

**QP Code : U24A046**

**Reg. No** : .....

**Name** : .....

**ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20**

**I SEMESTER B.Voc ( CBCSS-VUG ) DEGREE EXAMINATION, November 2024**

**B Voc Applied Biotechnology**

**SDC1APB01 : Biophysics**

**2024 Admission Onwards**

**(Credits: 4)**

**Time : 2.5 Hours**

**Maximum Marks : 80**

**Section A**

*Short answer type carries 2 Marks each (15x2=30 Marks) (Ceiling 25)*

1. Define first law of thermodynamics. [BTL1]
2. Name the different adsorption isotherms. [BTL1]
3. List the three common states of water. [BTL1]
4. Define ionic product of water. [BTL1]
5. What is dialysis? [BTL1]
6. How does passive transport differ from active transport in terms of energy use? [BTL2]
7. Explain how simple diffusion occurs across the plasma membrane. [BTL2]
8. What is a high-energy phosphate bond and where is it commonly found in the cell? [BTL2]
9. Use the concept of hydrogen bonding to explain why ice floats on water. [BTL3]
10. Explain how the structure of chloroplasts supports photosynthesis and what happens when alterations occur? [BTL3]
11. Given a reaction, where NADH is oxidized to NAD<sup>+</sup>, identify the molecule being reduced. [BTL3]
12. Explain the function of ATP synthase in cellular respiration. How does its activity contribute to ATP production? [BTL3]
13. Describe how glucose is converted into ATP during cellular respiration and explain the importance of the Krebs cycle in this energy production process. [BTL3]
14. Describe the role of mitochondria in energy production within a cell. How would a deficiency in mitochondrial function affect cellular processes and overall cell health? [BTL3]
15. Differentiate between hydrophilic, hydrophobic and amphipathic molecules. [BTL3]

**Turn Over**

## Section B

*Paragraph types carries 5 Marks each (8x5=40 Marks) (Ceiling 35)*

16. What is redox potential explain with suitable example? [BTL1]
17. State the second law of thermodynamics and the concept of enthalpy and entropy [BTL1]
18. Explain effect of solutes on colligative properties of water. [BTL1]
19. Explain how standard free energy changes are used to predict the direction of a chemical reactions. [BTL2]
20. Analyze the differences between catabolic and anabolic activities in cellular metabolism. How does each process support cell functions and what could happen to cell health if they are not balanced properly? [BTL3]
21. Analyze how redox reactions contribute to energy production in both photosynthesis and cellular respiration. [BTL4]
22. Choose the best explanation of how chemical potential and redox potential influence the electron transport chain in cellular respiration? [BTL3]
23. In a physiological setting such as blood, explain how the buffer capacity of the bicarbonate buffer system ( $\text{HCO}_3^-/\text{CO}_2$ ) adapts to increased metabolic activity, where the production of acids like lactic acid increases? [BTL5]

## Section C

*Essay-type carries 10 Marks : Answer any two questions.*

24. Explain how oxidation and reduction occur simultaneously in a biological redox reaction. [BTL2]
25. Apply your understanding of water's solvent properties to explain why is it called the "Universal solvent". [BTL3]
26. Construct a model to illustrate how variations in the chemical composition of the plasma membrane works. How do these variations influence the overall function of the membrane? [BTL3]
27. Explain why blood is able to resist changes in pH despite the addition of acidic or basic substances, and discuss the role of buffers in maintaining this homeostasis. [BTL5]

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