Mid-West University

Examinations Management Office

End Semester Examination 208[illegible]

Bachelor level/ B. Sc. /5th Semester — Full Marks: 60

Time: 3 hours — Pass Marks:30

Subject: Advanced Chemistry-I (CHE451)

Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks. Use separate answer sheet for Inorganic, Organic and Physical parts.

Inorganic Chemistry

Group-A

Long answer questions (attempt *any two*). **[2x5 = 10]**

1. Classify the hydrides. Write the properties of interstitial hydrides.
2. Describe the molecular orbital treatment for xenon difluoride with diagram.
3. Explain the preparation and properties of pseudohalogens.

Group-B

Short answer questions (attempt *any five*). **[5x2 = 10]**

4. Mention the isotopes of hydrogen. Write the application of heavy hydrogen.
5. Differentiate between electrovalent hydride and covalent hydride in terms of electronegativity values.
6. Write any two properties of xenon tetrafluoride.
7. Draw the two possible structures of xenon hexafluoride.
8. Why is boric acid considered as monobasic acid?
9. Write in short about 3C-2e bond formed by diborane.

Organic Chemistry

Group-A

Long answer questions (attempt *any two*) **[2x5 = 10]**

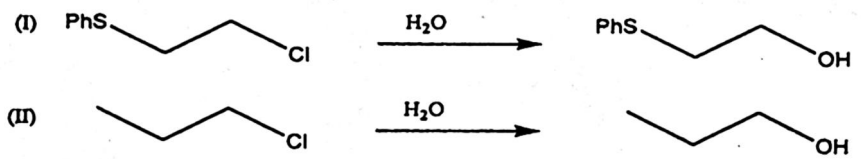
1. What do you mean by reaction mechanism? Enlist four methods of determining reaction mechanism. Explain any one method.
2. Write the generation, stability and fate of **carbenes** or **free radicals**.
3. Write short notes on:
   a) Principle of microscopic reversibility
   b) Baldwin's rules of ring closure

Group-B

Short answer questions (attempt *any five*) **[5x2 = 10]**

4. Write the possible products of addition of HBr in $H_2C{=}CH{-}CH{=}CH_2$. Label the kinetically controlled product and the thermodynamically controlled product.
5. Compare the stability of the possible carbocations formed by addition of H^+ to Propene.

6. Express these statements in chemical equations:
   a) Skeletal rearrangement in '**acyl nitrenes**' give alkyl '**isocyanates**'.
   b) *n*-butyl carbocation gives *sec*-butyl carbocation by hydride shift.
7. Differentiate between classical carbocations and non-classical carbocations.
8. Distinguish the aromatic and anti-aromatic species from these:
   Cyclopentadienyl anion, cycloheptatrienyl anion, Cyclobutadiene, Toluene.
9. One of the below reactions undergoes hydrolysis 600 times faster than the other. Identify that reaction and give the reason.



Physical Chemistry

Group-A

Long answer questions (attempt *any two*) **[2x5 = 10]**

1. Define activity coefficient. Explain Debye-Huckel's theory of activity coefficient.
2. Define collides. Classify colloids with examples. Explain the kinetic, optical, and electrical properties of colloids.
3. Illustrate the principle and working mechanism of concentration cell with and without transference.

Group-B

Short answer questions (attempt *any five*) **[5x2 = 10]**

4. What is Hydrogen overvoltage? Explain.
5. Write the relation between EMF and free energy change in an electrochemical cell.
6. What is the BET equation? Write its significance.
7. Why Frendlich's adsorption isotherm is better to explain multi-layer adsorption?
8. State Hardy-Schulze law.
9. Write any two methods for protection of colloidal solution.

The End