1. Which of the following is a reducing sugar?

A. Sucrose
B. Glucose
C. Cellulose
D. Starch

Answer: B. Glucose
Explanation: Glucose has a free aldehyde group in open chain form, making it a reducing sugar. Sucrose is non-reducing due to glycosidic linkage between the reducing groups.

2. The bond formed between two amino acids is known as:

A. Glycosidic bond
B. Ester bond
C. Peptide bond
D. Hydrogen bond

Answer: C. Peptide bond
Explanation: A peptide bond is an amide linkage formed between the –COOH group of one amino acid and $–NH_2$ of another.

3. Which vitamin is water-soluble?

A. Vitamin A
B. Vitamin D
C. Vitamin E
D. Vitamin C

Answer: D. Vitamin C
Explanation: Vitamin C (ascorbic acid) is water-soluble; A, D, and E are fat-soluble vitamins.

4. The main structural polysaccharide in plant cell walls is:

A. Starch
B. Glycogen
C. Cellulose
D. Chitin

Answer: C. Cellulose
Explanation: Cellulose is a β-1,4-linked polymer of glucose, forming rigid structures in plant cell walls.

5. Which of the following enzymes breaks down starch into maltose?

A. Maltase
B. Invertase
C. Amylase
D. Lactase

Answer: C. Amylase
Explanation: Amylase catalyzes the hydrolysis of starch to maltose and dextrins.

6. Which of the following is a disaccharide?

A. Glucose
B. Fructose
C. Sucrose
D. Ribose

Answer: C. Sucrose
Explanation: Sucrose is made of one molecule each of glucose and fructose.

7. Which of the following is not an essential amino acid?

A. Lysine
B. Valine
C. Alanine
D. Leucine

Answer: C. Alanine
Explanation: Alanine can be synthesized in the body; others must be obtained from diet.

8. Which of the following statements about enzymes is incorrect?

A. They are biocatalysts.

B. They are proteins in nature.
C. They increase activation energy.
D. They are highly specific.

Answer: C. They increase activation energy.
Explanation: Enzymes lower the activation energy, not increase it.

9. Benedict's test is used to detect:

A. Proteins
B. Lipids
C. Reducing sugars
D. Non-reducing sugars

Answer: C. Reducing sugars
Explanation: Benedict's reagent gives a brick-red precipitate with reducing sugars like glucose.

10. Which of the following contains β(1→4) glycosidic linkage?

A. Maltose
B. Lactose
C. Sucrose
D. Amylose

Answer: B. Lactose
Explanation: Lactose has a β(1→4) linkage between galactose and glucose.

11. Which among the following is a ketose sugar?

A. Glucose
B. Fructose
C. Galactose
D. Ribose

Answer: B. Fructose
Explanation: Fructose contains a ketone group, hence it is a ketose sugar.

12. The number of chiral carbons in glucose is:

A. 2
B. 4
C. 5
D. 6

Answer: B. 4
Explanation: Glucose has 4 chiral centers at C2, C3, C4, and C5.

13. The linkage between glycerol and fatty acids in fats is:

A. Peptide bond
B. Glycosidic bond
C. Ester bond
D. Hydrogen bond

Answer: C. Ester bond
Explanation: Fats are esters formed from glycerol and fatty acids.

14. Which vitamin prevents scurvy?

A. Vitamin A
B. Vitamin C
C. Vitamin D
D. Vitamin K

Answer: B. Vitamin C
Explanation: Deficiency of Vitamin C causes scurvy, characterized by bleeding gums and weakness.

15. Which of the following does not give a positive ninhydrin test?

A. Glycine
B. Alanine
C. Tyrosine
D. Glucose

Answer: D. Glucose

Explanation: Ninhydrin test detects amino acids. Glucose is a sugar, not an amino acid.

16. Which form of glucose rotates plane-polarized light to the right?

A. D-glucose
B. L-glucose
C. α-glucose
D. β-glucose

Answer: A. D-glucose
Explanation: D-glucose is dextrorotatory (rotates light to the right), while L-glucose is levorotatory.

