation box
49. The periodic boundary conditions (PBC) are applied in MD simulations to
- A. reduce the total potential energy of the system
 - B. eliminate surface artifacts and mimic bulk behavior
 - C. fix the positions of boundary atoms permanently
 - D. increase the time step of integration

50. Which of the following describes the 'rigid' approximation commonly used in water models such as TIP3P and SPC?
- A. The water molecules cannot move from their initial coordinates
 - B. The density of water remains constant across different temperatures
 - C. The bond lengths and bond angle of water are fixed.
 - D. The tetrahedral arrangement of bulk water is prevented.
51. Protein conformational changes and folding can be regulated by post-translational modifications (PTMs). Which PTM is primarily known for promoting protein folding and stabilization?
- A. Acetylation
 - B. Glycosylation
 - C. Ubiquitination
 - D. Phosphorylation
52. Among the following, which bacterial strain doesn't provide rare codon tRNAs?
- A. BL21 (DE3)
 - B. BL21 (DE3) Rosetta
 - C. BL21 (DE3) codon + RP
 - D. BL21 (DE3) codon + RIL
53. Why are non-ionic detergents preferred over denaturing detergents in bioprocess technology for the disruption of the cells?
- A. They are able to denature the protein
 - B. They cause the total membrane disruption
 - C. They retain the protein-protein interactions
 - D. They destroy the protein activity and function
54. Which of the following statements about the interplay between intron splicing and the regulation of gene expression is FALSE?
- A. Single transcript can produce two different protein products by splicing out an optional exon.
 - B. A single transcript can produce two different protein products by failing to splice out an optional intron.
 - C. The *Drosophila* DSCAM transcript can be spliced to potentially produce more than 35000 different proteins.
 - D. Positive regulation of intron splicing involves binding of a repressor to enhance intron skipping.
55. Which one will cause gene silencing at the post-transcriptional level?
- A. GlmS-Ribozyme
 - B. CRISPR-cas9
 - C. Zinc finger nuclease (ZFN)
 - D. Ligand dependent destabilization domain

56. Identify the wrong statement:

- A. DNA Polymerase delta has both the 3' to 5' exonuclease as well as 5'-3' exonuclease activity
- B. DNA polymerase alpha has 3' to 5' exonuclease activity but no 5'-3' exonuclease activity
- C. DNA polymerase I has both the 3' to 5' exonuclease as well as 5'-3' exonuclease activity
- D. DNA polymerase III does not possess 5'-3' exonuclease activity; instead, it utilizes 3'-5' exonuclease

57. Microsatellites are the resultants due to errors in

- A. Replication
- B. Transcription
- C. Translation
- D. Recombination

58. The recommended pressure inside the bioreactor is

- A. Positive
- B. Negative
- C. Neutral
- D. Anything

59. Both myeloid and lymphoid progenitors give rise to

- A. Dendritic cells
- B. Neutrophils
- C. B cells
- D. T cells

60. Which one of the following genomes of a virus alone is non-infectious

- A. ds DNA
- B. dsRNA
- C. ssRNA positive sense
- D. ssRNA negative sense

61. Which of the following is not the property of a live vaccine

- A. Natural administration
- B. Low dose
- C. No IgA response
- D. Single dose

62. Embryonic stem cells are

- A. Unipotent
- B. Pluripotent
- C. Multipotent
- D. Totipotent

63. In a Western blot experiment, the primary antibody is used to

- A. Block non-specific binding sites

- B. Detect the secondary antibody
 - C. Bind specifically to the target protein
 - D. Amplify the signal from the membrane
64. In flow cytometry, cells are sorted based on which of the following physical characteristics?
- A. Their adherence to plastic surfaces
 - B. Their ability to form colonies
 - C. Their fluorescence and light scattering properties
 - D. Their sedimentation coefficient in a sucrose gradient
65. Features of genomic islands in a bacterial chromosome include:
- I. (Because of their foreign origin) they have a different G+C composition than the chromosome as a whole
 - II. They usually insert in t-RNA genes and are flanked by mobilizable elements
 - III. They are always associated with imparting survival advantage or improve fitness
 - IV. They are retroviral in origins
- A. I and IV
 - B. I and II
 - C. II and III
 - D. III and IV
66. A chronic pathogen's pursuit within its host unfolds in the following step by step manner:
- A. Invade – gain niche – adopt to carbon source – avoid clearance by immune system
 - B. Invade – multiply – consume all carbon source – cause host death – hop to new host
 - C. Invade – overwhelm immune system – cause cytokine storm – cause host death
 - D. Adhesion – invasion – adaptation – immune evasion – persistence – sustained transmission
67. Which one of the following is not a pathogen encoded virulence factor?
- A. Adhesins
 - B. LPS
 - C. Flagellins
 - D. Nf-Kappa-B
68. Which of the following techniques are useful in bacterial genetic profiling?
- A. Immuno-electrophoresis
 - B. Multi-locus variable number of tandem repeats analysis (MLVA)
 - C. Pulsed field gel-electrophoresis
 - D. B and C
69. Which pathogen below is not linked to cancer?
- A. Epstein-Barr Virus
 - B. *Vibrio cholerae*
 - C. *Helicobacter pylori*
 - D. Human papilloma virus

70. The following are very important markers for diagnostic development against bacterial pathogens
- A. Secreted antigens
 - B. House keeping enzymes
 - C. Transposases
 - D. Heat shock proteins
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F-6

Rough work

F-6

Rough work

F-6

Rough work

University of Hyderabad
Entrance Examinations - 2026
Ph.D. Admissions – July Session

School/Department/Centre : BIOTECHNOLOGY AND BIOINFORMATICS
Course : Ph.D. Subject: BIOTECHNOLOGY/BIOINFORMATICS

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	D ✓	26	C ✓	51	A ✓
2	B ✓	27	C ✓	52	A ✓
3	A ✓	28	D ✓	53	C ✓
4	A ✓	29	D ✓	54	D ✓
5	C ✓	30	B ✓	55	A ✓
6	C ✓	31	C ✓	56	A ✓
7	B ✓	32	D ✓	57	A ✓
8	C ✓	33	A ✓	58	B ✓
9	B ✓	34	D ✓	59	A ✓
10	A ✓	35	A ✓	60	D ✓
11	B ✓	36	A ✓	61	C ✓
12	A ✓	37	D ✓	62	B ✓
13	C ✓	38	A ✓	63	C ✓
14	D ✓	39	C ✓	64	C ✓
15	A ✓	40	B ✓	65	B ✓
16	B ✓	41	D ✓	66	D ✓
17	D ✓	42	C ✓	67	D ✓
18	D ✓	43	D ✓	68	D ✓
19	B ✓	44	B ✓	69	B ✓
20	C ✓	45	C ✓	70	A ✓
21	B ✓	46	B ✓		
22	A ✓	47	A ✓		
23	B ✓	48	A ✓		
24	B ✓	49	B ✓		
25	B ✓	50	C ✓		

Note/Remarks:


Signature

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