1. (a) Define the following as related to stereochemistry.

(i) Chirality.
(ii) Enantiomers.
(iii) Polarized light.
(iv) Meso-compound. [4 marks]

(b) There are three possibilities for the arrangement of the four hydrogens of methane. Explain why the observed arrangement is tetrahedron. [2 marks]

(c) Explain why chiral molecules interact with polarized light. [1 mark]

(d) Draw the E and Z geometrical structures of 3-Methyl-2-hexene. [3 marks]

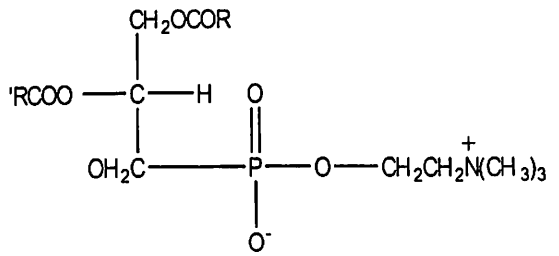
(Total = 10 Marks)

2. (a) List four biological molecules classified as lipids. [2 marks]

(b) Explain the chemical and physical characteristics of the biological molecules that identifies them as lipids. [3 marks]

(c) (i) Briefly explain vulcanization. [2 marks]
(ii) Draw the base structure of steroid molecules including correct ring labeling and carbon numbering. [3 marks]

(d) Below is the base structure of a class of lipid molecules.



R = Saturated
R' = Unsaturated

(i) Give the generic name of the related compounds. [1 mark]
(ii) What type or class of lipids do these come under. [1 mark]
(iii) Relating to their chemical nature, explain their use in food industries. [3 marks]

(Total = 15 Marks)

3. (a) (i) Define proteins. [1 mark]
(ii) Explain the structural feature which is common in all amino

acids as well as the differences. [2 marks]

(iii) What is isoelectric point as related to proteins and amino acids? [2 marks]

(iv) How is glycine different from the rest of the other amino acids? [2 marks]

(b) Show the reaction equation for the synthesis of amino acids from Potassium phthalimide. [4 marks]

(c) Briefly explain how an unknown amino acid can be identified from the technique of paper electrophoresis. [2 marks]

(d) From an electronic print out of an automated amino acid analyzer,

(i) What are the significance of the peak positions?

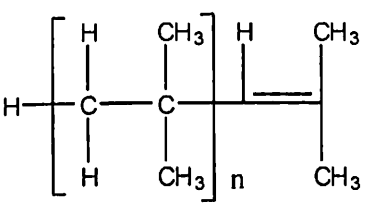
(ii) What does the area under each peak represent? [2 marks]

(Total = 15 Marks)

4. (a) Based on reaction mechanism, polymers are classified into chain growth polymers and step growth polymers. Give brief explanation of these two types of reactions. [2 marks]

(b) With supporting chemicals equations, explain the two types of reactions that take place to terminate polymerization reactions. [4 marks]

(c) Given below is a structure of a polymer product.



(i) Name the polymer. [1 mark]

(ii) Name the specific type of polymerization reaction that give rise to the polymer. [1 mark]

(iii) Explain the chemistry behind this type of polymerization reaction. [2 marks]

(Total = 10 Marks)