17. Which of the following is not a polysaccharide?

A. Glycogen
B. Starch
C. Maltose
D. Cellulose

Answer: C. Maltose
Explanation: Maltose is a disaccharide. The rest are polysaccharides.

18. The enzyme that converts glucose to glucose-6-phosphate is:

A. Hexokinase
B. Invertase
C. Amylase
D. Zymase

Answer: A. Hexokinase
Explanation: Hexokinase catalyzes phosphorylation of glucose to form glucose-6-phosphate in glycolysis.

19. Which of the following protein structures is destroyed during denaturation?

A. Primary
B. Secondary and tertiary
C. Quaternary only

D. All of the above

Answer: B. Secondary and tertiary
Explanation: Denaturation breaks hydrogen bonds and disulfide bridges, affecting secondary and tertiary structures.

20. Which of the following nucleic acid bases is found only in RNA?

A. Adenine
B. Cytosine
C. Thymine
D. Uracil

Answer: D. Uracil
Explanation: Uracil replaces thymine in RNA.

21. Which of the following enzymes helps in protein digestion in the stomach?

A. Trypsin
B. Pepsin
C. Amylase
D. Lipase

Answer: B. Pepsin
Explanation: Pepsin is secreted in the stomach and breaks proteins into peptides.

22. Which of the following is a non-reducing sugar?

A. Glucose
B. Lactose
C. Sucrose
D. Maltose

Answer: C. Sucrose
Explanation: Due to its glycosidic bond between anomeric carbons, sucrose cannot act as a reducing agent.

23. The number of peptide bonds in a tripeptide is:

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

Answer: B. 2
Explanation: A tripeptide has 3 amino acids linked by 2 peptide bonds.

24. The component of DNA that is different in RNA is:

A. Sugar
B. Phosphate
C. Base pairing
D. All of the above

Answer: A. Sugar
Explanation: DNA contains deoxyribose, RNA contains ribose. The base uracil also replaces thymine in RNA.

25. Which of the following proteins is fibrous in nature?

A. Myosin
B. Hemoglobin
C. Albumin
D. Enzyme

Answer: A. Myosin
Explanation: Fibrous proteins like myosin have elongated shapes and provide structural support.

26. Zwitterion formation in amino acids occurs due to:

A. Acid and ester group
B. Basic and acidic side chains
C. –COOH and $–NH_2$ group
D. Presence of ring structure

Answer: C. –COOH and $–NH_2$ group
Explanation: At isoelectric point, amino acids exist as zwitterions (NH_3^+ and COO^-).

27. Which of the following acts as a coenzyme?

A. Lipase
B. ATP
C. NAD^+
D. Maltose

Answer: C. NAD^+
Explanation: NAD^+ is a coenzyme that participates in redox reactions with enzymes.

28. Which of the following statements is incorrect about DNA?

A. It has a double helix structure
B. Adenine pairs with guanine
C. It contains deoxyribose
D. It has phosphodiester bonds

Answer: B. Adenine pairs with guanine
Explanation: Adenine pairs with thymine (A–T), guanine with cytosine (G–C).

29. Which of the following is not a function of proteins?

A. Catalysis
B. Structural support
C. Information storage
D. Transport

Answer: C. Information storage
Explanation: Proteins do not store genetic information; nucleic acids do.

30. Which of the following shows a positive Biuret test?

A. Glucose
B. Glycine
C. Dipeptide
D. Polypeptide

Answer: D. Polypeptide
Explanation: Biuret test detects peptide bonds; it's positive for polypeptides and proteins.

31. Which of the following forms osazone crystals that are identical in shape to those of glucose?

A. Sucrose
B. Fructose
C. Cellulose
D. Galactose

Answer: B. Fructose
Explanation: Fructose and glucose form the same osazone because they differ only at the first carbon, which does not affect the shape of the crystal.

32. Which of the following is a branched polysaccharide?

A. Cellulose
B. Amylose
C. Amylopectin
D. Inulin

Answer: C. Amylopectin
Explanation: Amylopectin is a branched polymer of α-D-glucose with α-1,6 glycosidic linkages at branch points.

