※ 考生請注意：本試題 □可 ☑不可 使用計算機

Short Answer

Answer the following questions in three sentences or less. Please answer all questions in complete sentences on your answer sheet. (4 points each)

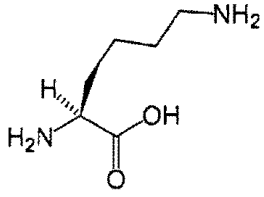
1 Part of homeostasis involves maintaining an internal pH balance. What dissolved compound helps maintain this pH balance? How does the compound work.

2. How is a solution and a suspension different?

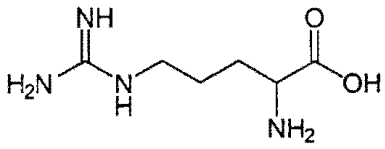
3. What are the two most important functions for lipids?

4. Provide the answers for the following protein purification:
   (A) A method for estimating the molecular weight of protein subunits
   (B) A method for separation of proteins based on their size
   (C) A method for separation of enzymes based on their biological activity
   (D) Method for separation of proteins by charge

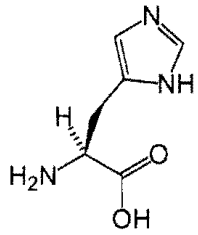
5. Write down the names of these four amino acids:



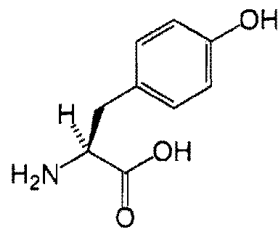
(A)



(B)



(C)



(D)

6. Electron transfer reaction through the mitochondrial inner membrane is concomitant with proton translocation. Which molecules are the initial electron donor and accepter in this electron transfer reaction?

7 Name factors that influence the rate of enzyme action.

8. What is the function of Salvage reactions?

(背面仍有題目,請繼續作答)

※ 考生請注意：本試題 □可 ☑不可 使用計算機

9. What are the four types of organic macromolecules?

10. What are isoenzymes?

11 The following mRNA sequence codes for a peptide of how many amino acids?
5'UUUGAUUAAAUGGGGGUA3'

12. Bacteria can both fix and assimilate nitrogen, plants can only assimilate nitrogen, and animals can do neither. What is the main purpose of nitrogen fixation and assimilation.

13. Explain why degradation of triacylglycerols in humans can be used to generate glucose via the gluconeogenic pathway even though fatty acid degradation does not result in net glucose production.

Essay

Answer the following questions in five sentences or more on a separate sheet of paper Be concise but also be thorough. (8 points each)

1 The pKa for acetic acid is 4.8. You make up a solution by dissolving 0.15g of sodium acetate in distilled water. You adjust the pH of the solution to 5.8 and the total volume of the solution is 0.1L. The molecular weight of CH_3COONa is 82.22 g/mol

(A) Calculate the ratio CH_3COO^-/CH_3COOH in the final solution (5%)

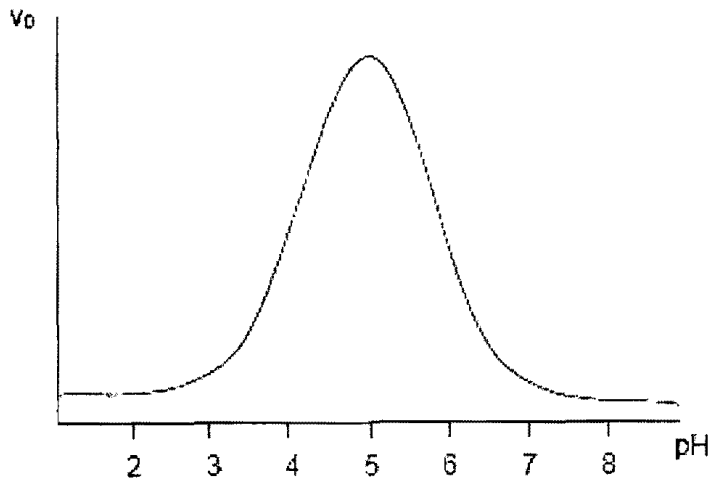
(B) Will the pH of this solution have a greater resistance to change by the addition of H^+ or a greater resistance to change by addition of OH^-? Why? (3%)

2. The number of ATP per glucose generated aerobically in muscle cells is 30 ATP, and the number of ATP per glucose generated anaerobically is just 2 ATP. Why is the number of ATP generated under these two conditions so different?

※ 考生請注意：本試題 □可 ☑不可 使用計算機

3. A peptide was found to have a molecular mass of about 650 and upon hydrolysis produced Ala, Cys, Lys, Phe, and Val in a 1:1:1:1:1 ratio. The peptide upon treatment with Sanger's reagent produced DNP-Cys and exposure to carboxypeptidase produced valine. Chymotrypsin treatment of the peptide produced a dipeptide that contained sulfur and has a UV absorbance, and a tripeptide. Exposure of the peptide to trypsin produced a dipeptide and a tripeptide. Deduce the sequence of the peptide.

4. The initial rates of an enzyme-catalyzed reaction change with pH according to the following profile. Given that the mechanism involves a general acid and a general base, what two amino acids might perform these functions? Briefly explain your reasoning.



5. Briefly describe RNA interference, noting specifically the characteristics of the relevant molecules involved in the process, and how this is now being used to study gene function.

6. What is an operon and how is this more efficient for transcriptional control than the circumstance in its absence?