D 102515 (Pages : 9) Name.....

Reg. No.....

P.G. ENTRANCE EXAMINATION, APRIL 2024

BIOCHEMISTRY

Time : Two Hours Maximum : 200 Marks

Underline the best possible answers from the given options.

*Answer **all** questions, 4 marks each.*

1 mark will be deducted for each wrong answer.

1. Which form of DNA is characterized by a left-handed helix ?

   (A) A-form. (B) Z-form.

   C) C-form. (D) B-form.

2. Which heteropolysaccharide is found in the extracellular matrix of connective tissues and provides structural support ?

   (A) Inulin. (B) Chitin.

   (C) Glycogen. (D) Hyaluronic acid.

3. Which of the following is an example of anabolic process ?

   (A) Glycolysis. (B) Citric acid cycle.

   (C) Gluconeogenesis. (D) Protein synthesis.

4. Which of the following fatty acids is considered essential in the diet ?

   (A) Oleic acid. (B) Palmitic acid.

   (C) Linoleic acid. (D) Stearic acid.

5. What type of transport protein facilitates the movement of two different molecules or ions in the same direction across the membrane ?

   (A) Symport. (B) Uniport.

   (C) Antiport. (D) ATPase.

6. Which enzyme catalyses the conversion of fructose-6-phosphate to fructose-1,6-bisphosphate in glycolysis ?

   (A) Glucose-6-phosphate isomerase.

   (B) Phosphofructokinase.

   (C) Aldolase.

   (D) Hexokinase.

7. Which process involves the breakdown of glycogen to release glucose ?

   (A) Lipogenesis. (B) Glycolysis.

   (C) Gluconeogenesis. (D) Glycogenolysis.

8. What is the primary concern when handling radioactive materials in the laboratory ?

   (A) Proper storage. (B) Ensuring proper ventilation.

   (C) Minimizing exposure. (D) Disposal procedures.

9. What is the primary principle behind Radioimmunoassay ?

   (A) Measurement of enzyme activity using radioactive substrates.

   (B) Measurement of radioactivity by counting emitted photons.

   (C) Measurement of radioactivity by detecting emitted particles.

   (D) Measurement of antigen-antibody interactions using radioactive labels.

10. What is the underlying principle of sedimentation technique in centrifugation ?

    (A) Separation based on size.

    (B) Separation based on charge.

    (C) Separation based on density.

    (D) Separation based on affinity for a ligand.

11. Which chemical reaction is responsible for the formation of a peptide bond between amino acids ?

    (A) Oxidation. (B) Dehydration synthesis.

    (C) Reduction. (D) Hydrolysis.

12. Which of the following is a macro mineral important for bone health and muscle function ?

(A) Iodine. (B) Zinc.

(C) Calcium. (D) Iron.

13. Which type of RNA carries amino acids to the ribosome during protein synthesis ?

(A) Messenger RNA. (B) Transfer RNA.

(C) Ribosomal RNA. (D) Regulatory RNA.

14. Which of the following is a purine base found in DNA ?

(A) Thymine. (B) Cytosine.

(C) Uracil. (D) Adenine.

15. What is the purpose of using microarrays in bioinformatics ?

(A) Analysing protein-protein interactions.

(B) Predicting protein secondary structures.

(C) Studying gene expression levels for thousands of genes simultaneously.

(D) Identifying single nucleotide polymorphisms (SNPs).

16. What term describes the spontaneous interconversion between different anomeric forms of a sugar in solution ?

(A) Mutarotation. (B) Eplmerization.

(C) Isomerization. (D) Hydrolysis.

17. Which of the following isotopes is commonly used as a radioactive label in biochemical experiments due to its stable incorporation into biomolecules ?

(A) Uranium-235. (B) Carbon-14.

(C) Potassium-40. (D) Hydrogen-1.

18. What term describes the presence of four different groups bonded to a central carbon atom in an amino acid ?

(A) Polar. (B) Aliphatic.

(C) Aromatic. (D) Chiral.

19. What is the primary function of the pentose phosphate pathway ?

(A) Synthesis of glucose from non-carbohydrate precursors.

(B) Breakdown of glycogen to release glucose.

(C) Generation of NADPH and ribose-5-phosphate.

(D) Production of ATP through oxidative phosphorylation.

20. How does an increase in temperature affect the osmotic pressure of a solution ?

(A) Osmotic pressure increases.

(B) Osmotic pressure decreases.

(C) Osmotic pressure remains unchanged.

(D) Osmotic pressure depends on the nature of solute.

21. Which classification of lipids includes triacylglycerols ?

(A) Steroids. (B) Phospholipids.

(C) Compound lipids. (D) Simple lipids.

22. Calculate the molarity of a solution containing 40 grams of NaOH dissolved in 1000ml of water.

(A) 5 M. (B) 0.4 M.

(C) 1 M. (D) 2 M.

23. Which organelle is responsible for photosynthesis in plant cells ?

(A) Chloroplast. (B) Golgi complex.

(C) Lysosomes. (D) Mitochondria.

24. Which hormone plays a crucial role in bone metabolism by promoting calcium absorption from the intestines ?

(A) Insulin. (B) Thyroxine.

(C) Growth hormone. (D) Parathyroid hormone.

25. Metastasis refers to :

(A) The initial formation of a tumour.

(B) Cancerous cell growth confined to a specific organ.

