

# KAMARAJ COLLEGE (Autonomous)

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(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(4 Pages)

Reg. No:.....

Question Code: 26E01521

Course Code: 25UEMB21

UG Degree - End Semester Examinations, April 2026

Second Semester  
B.Sc., MICROBIOLOGY

Basic Biochemistry

(For those who joined in June 2025 onwards)

Time : 3Hours

Maximum : 75 Marks

## PART - A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

- CO:1 1. Which subatomic particle determines the atomic number of an  
K:1 element?  
(a) Neutron (b) Proton  
(c) Electron (d) Positron
- CO:1 2. Which of the following compounds has the highest standard  
K:2 free energy of hydrolysis ( $\Delta G^\circ$ )?  
(a) Glucose-6-phosphate (b) ATP → ADP  
(c) Phosphoenolpyruvate (d) GTP → GDP
- CO:2 3. Which of the following is a ketohexose?  
K:1 (a) Glucose (b) Galactose  
(c) Fructose (d) Ribose
- CO:2 4. Sucrose is a non-reducing sugar because:  
K:2 (a) It does not contain glucose  
(b) It contains a ketone group  
(c) Both anomeric carbons are involved in glycosidic bond formation  
(d) It cannot dissolve in water
- CO:3 5. Which of the following is an essential amino acid in humans?  
K:1 (a) Alanine (b) Glycine  
(c) Lysine (d) Serine

- C0:3  
K:2 6. The stability of the  $\alpha$ -helix structure in proteins is mainly due to:
- (a) Disulfide bonds (b) Hydrogen bonds between peptide backbone atoms  
(c) Ionic bonds between R groups (d) Hydrophobic interactions
- C0:4  
K:2 7. Which of the following is an essential fatty acid?
- (a) Palmitic acid (b) Oleic acid  
(c) Linoleic acid (d) Stearic acid
- C0:4  
K:2 8. The ester (diester) bond in storage lipids is formed between:
- (a) Two fatty acids (b) Glycerol and amino acids  
(c) Glycerol and fatty acids (d) Fatty acids and phosphate
- C0:5  
K:1 9. Which of the following is a fat-soluble vitamin?
- (a) Vitamin C (b) Vitamin B<sub>12</sub>  
(c) Vitamin D (d) Vitamin B<sub>6</sub>
- C0:5  
K:2 10. Vitamin C primarily functions in:
- (a) Blood clotting (b) Collagen synthesis  
(c) Vision (d) Calcium absorption

**PART - B (5 X 5 = 25 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 250 words.**

- C0:1  
K:3 11. (a) Explain the types of chemical bonds found in biological systems with suitable examples.
- (OR)**
- (b) Apply the First and Second Laws of Thermodynamics to explain energy flow in biological systems.
- C0:2  
K:3 12. (a) Classify monosaccharides based on functional groups and number of carbon atoms with suitable examples.
- (OR)**
- (b) Differentiate between reducing and non-reducing sugars with suitable examples.
- C0:3  
K:3 13. (a) Explain essential and non-essential amino acids with suitable examples and significance.
- (OR)**
- (b) Describe the peptide bond and explain the primary structure of proteins.

C0:4 14. (a) Define lipids and classify them into major classes with  
K:3 examples.

**(OR)**

(b) Differentiate between essential and non-essential fatty acids with suitable examples and significance.

C0:5 15. (a) Classify vitamins into fat-soluble and water-soluble  
K:3 groups with suitable examples and sources.

**(OR)**

(b) Explain the functions of any four vitamins and mention deficiency disorders.

**PART - C (5 X 8 = 40 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 500 words.**

C0:1 16. (a) Describe the principles of bioenergetics. Discuss standard  
K:5 free energy change ( $\Delta G^\circ$ ) and explain why ATP is considered an energy-rich compound.

**(OR)**

(b) Compare Phosphoenolpyruvate (PEP), ATP, and GTP as energy-rich compounds. Evaluate their biological significance.

C0:2 17. (a) Compare storage and structural polysaccharides with  
K:4 respect to structure, linkage and biological significance.

**(OR)**

(b) Analyze why maltose and lactose are reducing sugars but sucrose is non-reducing. Discuss structural basis and biochemical implications.

C0:3 18. (a) Discuss the four levels of protein structure and analyze the  
K:5 forces stabilizing each level.

**(OR)**

(b) Evaluate the biological importance of proteins with reference to structure–function relationship.

C0:4 19. (a) Compare storage lipids and structural lipids with respect  
K:4 to structure, composition and biological role.

**(OR)**

(b) Discuss the structure of glycerol and explain the formation of ester (diester) bonds in lipids. Evaluate the biological importance of lipids.

C0:5 20. (a) Analyze fat-soluble vitamins with respect to absorption,  
K:5 storage, function and toxicity.

**(OR)**

(b) Analyze the biochemical roles of B-complex vitamins and vitamin C in metabolism. Evaluate their importance in maintaining health.