

## THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2018

(CUCSS—PG)

Chemistry

CH 3C 11—REAGENTS AND TRANSFORMATIONS IN ORGANIC CHEMISTRY

(2015 Syllabus Year)

Time : Three Hours

Maximum : 36 Weightage

## Section A

*Answer all questions.**Each question carries 1 weightage.*

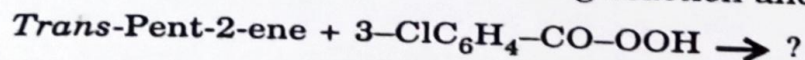
1. Suggest an oxidation reaction by which cyclohexene may be converted to a *cis*-cyclohexan-1, 2- diol. Write the mechanism.
2. How can  $\text{Ph-C} \equiv \text{C-Me}$  be reduced stereoselectively to *cis*- $\text{Ph-CH} = \text{CH-Me}$  ?
3. How do the reactivities of  $\text{LiAlH}_4$  and  $\text{LiBH}_4$  differ ? Write typical examples.
4. Suggest a method to synthesise  $\text{Me}_3\text{C-O-CO-NH-CH}_2\text{-COOEt}$  from ethyl glycinate.
5. Which reagents and conditions are available for deprotecting the fully protected ?  
 $\text{Me}_3\text{C-O-CO-NH-CH}_2\text{-CO-O-CH}_2\text{-C}_6\text{H}_5$  to glycine ?
6. Explain the terms thermosets and thermoplastics. Write examples.
7. Write an example of an aziridine synthesis from alkenes.
8. Write the structure of nucleic acid bases adenine, guanine, thymine and cytosine.
9. Discuss the aromatic electrophilic substitution reactivity of thiophene.
10. Which product would result from 4, 4-dimethylcyclohexa-2, 5-dieneone if it is treated with an acid? What is the mechanism ?
11. The isomeric  $\alpha$ -chloroketones  $\text{PhCHCl-CO-Me}$  and  $\text{PhCH}_2\text{-CO-CH}_2\text{Cl}$  both give the same carboxylic acid upon reaction with aq. hydroxide ion. Which is this product and how does it form.
12. Illustrate the Woodward method of alkene hydroxylations.

(12 × 1 = 12 weightage)

## Section B

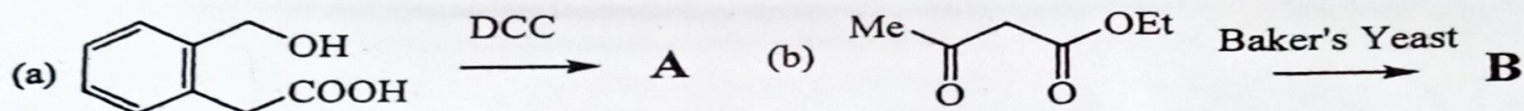
*Answer any eight questions.**Each question carries 2 weightage.*

13. Identify the product(s) in the following reaction and explain the formation.



Turn over

14. What is Dess-Martin periodinane? Exemplify its use as an oxidant. What is the mechanism of its reaction?
15. Describe two methods, NOT involving hydrogen, by which acetophenone can be reduced to an alcohol. Write equations, reagents and mechanisms.
16. Suggest a reductive method for converting an oxo group  $>C=O$  to a methylene  $-CH_2-$  group.
17. Identify the Products A and B in the following synthetic transformations. Explain your answer:



18. What are the characteristics required for the cations and anions so that ionic liquids would form from these. Cite examples. What are the advantages of ionic liquids as a reaction medium?
19. (a) Identify the product that can be obtained from Gilman reagent by its reaction with  
 (i)  $H_2C=C(Me)-CO-Me$ ; and (ii)  $n-BuBr$  respectively.  
 (b) What is Lindlar's catalyst? Which product would arise from  $Ph-C=C-Me$  upon its reaction with  $H_2$  in presence of Lindlar's catalyst?
20. Describe the industrial process by which rayon is manufactured from cellulose.
21. Define copolymers and explain how can these be synthesized.
22. Describe a method by which the amino acid sequence of a polypeptide can be determined by sequencing.
23. Write a method each for the synthesis indole and quinoline ring systems.
24. Explain the mechanism and use of Suzuki coupling.

(8 × 2 = 16 weightage)

### Section C

*Answer any two questions.  
 Each question carries 4 weightage.*

25. Which are the catalysts used in: (a) Jacobsen; and (b) Sharpless epoxidation? Using typical examples, discuss the stereochemical outcome and enantioselectivity of these two epoxidations.
26. Describe reagents, mechanism and synthetic uses of: (a) McMurray coupling; and (b) Birch reduction.
27. Describe Hantzsch pyrrole, thiazole and pyridine synthesis.
28. Illustrate the use of Heck and Stille coupling in C-C bond formations.

(2 × 4 = 8 weightage)