(C) The spread of cancer from one part of the body to another.

(D) The regression of a tumour.

26. Which method involves the removal of solvent from a protein solution under reduced pressure and low temperature ?

(A) Dialysis.

(B) Reverse dialysis.

(C) Ultrafiltration.

(D) Lyophilization.

27. Which cell type lacks a true nucleus ?

(A) Prokaryotic.

(B) Eukaryotic.

(C) Animal.

(D) Plant.

28. What is the primary function of second messengers like cAMP in hormone signaling ?

(A) Directly activate gene transcription.

(B) Induce protein synthesis.

(C) Amplify the signal inside the cell.

(D) Inhibit enzyme activity.

29. What is the purpose of using the BLAST algorithm in bioinformatics ?

(A) Identifying potential drug candidates.

(B) Predicting protein secondary structures.

(C) Searching for sequence similarities in databases.

(D) Analysing microarray expression data.

30. Which organelle contains its own genetic material and is involved in the synthesis of proteins ?

(A) Ribosomes.

(B) Mitochondria.

(C) Golgi complex.

(D) Endoplasmic reticulum.

31. The significance of the erythrocyte sedimentation rate (ESR) lies in its ability to :

(A) Measure blood glucose levels. (B) Assess coagulation status.

(C) Detect inflammation. (D) Analyse liver function.

32. What is the primary purpose of using a Geiger-Muller (GM) counter ?

(A) To measure the intensity of emitted light.

(B) To visualize the distribution of radioactive substances in tissues.

(C) To detect radioactive emissions by counting ionized particles.

(D) To quantify the amount of radioactivity in a sample.

33. What is the role of buffers in biological systems ?

(A) They maintain a constant pH.

(B) They increase the rate of enzyme reactions.

(C) They store energy in the form of ATP.

(D) They facilitate cell signalling processes.

34. What is the purpose of using a blank solution in spectrophotometry ?

(A) To dilute the sample for accurate measurement.

(B) To provide a baseline for measurement by subtracting its absorbance from the sample absorbance.

(C) To calibrate the spectrophotometer.

(D) To increase the sensitivity of the instrument.

35. Which chromatographic technique is commonly used for the separation of proteins based on their size ?

(A) Ion exchange chromatography.

(B) Affinity chromatography.

(C) Gel chromatography.

(D) High-performance liquid chromatography (HPLC).

36. Which diagnostic technique is commonly used for cancer screening ?

(A) Blood tests. (B) X-rays.

(C) CT scans. (D) All of the above.

37. Which disaccharide is composed of glucose and fructose molecules joined by a glycosidic linkage ?

(A) Sucrose. (B) Lactose.

(C) Maltose. (D) Isomaltose.

38. Which cell junction type is responsible for anchoring intermediate filaments between adjacent cells ?

(A) Desmosomes. (B) Tight junctions.

(C) Gap junctions. (D) Cadherins.

39. What is the principle behind colorimetry ?

(A) Measurement of scattered light.

(B) Measurement of emitted light.

(C) Measurement of absorbance at specific wavelengths.

(D) Measurement of fluorescence emission.

40. Which of the following is an example of nonionizing radiation ?

(A) Gamma rays. (B) X-rays.

(C) uv rays. (D) Beta particles.

41. What is the difference between ΔG and ΔG° ?

(A) ΔG measures the total energy change in a reaction, while ΔG° measures the potential energy available for work.

(B) ΔG is the change in free energy under non-standard conditions, while ΔG° is the change in free energy under standard conditions.

(C) ΔG measures the potential energy available for work, while ΔG° measures the total energy change in a reaction.

(D) ΔG is the change in free energy under standard conditions, while ΔG° is the change in free energy under non-standard conditions.

42. The synthesis of catecholamines and neurotransmitters involves derivatives from which amino acid ?

(A) Serine.
(B) Tyrosine.
(C) Tryptophan.
(D) Methionine.

43. The HDL-LDL ratio is significant in assessing :

(A) Liver function.
(B) Thyroid function.
(C) Cardiovascular risk.
(D) Blood glucose levels.

44. Which chemical reaction is responsible for the formation of a peptide bond between amino acids ?

(A) Oxidation.
(B) Dehydration synthesis.
(C) Reduction.
(D) Hydrolysis.

45. Restriction endonucleases are enzymes that :

(A) Synthesize DNA.
(B) Join DNA fragments together.
(C) Cut DNA at specific recognition sequences.
(D) Amplify DNA sequences.

46. Which of the following is an example of an oxidoreductase enzyme according to the IUBMB classification ?

(A) Amylase.
(B) Catalase.
(C) Lysozyme.
(D) DNA polymerase.

47. Maple syrup urine disease is associated with the metabolism of :

(A) Phenylalanine.
(B) Galactose.
(C) Leucine.
(D) Fructose.

48. Which of the following is NOT a method of enzyme immobilization ?

(A) Covalent binding.
(B) Encapsulation.
(C) Adsorption.
(D) Dialysis.

49. What is the function of hemoglobin in the blood ?

(A) Oxygen transport. (B) Blood clotting.

(A) Immune response. (D) pH regulation.

50. The primary function of the proteasome is to :

(A) Synthesize proteins.

(B) Degrade damaged or unwanted proteins.

(C) Transport proteins across cellular membranes.

(D) Facilitate protein folding in the endoplasmic reticulum.