Name- **Roll No-**

LS2101: BIOCHEMISTRY

Class Test 2

Date: 27.09.23

Full Marks= 20

Time= 45 minutes

Answer ALL the questions

Q1. What is the net gain of ATP molecules in glycolysis per molecule of glucose?

a) 0 b) 2

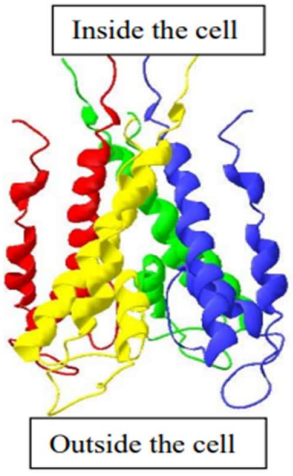
c) 4 d) 6 **[1]**

Q2. What is the pH of a solution containing 0.24 mol/L of NH4Cl and 0.02 mol/L of NaOH (pKa of NH_4^+/NH_3 is 9.25)? **[1]**

Q3. An enzyme:

a) Reduces the free energy change of the reaction
b) Increases the free energy change of the reaction
c) Reduces the activation energy of the reaction
d) Reduces the heat of reaction **[1]**

Q4. Below is a ribbon representation of the K+ channel, a membrane spanning protein made up of four copies of a single polypeptide. The K+ channel allows K+ ions to be shuttled through the membrane. **[1+1+2=4]**



a) What protein secondary structure is part of the K+ channel protein as shown above?

b) Does the K+ channel have quaternary structure? If yes, describe it.

c) What type(s) of amino acids do you expect to find on the K+ channel polypeptides

i) next to the tails of the membrane lipids? (Circle all that apply)

Polar **Nonpolar** **Positively charged** **Negatively charged**

ii) Justify your answer.

iii) next to the heads of the membrane lipids? (Circle all that apply)

Polar **Nonpolar** **Positively charged** **Negatively charged**

iv) Justify your answer.

Q5. Fill in the blanks:

[1]

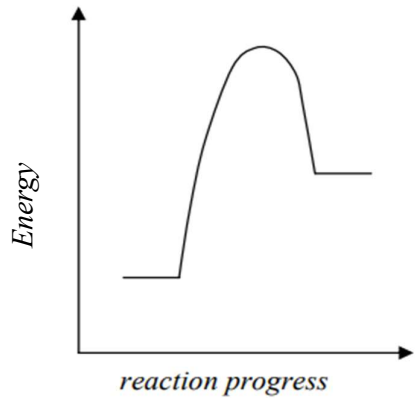
A _____ is an organism that is capable of making its own food store, while a _____ must rely on getting food from the environment.

Q6. Sucrose has **[1]**

i) α- 1,2 glycosidic bond ii) β- 1, 2 glycosidic bond

iii) α- 1, 4 glycosidic bond iv) β- 1,4 glycosidic bond

Q7. Below is the energy diagram for the reaction C+D → A+B. **[2]**



a) On the energy diagram above, label the following:

i) E_a ($\Delta G‡$) ii) ΔG iii) A+B iv) C+D

b) Based on the diagram above,

i) $\Delta G > 0$ ii) $\Delta G = 0$ iii) $\Delta G < 0$

Q8) For the first pair of amino acids listed below, draw the two amino acids with the side chains interacting and list the strongest type of interaction that can occur between the side chain groups. For the remaining pairs, simply list the strongest type of interaction that occurs between the side chain groups. Choose from covalent bonds, hydrogen bonds, ionic bonds, or van der Waals interactions. **[4]**

i) tyrosine, serine

ii) cysteine, cysteine-

iii) Leucine, Isoleucine-

iv) Glutamic acid, Lysine-

Q9. Which of the following enzyme complex is part of both citric acid cycle and electron transport chain? **[1]**

i)Succinate dehydrogenase ii) Malate dehydrogenase
iii)Citrate synthase iv) α- Ketoglutarate dehydrogenase

Q10. Where does TCA cycle take place in- **[1]**

i) Mitochondrial matrix ii) Outer mitochondrial membrane
iii) Cytosol iv) Plasma membrane

Q11. Which step is the isomerisation step in TCA cycle. Name the isomers. **[2]**

Q12. In the citric acid cycle operating under aerobic conditions, which one of the following is not directly involved? **[1]**

i) NAD+
ii) FAD+
iii) Molecular Oxygen
iv) Succinate