



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 3rd Semester Examination, 2020, held in 2021



CEMACOR07T-CHEMISTRY (CC7)

ORGANIC CHEMISTRY-III

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

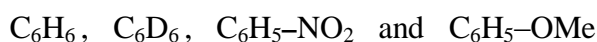
Answer any four questions taking one from each unit

UNIT-I

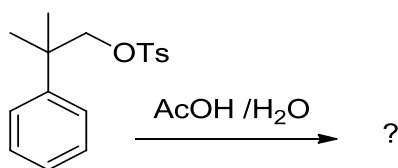
1. (a) State whether the formation of $\text{Me}_3\text{CCH}(\text{OH})\text{Me}$ by acid catalyzed hydration of $\text{Me}_3\text{CCH}=\text{CH}_2$ is possible or not. If not, then how this transformation could be achieved? 3
- (b) Three isomeric alkenes A, B and C with molecular formula C_5H_{10} on hydrogenation produce 2-methylbutane. A and B give the same tertiary alcohol on oxymercuration-demercuration. B and C give different primary alcohols on hydroboration-oxidation. Logically deduce structures of A, B and C. 3
- (c) Carry out the following conversions: 2+2
 - (i) 2-butyne to (Z)-2,3-dideutero-2-butene
 - (ii) 4, 4-dimethyl-2-pentene to 4, 4-dimethyl-1-pentene.
2. (a) Singlet carbene adds to *cis*-2-butene in a stereospecific manner whereas triplet carbene does not — Explain. 3
- (b) Identify the product(s) formed when 1-octene is reacted with NBS/ CCl_4 . Predict the relative yields with proper justification. 2
- (c) What happens when 1, 3-butadiene is treated with HBr at -80°C and at 40°C separately? Predict the product composition in each case and offer proper explanation in support of your answer. 3
- (d) Give a simple reaction to distinguish 1-butyne from 2-butyne. 1
- (e) Write structural formula for the compound which yields pentane-1,5-dial on reductive ozonolysis. 1

UNIT-II

3. (a) Pivaloyl chloride (Me_3CCOCl) reacts with benzene in presence of anhydrous AlCl_3 to give mainly tert-butylbenzene whereas anisole under same reaction condition gives mainly *p*-methoxypivalophenone — Explain. 2
- (b) Predict the favoured position of aromatic electrophilic substitution of the following compounds and justify your answer in each case: 2
- (i) $\text{Ph}-\text{CH}=\text{CH}-\text{CO}_2\text{H}$ (ii) $\text{Ph}-\text{CO}_2\text{H}$
- (c) Compare reactivity of PhNHCOCH_3 , aniline and benzene toward bromination reaction with proper justification. What is the major monosubstituted product formed during bromination of PhNHCOCH_3 ? 2
4. (a) Compare the reactivity of the following compounds towards nitration reaction using a mixture of concentrated HNO_3 and H_2SO_4 : 2



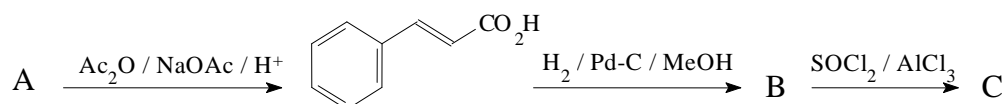
- (b) Predict the product giving proper mechanism. 2



- (c) Account for the following observation: 2
The amination of both *O*-chloroanisole and *m*-chloroanisole yields only *m*-anisidine.

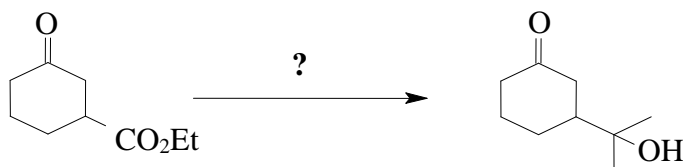
UNIT-III

5. (a) *p*-*N,N*-dimethyl aminobenzaldehyde or *p*-nitrobenzaldehyde separately on treatment with KCN/EtOH fails to give benzoin condensation reaction but a mixture of these two readily responds to the reaction. Explain the observation mechanistically. 4
- (b) Give structural formula and name of the product of the reaction between benzaldehyde and semicarbazide. Comment on the nucleophilic site(s) in the semicarbazide molecule. 2
- (c) Write down all the possible products from a mixed Claisen condensation with $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_3$ and $\text{PhCH}_2\text{COOCH}_3$. 2
- (d) In the following reaction sequence, identify A, B and C. Suggest suitable mechanism for the conversion from B to C. 3



