A separate response sheet is provided in which you have to fill in the boxes with final answers to the questions. All questions carry 1 mark, except for Q9, which carries 2 marks.

1. Draw the ring form of β-D-glucose. The linear form of glucose is shown in the end for your reference.

2. Trehalose is Glc(α1 ↔ 1α)Glc. Will this disaccharide produce brown-red precipitate with Fehling' reagent?

3. Consider the following compound

$$CH_2COO^- \leftarrow pK_a=3.9$$
$$\overset{+}{H_3N}-\overset{|}{\underset{|}{C}}-COO^-$$
pK_a=8.8   H   pK_a=2.1
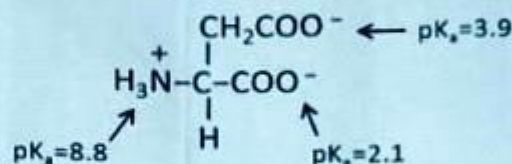
If this compound were to be present in the blood, what will be the net charge on the majority of the molecules?

4. For the amino acid tyrosine, the pKa of the –carboxylic, -amino and R groups are 2.2, 9.1 and 10.07 respectively. What will be the pI of this aminoacid?

5. Organisms such as E. coli that harvest energy from breakdown of organic molecules and cannot fix CO_2 into biomolecules are called _____. (Fill the blank)

6. If one were to hold the breath for prolong period of time, the pH of the blood will tend to _____. Fill the blank.

7. Phosphoric acid anhydride bond is associated with which one of the following biomolecules
   a) Sucrose
   b) Adenosine monophosphate
   c) Adenosine triphosphate
   d) Glucose-6-phosphate

8. What are the concentrations of acetic acid and acetate ions in a 0.2 molar acetate buffer, maintained at pH 5.0. (pKa for acetic acid is 4.77)

9. The energy available through conversion of PEP to Pyruvate is utilized to generate ATP by coupling the two reactions as follows. The standard free energy changes are indicated.

PEP $\longrightarrow$ Pyruvate + Pi   -62 KJ/mole
ADP + Pi $\longrightarrow$ ATP   +32 KJ/mole
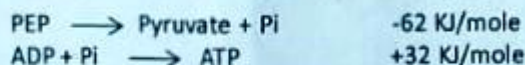
What is the standard equilibrium constant (K'_{eq}) for the reaction ADP + PEP $=$ Pyruvate + ATP

Glucose