M.Sc Chem Sem II

Paper EC-I (Physical Organic Chemistry)

Full Marks: 70 Time: Two Hours

Model Questions

Answer any two questions from each group.

Group A

Q.1 What do you mean by Thermodynamic and Kinetic Control of a reaction? Give one example to illustrate. 10

Q.2 Derive Winstein –Holness equation. 10

Q.3 Write short notes on

i) Hammond's principle ii) Types of organic reactions 10

Q.4 What is the physical significance of substituent constant and reaction constant in Hammett equation? 10

Q.5 How Hammett equation is one example of linear free energy relation ? Explain. 10

Q.6 What do you mean by the term kinetic and thermodynamic requirement of a reaction? 10

Group B

Q.7 a)What do you mean by the term- isotope effect?

b) Discuss the types of isotope effect.

c) Give the origin of Primary and secondary isotope effect. 4+6+15

Q.8 a) Discuss various methods of determining mechanism of an organic reaction. Nature of products, kinetic data, use of isotopes, study of intermediates and stereochemical aspect may be considered. 25

Q.9 a)Derive Taft equation.

b) Write Hammett equation and illustrate its application. 15+10

Q.10 Apply HMO theory to allyl system and obtain energy expression for π –orbitals, π -bond energy and delocalization energy. Calculate electron

densities, bond order and free valence of the allyl system(radical, cation and anion).

25

Q.11 Apply HMO theory to butadiene and obtain energy expression for π –orbitals, π -bond energy and delocalization energy. Calculate electron densities, bond order and free valence of the system.

25

Q.12 Discuss two cases of deviation from linearity of Hammett equation. Why they are more useful.?

25