

SECOND SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, APRIL 2022

(CBCSS)

Chemistry

CHE 2C 07—REACTION MECHANISM IN ORGANIC CHEMISTRY

(2019 Admission onwards)

Maximum : 30 Weightage

Time : Three Hours

General Instructions

1. In cases where choices are provided, students can attend **all** questions in each section.
2. The minimum number of questions to be attended from the Section / Part shall remain the same.
3. The instruction if any, to attend a minimum number of questions from each sub section / sub part / sub division may be ignored.
4. There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.

Section A*Answer any **eight** questions.**Each question carries a weightage of 1.*

1. What is neighboring group participation in nucleophilic substitution ? How does it affect the stereochemical outcome of the reaction ?
2. Explain the effect of reaction medium on S_N1 and S_N2 reactions ?
3. The reaction of alkenes with singlet carbenes is stereospecific. Explain.
4. Indicate the mechanism and its evidence for $B_{AC}2$ ester hydrolysis.
5. Predict the cyclic product obtained from 2Z, 4E-hexadiene on photochemical conditions. Specify the stereochemistry.
6. Illustrate photo-Fries rearrangement with a suitable example.
7. Show that Cope rearrangement is a [3, 3] sigmatropic shift.
8. What is Barton reaction ? Give one example.

Turn over

9. Write a short note on oxa di-*pi*-methane rearrangement.
10. Write a brief note on Emde degradation.

Section B

Answer any **six** questions.

Each question carries a weightage of 2.

11. Explain the addition-elimination mechanism of aromatic nucleophilic substitution with appropriate examples.
12. Define the terms *ipso* substitution and *cine* substitution. Indicate the mechanism with appropriate examples.
13. Substitution and elimination reactions are competing reactions. Explain. What are the factors deciding the outcome?
14. Which are the important factors contributing to the stability of carbocations? Why are *tert*-butyl cations even more stable than benzyl type cations?
15. In the following reaction, when racemic substrate is heated only one of the diastereomeric products is formed.



What class of pericyclic reaction is involved in the transformation? Explain the stereochemical course of the reaction and antarafacial.

16. Explain any *two* photochemical reactions involving olefinic double bonds.
17. What information is deduced by Hofmann degradation of alkaloids? Illustrate with an example.
18. Outline the conversion of cholesterol into testosterone.

Section C

Answer any two questions.

Each question carries a weightage of 5.

19. With appropriate examples, discuss the mechanistic and stereochemical aspects of SN1, SN2 and SN2' reactions.
20. Write a detailed note on synthetically useful base catalysed condensation reactions of carbonyl compounds.
21. Using correlation diagram derive Woodward-Hoffmann rules for the electrocycilsation of a linear conjugated 4-electron π -system under thermal conditions.
22. Outline the total synthesis of cephalosporin.

(2 × 5 = 10 weightage)