33. Which of the following is an example of a disaccharide with α-1,4 glycosidic linkage?

A. Sucrose
B. Maltose
C. Lactose
D. Cellobiose

Answer: B. Maltose
Explanation: Maltose consists of two glucose units linked by an α-1,4 bond.

34. Which of the following polysaccharides is water-insoluble and used in making paper and textiles?

A. Glycogen
B. Starch
C. Amylopectin
D. Cellulose

Answer: D. Cellulose
Explanation: Cellulose is insoluble in water and provides mechanical strength to plant structures and is used in paper/textiles.

35. Which sugar does not undergo mutarotation?

A. Glucose
B. Fructose
C. Sucrose
D. Galactose

Answer: C. Sucrose
Explanation: Sucrose is a non-reducing sugar; it does not have a free anomeric carbon to undergo mutarotation.

36. Which vitamin is a coenzyme in decarboxylation reactions?

A. Vitamin B1 (Thiamine)
B. Vitamin B2 (Riboflavin)
C. Vitamin B6 (Pyridoxine)
D. Vitamin C

Answer: A. Vitamin B1 (Thiamine)
Explanation: Thiamine pyrophosphate (TPP), a derivative of Vitamin B1, is a coenzyme in decarboxylation of α-keto acids.

37. Deficiency of which vitamin leads to megaloblastic anemia?

A. Vitamin A
B. Vitamin B6
C. Vitamin B12
D. Vitamin C

Answer: C. Vitamin B12

Explanation: Vitamin B12 deficiency impairs DNA synthesis in red blood cells, leading to megaloblastic anemia.

38. Which of the following vitamins is heat-labile and easily destroyed by cooking?

A. Vitamin A
B. Vitamin C
C. Vitamin D
D. Vitamin E

Answer: B. Vitamin C
Explanation: Vitamin C is sensitive to heat and gets easily destroyed during cooking.

39. Which vitamin plays a major role in calcium and phosphate absorption in the body?

A. Vitamin B6
B. Vitamin D
C. Vitamin A
D. Vitamin K

Answer: B. Vitamin D
Explanation: Vitamin D increases calcium and phosphate absorption from the intestine and maintains bone health.

40. Which vitamin helps in the conversion of tryptophan to niacin?

A. Vitamin B2
B. Vitamin B6
C. Vitamin B1
D. Vitamin B12

Answer: B. Vitamin B6
Explanation: Pyridoxine (Vitamin B6) is essential for the enzymatic conversion of tryptophan to niacin (Vitamin B3).

41. Which of the following statements is correct regarding DNA and RNA?

A. DNA has uracil, RNA has thymine

B. Both contain ribose sugar
C. DNA is double-stranded, RNA is mostly single-stranded
D. RNA is more stable than DNA

Answer: C. DNA is double-stranded, RNA is mostly single-stranded
Explanation: DNA forms a double helix while RNA generally exists as a single strand.

42. In a DNA double helix, the number of purines equals the number of:

A. Sugars
B. Pyrimidines
C. Phosphates
D. Ribose

Answer: B. Pyrimidines
Explanation: According to Chargaff's rule, purines (A, G) = pyrimidines (T, C) in DNA.

43. A nucleoside is made up of:

A. Base + Sugar + Phosphate
B. Base + Sugar
C. Base + Phosphate
D. Sugar + Phosphate

Answer: B. Base + Sugar
Explanation: A nucleoside lacks the phosphate group present in nucleotides.

44. Which of the following pairs is correctly matched?

A. Adenine – Pyrimidine
B. Guanine – Purine
C. Uracil – Purine
D. Thymine – Purine

Answer: B. Guanine – Purine
Explanation: Adenine and guanine are purines; cytosine, uracil, and thymine are pyrimidines.

45. The repeating unit of nucleic acids is:

A. Amino acid
B. Glucose
C. Nucleotide
D. Nucleoside

Answer: C. Nucleotide
Explanation: Nucleic acids like DNA and RNA are polymers of nucleotides.