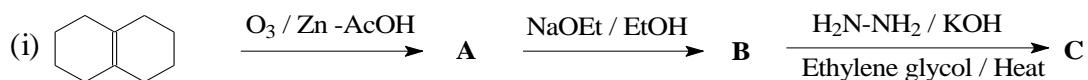
- (e) α, β -unsaturated acid, $\text{RCH}_2\text{CH}=\text{CHCO}_2\text{H}$ decarboxylates readily on heating but $\text{R}_3\text{CCH}=\text{CHCO}_2\text{H}$ does not. — Why? 2

- (f) Carry out the following conversion applying protection / deprotection technique. 2

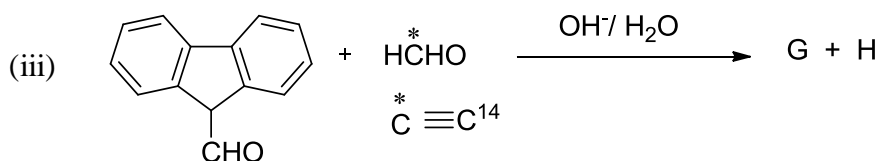


- (g) Optically active $\text{PhCOCH}(\text{Et})\text{Me}$ is racemised on base treatment but $\text{PhCOCH}_2\text{CH}(\text{Et})\text{Me}$ does not — Explain. 3

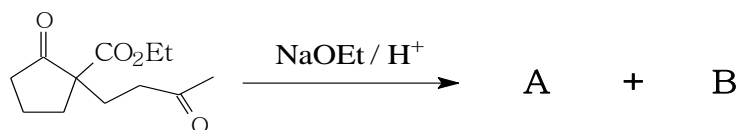
6. (a) Identify the products the following reaction. 3+3+2



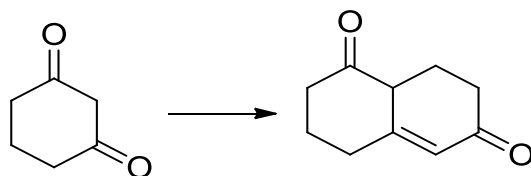
(ii)



- (b) When the following compound is treated with NaOEt/EtOH , two isomeric compounds (A) and (B) are obtained. Give suitable mechanism for the formation of the products. 3

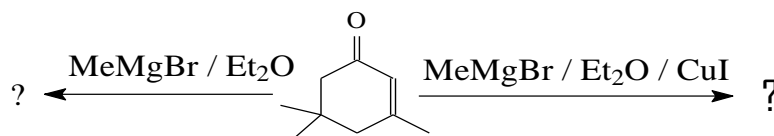


- (c) Synthesis of 2,2,5,5-Tetramethylhex-3-ene cannot be accomplished by Wittig reaction — Explain. 2
- (d) Semicarbazide hydrochloride alone does not react with a ketone to give semicarbazone but when mixed with sodium acetate — it does — Why? Which nitrogen is involved in the reaction and why? 3
- (e) Convert: 2

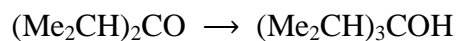


UNIT-IV

7. (a) Give the products with proper explanations: 2



- (b) Carry out the following conversion involving organometallic reagents: 2



- (c) Why Zn is a specific reagent for Reformatsky reaction? 2

8. (a) Convert the following using organometallic reagents: 2



- (b) What happens when PhCH_2MgBr is treated with HCHO followed by acidification? 2

- (c) How can you prepare the acid $\text{R}_3\text{C}-\text{CO}_2\text{H}$ from R_3COH ? 2

N.B. : Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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