

Ph.D. ENTRANCE EXAMINATION, APRIL 2022
BIOCHEMISTRY

Time : Two Hours

Maximum : 100 Marks

Part A

*Choose the correct answer from given options.**Answer all questions.**Each question carries 2 marks.*

1. Example for Hydrophobic amino acid is :
(a) Alanine. (b) Threonine.
(c) Tyrosine. (d) Cysteine.
2. Which of the following acids has the lowest pKa value ?
(a) Acetic acid. (b) Sulphuric acid.
(c) Dil.HCL. (d) Oxalic acid.
3. Which of the following is an isotonic solution ?
(a) 0.9 % sodium chloride. (b) 0.45 % sodium chloride.
(c) Oceans. (d) 10 % dextrose in water.
4. Which of the following amino acids are known as helix breakers ?
(a) Proline and glycine. (b) Isoleucine and leucine.
(c) Valine. (d) Threonine.
5. What is the general mechanism of an enzyme ?
(a) It acts by reducing the activation energy.
(b) It acts by increasing the activation energy.
(c) It acts by decreasing the pH.
(d) It acts by increasing the pH.

Turn over

6. Which of the following cannot denature a protein ?
- (a) Iodoacetic acid.
 - (b) SDS detergent.
 - (c) Urea.
 - (d) Heating to 90°C.
7. Name the site of synthesis of plant hormone Gibberellins :
- (a) Endosperm.
 - (b) Coleoptile tip.
 - (c) Young leaves.
 - (d) Scetullum.
8. Which of the following is a glycoprotein hormone ?
- (a) Oxytocin.
 - (b) Insulin.
 - (c) TSH.
 - (d) Antidiuretic hormone.
9. Which of these statements are TRUE for a glycosidic bond ?
- (a) The bond between sugar and the nitrogenous base.
 - (b) The bond between the two sugar residues.
 - (c) The bond between sugar and phosphate.
 - (d) The bond between base and phosphate.
10. Ames test is employed to :
- (a) Assess cytotoxicity.
 - (b) Quantify Lipid.
 - (c) Quantify Protein.
 - (d) Assess Genotoxicity.
11. Organic solvents denature proteins by disrupting which if the following ?
- (a) Hydrogen bonds.
 - (b) Disulfide bonds.
 - (c) Hydrophobic Interactions.
 - (d) Salt Bridges.
12. VDJ recombination is facilitated by :
- (a) RAG.
 - (b) Ligase 1.
 - (c) DNA Pol alfa.
 - (d) Salt Bridges.

13. Which enzyme is used to avoid ligation of separate DNA ?
(a) Kinase. (b) Phosphatase.
(c) Endonuclease. (d) Ligase.
14. Which of the below amino acids is responsible for curling of hair ?
(a) Glutamine. (b) Glycine.
(c) Tyrosine. (d) Cystein.
15. Example for DNA intercalator ?
(a) Cis-platin. (b) Ethyl methane sulfonate.
(c) Methotrexate. (d) Acridine orange.
16. In mass spectrometer, ions are separated based on which of the following ?
(a) Molecular weight. (b) Charge.
(c) Mass. (d) Mass to charge ratio.
17. Sodium dodecyl sulphate (SDS) used in SDS PAGE is :
(a) An anionic detergent. (b) A cationic detergent.
(c) A non-ionic detergent. (d) An Anionic exchanger.
18. Which is the negative acute-phase protein in the serum ?
(a) C-reactive protein. (b) Ferritin.
(c) Ceruloplasmin. (d) Albumin.
19. What is the role of beta mercaptoethanol in SDS-PAGE ?
(a) To reduce disulfide bonds.
(b) To cleave peptide bonds.
(c) To remove side chain of amino acids.
(d) As colour indicator.
20. Example for Hydrophilic amino acid is :
(a) Alanine. (b) Isoleucine.
(c) Leucine. (d) Serine.

21. Membrane blebbing can be seen during :
- (a) Apoptosis. (b) Necrosis.
(c) Carcinogenesis. (d) Mutagenesis.
22. Propidium iodide stains :
- (a) DNA. (b) RNA.
(c) Both DNA and RNA. (d) Protein.
23. Committee constituted for animal experimentation and ethics in India is :
- (a) IAEC. (b) CPCSEA.
(c) IEC. (d) ICMR.
24. Committee established under the Department of Biotechnology, Ministry of Science and Technology, INDIA for monitoring the safety of on-going research projects and activities involving genetically engineered organisms is :
- (a) ICMR. (b) IBSC.
(c) RCGM. (d) IAEC.
25. Which of the following is not a common statistical software ?
- (a) SPSS. (b) R.
(c) MATLAB. (d) PDB.

(25 × 2 = 50 marks)

Part B

Answer all questions.

Each question carries 10 marks.

1. What is PCR and how does real time RT-PCR work with the COVID-19 virus ?
2. What is an amphibolic pathway? Describe a metabolic pathway having amphibolic nature.
3. Who has been awarded the Nobel Prize in Chemistry 2020? Give an account on the discovery which won the Nobel Prize.
4. What is enzyme engineering ? What are the advantages of enzyme engineering ?
5. What are the different methods used for protein isolation and purification ?

(5 × 10 = 50 marks)